

AM Stereo Decision Up In Air

Las Vegas, NV ... The FCC's recent decision to approve the Magnavox AM stereo system was met with unexpected and heavy criticism from broadcasters at the NAB show. Up until the first workshop which concerned itself with the topic, the feelings expressed by those involved was one of disbelief that Magnavox, never considered by most to be one of the stronger proponents, got the nod from the FCC's Office of Science and Technology. This feeling erupted to the surface rather dramatically during the AM Stereo Implementation Workshop held on Monday, April 14th.

Workshop discussion

The workshop was moderated by Chris Payne of the NAB, and the panel consisted of Bob Streeter from Magnavox, Wilson LaFollette from the FCC, Robert Reymont from WGAR (one

Many Broadcasters React Unfavorably to FCC Decision for Magnavox

Commissioners May Reconsider

of the stations which had tested the Magnavox system previously). The session opened with brief statements from Payne and LaFollette followed by an in-depth review of the Magnavox system given by Bob Streeter. Throughout, there was hardly a murmur from the audience which filled the room. Things began to open up with Reymont's discussion of his experiences in testing the Magnavox system at WGAR.

As most people at the session seemed to realize, WGAR experienced significant difficulties in testing the Magnavox

system. This had to do with "clicks and pops" coming from the stereo receiver whenever the WGAR transmitter exceeded 95% modulation. Reymont did not try to minimize this problem, and described at some length how he tried to stop his 50KW transmitters from exceeding 95% modulation, so as to eliminate the problem. All he ended out doing, though, was burning up the various protective devices he tried to use! Both Payne and Streeter then commented that the "click and pop" problem was mainly a receiver problem which could

be "designed" away. As for full modulation of the transmitters, the comment seemed to be that most transmitters could be appropriately modified.

At this time, the workshop was opened for questions, and it was immediately apparent that the audience didn't like what they had been hearing. One after another, representatives of Meredith Broadcasting, KUIP, KHHO, KKUA, and others got up to question the performance of the Magnavox system. When Leonard Kahn got up, the audience cheered, but the discussion began to get out of hand. With time rapidly running out, Chris Payne ended the session with everyone milling around afterwards to see what would happen next.

Meeting with Commissioners

The following morning, during a radio workshop entitled "The FCC's Crystal Ball," the AM stereo decision was brought up again. This time the panel was moderated by Vincent Wasilewski, President of the NAB, and the panel consisted of four of the FCC Commissioners, Brown, Lee, Quello and Fogarty. After reviewing a variety of topics, someone from the audience brought up the AM stereo decision. With actually little prodding, two of the Commissioners (Quello and Lee), said they would change
(continued on page 6)

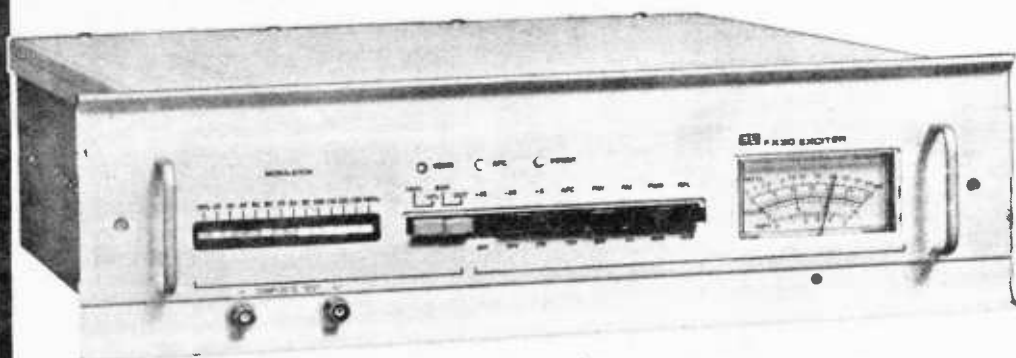
AVISO IMPORTANTE:

CON NUESTRA EDICIÓN DE JUNIO INICIAREMOS UNA SECCIÓN EN ESPAÑOL.

INSIDE BEE

Optimod Modifications **2**
Modulation Analysis **3**
Reader's Forum **4**
The Audio Process **5**
Kahn Interview **6**
April FCC Developments **9**
Free on VTR's **11**
Action-gram **15**
"The Exchange" **14, 16-22**

Allied Number 1 In Broadcast Equipment



BE *New*
**Model FX-30
Exciter**

Whether it is used in one of the new Broadcast Electronics FM transmitters, or as a replacement for an existing exciter, the FX-30 is the new performance leader in FM broadcasting. The entire chassis is mounted on slides, so when the unit is pulled out from the rack or transmitter, all sub-assemblies are easily accessible while the unit continues to operate.

- * Superior performance rivals the best hi-fidelity tuners
- * Composite inputs compatible with all stereo and SCA generators

- * Extremely low distortion - THD and IMD less than 0.08%
- * First exciter to specify transient intermodulation distortion (TIM) at less than 0.1%
- * Quiet operation - typical S/N ratio of 78 dB
- * Completely broadband - requires no tuning adjustments
- * Extensive metering, including built-in modulation indicator
- * Elegant styling

\$4493.00

**Allied
Broadcast
Equipment**

635 SOUTH E STREET - P.O. BOX 786 - RICHMOND, INDIANA 47374
Ordering Call 800-428-6954 In Indiana Call 800-382-6907
INFORMATION CALL 317-962-8596 CHICAGO SALES 312-784-2257
Washington State 800-562-0062 Western States 800-426-4254

Modifications On The Optimod-FM

By Robert Orban/Orban Assoc.

Part I of II parts.

San Francisco, CA ... It seems that there are a large number of suggested modifications for the 8000A floating around the industry. Let's try to clarify which modifications are legitimate, and which will simply result in a degraded 8000A.

In general the "good" modifications either update the unit with IC's which were unavailable or unproven when the 8000A was designed, or else change the loudness/brightness/distortion tradeoff designed into the 8000A to make it more suitable for a given format or special situation.

The "bad" modifications usually result from ignorance or naivete. They are often IC replacements which either

make no audible improvement or actually degrade certain aspects of the unit's performance (noise, or stability of 38kHz suppression, for example). Other modifications may result in the 8000A's performing poorly in high RF environments, or in other problems which were not immediately apparent to the engineer who first developed the modifications.

IMPORTANT

If any modifications are made, it is particularly important to follow workmanship standards described on p. V-4 of one's operating manual ("Replacement of Components on Printed Circuit Boards"). Recommended modifications will not necessarily void one's warranty. However, Orban Associates Inc. reserves the right to not

honor the warranty on modified units which, in its judgement, have been compromised due to poor standards of workmanship or other abuse.

IC Replacements

Recently, an almost hysterical concern has been expressed over "transient intermodulation distortion," distortion caused by the signal's being subject to slope overload or "slewrate limiting."

The 8000A, even in its earliest version, never subjected the signal to actual slewrate limiting anywhere in the circuitry. However, at certain points in the circuitry, the signal came close enough to the slewrate limit point to possibly induce "sub-slewing" TIM.

Before doing any modifications, it is useful to see if a signal degradation is due to audibly perceived TIM, or simply due to the high frequency limiting and clipping required to accommodate the signal to the 75us preemphasis while retaining competitive loudness. The latter is far more likely to be what one is actually hearing.

The best way to test this is to remove the 8000A from service and place it in the production studio or another environment which has a good monitor system and which permits accurate A/B comparisons between the processor's input and its output. Connect the TEST jacks on the rear panel of the 8000A to the monitor switching system through a pair of accurate 75us deemphasis networks. Play demanding music through the 8000A, and adjust the audio drive level into the unit about 2dB below the level where gain reduction is first exhibited on the meter. Put the 8000A in PROOF mode, thus defeating all hf limiting and clipping. CAREFULLY match monitoring levels between the console output and the 8000A output. (If levels are unbalanced by only a few tenths of a dB, this can introduce an apparent quality change.) What one is hearing when one switches to the deemphasized 8000A output is now *only* the effects of any TIM or other distortion in the circuitry; one's ear is not being fooled by processing effects or level imbalances. If there seems to be a significant degradation in TEST

mode, then proceed with the chip changes. Otherwise, leave well enough alone!

To avoid any possibility of sub-slewing TIM, later production units of the 8000A were fitted with faster chips which had been introduced since the original 8000A design, and which had proven to be reliable. These chips may be field-retrofitted into the audio processing part of the 8000A *only* (up to the "Audio Test Jacks"). Retrofitting the stereo generator demands that it be realigned. Most stations don't have the time, experience, or proper test equipment to do this right.

IMPORTANT

Replacing *any* chip after the 30Hz highpass filter (IC203, 204) requires that the 38KHz suppression be measured on one's calibrated stereo monitor, and that the "touchup alignment" procedure on p. A-1 of one's operating manual be performed if suppression is less than -45dB.

4558's: All 4558 dual opamps may be replaced with Texas Instruments TL072's or National LF353's. The Signetics NE5530 is *not recommended* because it has a class-B input stage.

1556's: Very early units used 1556 single opamps in a number of sockets. These may be replaced (in the audio processing section *only*) with Texas Instruments TL071's or National LF353's. The Signetics NE530 is *not recommended*. (NOTE: Middle-period 8000A's used RCA CA3140's in these sockets. These are fully adequate, and no benefit would result from their replacement.)

709's: The 709 single opamps should *not* be replaced. They were chosen for low noise. In their specific circuit configuration, they do not suffer from slewrate limiting, crossover distortion, or other problems sometimes attributed to them.

301A's: The 301A's are compensated for a slewrate of 5 v/us. This is fully adequate; these chips should *not* be replaced.

(continued on page 11)


Trident Audio Developments Limited
cordially invite you to view their
FLEXIMIX
at

your own premises

*on
any date and time to suit you*

*and put it through its paces
on your own work*

RSVP
by calling EMPIRICAL AUDIO
at 914-762-3089.



See for yourself...

... how Trident's Fleximix can grow from a small desk today to a big desk tomorrow.

Versatile and reliable, with 'big board' professional facilities, yet so compact.

But don't just take our word for it. Invite us along to your place and put the Fleximix through its paces on your own current project.

We guarantee you won't be disappointed. Just call EMPIRICAL AUDIO — TODAY.

Also available from: **Western U.S.** Studio Maintenance Services, California. Tel: 213-877-3311
Southeastern U.S. Wilson Audio Sales, Nashville. Tel: 615-794-0155.

Circle 107 on Action-gram.

When Your Turntable System Deserves The Finest: EP2-C

The EP2-C, designed for the broadcast industry, is a two channel RIAA equalized phono preamp with active balanced outputs. Circuitry is based on the Signetics NE5534 op amp and constructed of top quality American made components.



Phase Audio

For Information Call: 151 N. Angelus
Memphis, TN. 38104

(901) 726-1900

Circle 103 on Action-gram.

Modulation Analysis . . .

by Pamela W. Peterson

New York, NY . . . Many program directors and chief engineers find themselves, at some point in their respective careers, crouched over a console eyeing each other with barely concealed distaste, while the C.E. points at the modulation monitor and the P.D. gestures at the control room speakers. Both agree that some audio processing is necessary; they differ as to how much and what kind. The program director is yelling about "the station's sound"; the C.E. is trying to explain "100% negative modulation peaks."

Modulation Analysis

Modulation Analysis provides a common ground on which the two can meet. Briefly, Modulation Analysis provides a computerized analysis of a station's sound taken off the air. Not only can one see graphically what one's modulation characteristics look like, one can see what the competition's modulation characteristics look like. The information a Modulation Analysis delivers is exactly the kind of information which is not delivered by a proof of performance: how one's station's audio chain performs with the limiters, compressors, and audio processors in and working.

"How can this be," one asks skeptically, "since the instantaneous characteristics of the audio chain depend on the instan-

This work was done by Eric Small & Associates, New York.

taneous characteristics of the music: loud, soft, high-pitched, bassy, etcetera?" (Very perceptive of you to ask.) Modulation analysis works through a period of time (says one record), showing the distribution of percentages of modulation.

Incidentally, since the analyzer looks at either composite baseband for FM or audio for AM and discs, one can play the same piece of music directly from the disc into it and see the difference between a

processed off the air signal and the unprocessed audio of the disc.

Modulation Analysis Tests

Let's look at some actual graphs. Figure 1 is a moderately processed rocker. RMS MODULATION provides a figure of "average" modulation for comparison with other stations, while INDEX OF PROCESSING is a number that decreases with increasing compression and

limiting. Figure 2 is of a disc played directly into the analyzer; compare the modulation and processing to that of Figure 1! For an even greater contrast check out Figure 3. This is another rocker, but here we have higher modulation and a lot more processing. The station also appears to be baseband clipping—note the very step drop at about 90% modulation.

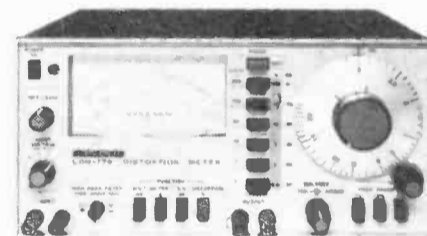
(continued on page 12)

Super LEADER Package PROOF-OF-PERFORMANCE at Unheard of Prices!

LEADER LAG-125 LOW DISTORTION AUDIO GENERATOR



- Clean square waves test transient response.
- Low distortion sine wave output — less than .03%.
- Burst signals for transmitter tests.
- Pushbutton frequency range switching, 5 steps.
- 0 to 50 dB calibrated attenuator.
- Frequency sync. from external source.
- 600 Ohm output termination.



LEADER LDM-170RF DISTORTION METER

- Completely RF shielded
- Voltage range 1 mV to 300 V in 12 ranges
- Accuracy $\pm 5\%$ of full scale
- Distortion ranges: 100%, 30%, 10%, 3%, 1%, .3%
- Less than .03% residual distortion
- Monitor output

**IMMEDIATE DELIVERY &
TWO-YEAR WARRANTY
MONEY-BACK GUARANTEE IF YOU
ARE NOT COMPLETELY SATISFIED.**

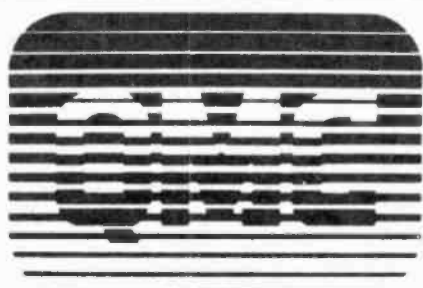
Check These Prices!

Leader LAG-125 Low Distortion Audio Generator	\$525
Leader LDM-170RF Distortion Meter	\$640
Leader LBO-507A 20 MHz Triggered Oscilloscope	\$580
PACKAGE PRICES:	
LAG-125, LDM-170RF, LBO-507A	\$1,600
LAG-125, LDM-170RF	\$1,100



LEADER LBO-507A 20 MHZ TRIGGERED OCILLOSCOPE

- Stable, bright display
- Outstanding trigger sensitivity over entire operational range.
- 10 mV sensitivity and 17.4 nSec rise time.
- X5 magnification
- Includes probe



CALL TOLL FREE 1-800-241-7878
IN GEORGIA CALL COLLECT 404/324-1271

Quality Media Corporation

P.O. BOX 7008 • COLUMBUS, GA. 31908

Broadcast Equipment Exchange

VOL. 4, NO. 5 May 1980



Broadcast Equipment Exchange (ISSN: 0194-2190) is published monthly by Industrial Marketing Advisory Services, Inc., 2425 Wilson Blvd., Arlington, VA 22201. Phone (703) 525-0400. It is edited for professional broadcast and audio-visual equipment users. Subscription rate is \$25 per year for first class delivery. Copyright 1980 by Industrial Marketing Advisory Services, Inc. All rights reserved. Controlled circulation postage paid at Riverdale, MD (USPS: 440-570) and Arlington, VA. (USPS: 493-370). POSTMASTER: Address correction requested. Send form 3579 to Broadcast Equipment Exchange, P.O. Box 1238, Arlington, VA 22210.

Publisher:
Stevan B. Dana

Editor:
Kathleen Imbema

Contributing Editors:
Bill Sacks, A.E.S./Audio
Clint Free/TV
Winn Schwartau/Recording

Circulation Manager:
Simone Leiser

Production Manager:
Graciela Molina

Computer Consultant:
Larry D. Hughes

FULL COMPASS SYSTEMS

Dear Audio Engineer,

Full Compass Systems is more than the average dealer. Our staff offers creative solutions to all your audio problems.

A well-designed studio would be incomplete without TECHNICS turntables. Consider the rest of the TECHNICS broad line including recorders, linear phase speakers, amps and tuners.

Full Compass carries over 50 lines of professional equipment to suit your needs. Call us, your all around professionals.

Sincerely yours,
Full Compass Systems, Ltd.

Jonathan Lipp
Jonathan Lipp
Chief Engineer



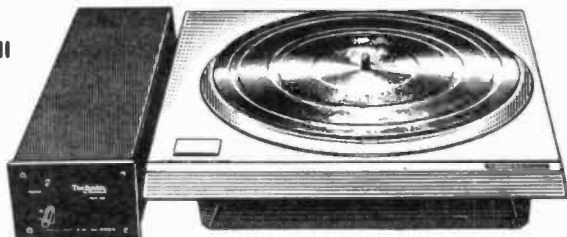
RS-9900US
LIST \$2000
SPECIAL \$950



SU-8099
115 w/ch
LIST \$1000
SPECIAL \$495

CALL
TOLL-FREE
800-356-5811

SP-10 Mk II
SPECIAL
\$675



Call Your ALL Around Professionals

Circle 119 on Action-gram.

Reader's Forum

Got something to say about BEE? Any comments on articles? Get it off your chest! Call us at 800-336-3045 or send a letter to Reader's Forum (BEE, Box 1238, Arlington VA 22210) for a reply.

More re VU Meter

Dear BEE:

I enjoy your (Bill Sacks') column in BEE and regret having missed the circuit I need badly, your VU meter amp. Could you see that I get a copy of that diagram and article?

Most Appreciately,
Hal Rogers
Parma OH 44134

BEE Replies:

No problem Hal, a copy is in the mail. See Bill Sacks' column again this month for more on this circuit idea.

On BEE

Dear BEE:

I'm what you might refer to as a rookie in the broadcast engineering field. Your publication has a goldmine of info and ideas. I've already used variations from your "Do we need transformers?" article to build a newsroom board. Keep those ideas coming!

Phil Wells/C.E.
KPSI
Palm Springs CA 92262

BEE Replies:

Thanks Phil, we've got more good "stuff" coming in the months ahead!

Topic—Composite Clipping

Dear BEE:

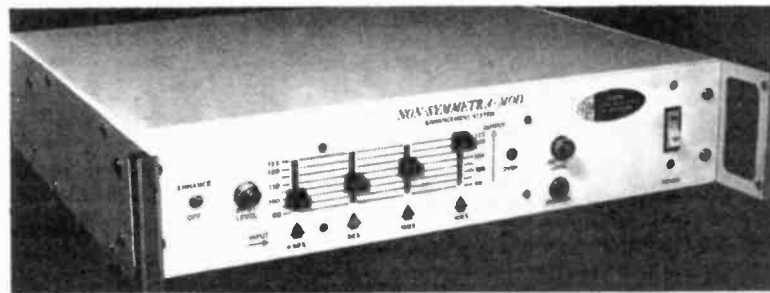
I am the designer of the Sta-Max composite clipper, which was the subject of heavy debate at the NAB, both in the technical sessions and on the Convention floor. Many individuals from large manufacturing firms spoke out against the technique, either because the devices

were being overused and abused, or because clipping was not necessary with their equipment. Since few people were at the show who could speak out and defend the technique with expertise, the consensus of opinion leaned heavily towards disfavor of composite clipping, whether for legitimate overshoot protection or for outright heavy signal clipping. I am sorry I was not present at the NAB show to debate the opponents, as no one there seemed to know enough about the concept to speak about it constructively.

The original purpose and design of the Sta-Max was for absolute overshoot protection, while maintaining the ultimate faithfulness and transparency to the program material and its stereo specifications. But then stations discovered that they got louder and louder with more and more clipping. Soon, many markets had full-bore loudness wars, each station trying to out-clip the other to the point of unacceptable distortion. Some secret reports found their way into the Commission, and soon the panic spread that the devices would be made illegal. Extensive testing and research has been done on the Sta-Max to show compliance with current FCC rules and regulations as an overshoot protection device, and believe it or not, including up to 0.5 db of continuous pilot clipping at any audio frequency or test mode. Regardless of what the manufacturers may claim or disclaim, I haven't seen a composite STL or stereo generator yet that didn't overshoot to some extent. In fact, I have personally filed data with the Commission showing the Sta-Max benefits

(continued on page 12)

Announcing ... New From Kahn The NON-SYMMETRA-MOD Modulation Enhancement System



This new technique allows you to convert symmetrical audio waves to asymmetrical waves providing full +125% positive peak modulation with excellent quality. Avoids the annoying distortion of conventional devices. And, of course, it is suitable for AM stereo.

En México representado por I.E.R.

KAHN COMMUNICATIONS, INC.

839 Stewart Avenue
Garden City, NY 11530
516-222-2221

Circle 106 on Action-gram.

Bill Sacks on the Audio Process

Clipping & More on V.U.

Arlington, VA ... The recent FCC AM stereo decision and stereo baseband clipping were two of the hottest topics of conversation at the recent NAB convention at Lost Wages. Briefly, the AM stereo debate at the FCC and FCC's subsequent decision to use the Magnavox system showed me that the FCC needs more input from technical personnel. Personally, I think that this decision did not further the public interest in broadcasting.

Baseband Clipping

Stereo baseband (or composite) limiting (clipping) has been used for years by a few engineers across the country but the subject has never been openly discussed, mainly because all of the composite clippers were home-brew devices, hidden deep inside a hot-rodded stereo generator or exciter. Chief engineers using this technique treated it as a trade secret in the alchemy of competitive audio processing. They also feared disclosure of the technique would bring undue attention from the FCC. In all fairness, I must point out that a few engineers used their homemade clipper very conservatively (possibly out of fear of discovery). However, in the last two years or so a plethora of these devices have become available on the open market which unfortunately has opened the door to widespread abuses of the technique. The FCC is now faced with the problem of how to regulate these devices. There is talk of grandfathering the boxes now on the air and regulating

their construction and use in the near future.

A Little Advice

Personally, I would prefer to see a composite clipper marketed with a V.C.A. device ahead of the actual clippers. This proposed clipper device would have a sensor with a predetermined

(potted) limit circuit monitoring the depth of clipping. I would suggest 0.25-0.5 db as an absolute maximum and the threshold of gain reduction. Attempts to adjust the device for grosser amounts of clipping would be futile since the circuits would be designed to reduce output levels after the clipping threshold has been exceeded. The attack time

constants should be maybe 20-30 milliseconds or so. That should not interfere with any instantaneous overshoot protection. The release time should be about two seconds to make the protection limiter obvious and obnoxious sounding when functioning. This would prevent abuse of these devices by caus-

(continued on page 8)

BROADCAST MAINTENANCE/TROUBLESHOOTING SEMINARS

For Radio and TV Broadcast Engineers and Technicians

Los Angeles June 25-27 • Chicago July 23-25

Philadelphia August 13-15

Specifically for engineers and technicians responsible for maintenance and troubleshooting equipment outages.

- Day 1 - Test Equipment
- Day 2 - Solid-State Maintenance & Troubleshooting
- Day 3 - Digital Electronics In Broadcasting

3 Days + 1
For Key Upgrading
in 1980



1-Day AM/FM Proof Of Performance Seminar

(Optional-Separate Fee)

Los Angeles June 28 • Chicago July 26 • Philadelphia August 16

Package Fees Include:

- Timely training
- Best teachers
- Carry-home manual
- Hands-on experience
- Certificate of training
- All workshop materials and functions
- Hotel room (double-occupancy)
- Meals

Seminar-Only Fees Include:

- Timely training
- Best teachers
- Carry-home manual
- Hands-on experience
- Certificate of training

Class Size Limited

**BE THERE,
ENROLL NOW!**

ENROLL ME!

Los Angeles Chicago Philadelphia Put me on LIAISON'S mailing list.

FEES: 3-day Package \$950 4-Day Package \$1150 3-day Seminar Only \$735 Proof of Performance Only \$200

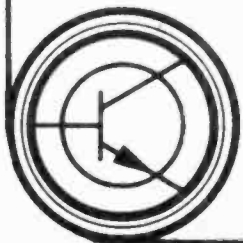
Total Enclosed \$ _____ Check # _____ MO \$200 Deposit.

Charge my Master Charge # _____ Expires _____ Signature _____

NAME _____ AGE _____ PHONE () _____

ADDRESS _____ COMPANY _____ TITLE _____

CITY _____ STATE _____ ZIP _____



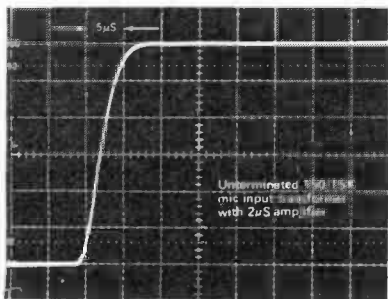
Liaison Electronics Seminars

(317)-253-7774

P. O. Box 40821 Indianapolis IN 46240

jensen transformers
By REICHENBACH ENGINEERING

Wide Bandwidth
Minimum Transient Distortion
Low Noise



Years of transformer manufacturing and design experience, combined with computer assisted technology, have enabled us to make a *significantly audible improvement* in the performance of audio transformers.

Write or call for information
10735 BURBANK BOULEVARD
N. HOLLYWOOD, CA 91601
(213) 876-0059

(Visitors by appointment only.)

Circle 126 on Action-gram.

Circle 141 on Action-gram.

The Marketplace & AM Stereo

Garden City, NY ... Since the FCC's decision to recommend the Magnavox AM stereo system has created such controversy, BEE felt that it might be worthwhile to re-evaluate the concept of the so-called "marketplace decision." As reported last month, the Broadcast Bureau's recommendation to the Commission was to set minimum standards which all 5 proposed systems could meet, and then let the broadcasters decide which system they wanted to buy. The Commission rejected this proposal and stated that they wanted a single system approved.

Why did the Broadcast Bureau recommend the marketplace and not the Commission as the place to decide this issue? Their arguments before the Commission on 9 April seemed weak to many people, and by the vote, they were obviously ineffective. To pursue this further, BEE has interviewed Leonard Kahn, President of Kahn Communications Inc, and perhaps what follows is a better attempt to explain how the marketplace would function for AM stereo.

BEE Who first introduced the question of "marketplace" in the AM proceedings?

LK I guess I did. I mentioned the matter in my August 1st, 1979 Reply Comments to the Commission. But the original idea is not mine. I just worked on the engineering part—it came out of the Broadcast Bureau and the basic concept comes from Chairman Ferris and Dr. Nina Cornell.

BEE Just how would this so-called "market procedure" work?

LK Very much like free enterprise works in normal commerce except in this case the Commission had to make a determination that none of the systems would increase interference and hurt other broadcasters. The Commission made that determination—they did require Belar to restrict his frequency response and change deviation—but they now believe all systems could enter the marketplace.

BEE But wouldn't that require the public to purchase 5 types of receivers?

LK This is where everything got mixed up. You and I are both engineers and you know how easy it is to jump to a false conclusion—we were taught that in school. The answer to your question is "no" for a number of reasons. First of all I am certain that there won't be 5 serious contenders in the marketplace. They just won't get off the ground. What is more, within three or four months—that is as soon as the proponents get actual transmitter exciters and sample receivers into the hands of the broadcasters, the rhetoric stops and the engineering starts. I am certain there will be only one survivor in the marketplace in three to four months before the receiver people tool up. I don't believe there will even be two types of receivers offered to the public and you know, if I am wrong and we have two or more marketplace survivors a "universal" receiver will take over in the marketplace.

BEE Before you discuss the universal receivers, let me ask you how the marketplace decision will be made. Just who

decides in the marketplace, the public?

LK No, the public will not do the deciding, at least not directly. It won't work that way. The group that will decide will be the broadcasters. If they don't like a system they will not use it, and they move fast. Just try getting a broadcaster to use something that hurts their modulation or their coverage or makes strange noises. If you get them to put it on a minute you will be lucky. I can't imagine a broadcaster dropping modulation in this competitive world, and no way is he going to accept "clicks and pops." I have worked with broadcasters for over 25 years, they're tough, and they know what they are doing. We just put stereo on 13 or 14 stations all around the country (even Canada and Mexico) and every one of them insisted on full modulation and no funny noises and good push-button comparisons in their 0.5 mv contour; they are real careful. They must be to survive and keep their listen-

ers. Their interests are the same as the public's, otherwise they lose ratings and income.

BEE But wouldn't the receiver manufacturers have a say?

LK No, not really. All of the important receiver manufacturers have said they had designs for all five systems and they are not stupid. They will do as the marketplace commands. They are not going to mass produce receivers until they are certain the broadcasters are on-the-air in quantity with a system. And they will not move until they are sure that the broadcaster will stay on the air.

BEE But couldn't the receiver manufacturers, say in Japan, get together and force the decision for a single system that they want?

LK No, because number one, they would have some anti-trust problems, but more
(continued on page 10)

AM Stereo At NAB

(continued from page 1)

their vote regarding the Magnavox choice if they felt that the broadcasters, as a group, didn't agree. This astounded many in the audience, and of course, gave heart to the proponents who were rejected. The consensus of feeling was that the Commissioners have been hearing, loud and clear, many of the broadcasters' objections to the Magnavox system, and that it apparently was more

than just "bad-mouthing" by the rejected proponents' adherents.

After the session was over, all of the attendees felt that perhaps the issue wasn't dead yet. The FCC, in their 4-2 vote on April 9th, decided that they wanted one single system approved, and only recommended that it be the Office of Science and Technology's choice, Magnavox. If they can be convinced otherwise, they will go along with one of the other systems instead.

After the NAB show, both Harris and Hazeltine filed with the FCC for release of the Office of Science and Technology matrix which was used to rank the various systems. These requests have been turned down. Kahn Communications has filed a motion to grant an oral hearing where all of the proponents could make their case directly to the Commissioners, and some of the other proponents are supporting this motion. It is unknown as to whether the FCC will grant this motion anytime soon. A number of the proponents have done mailings to the stations asking them to write the FCC and let the Commissioners know where they stand on the issue and BEE supports this activity.

As Commissioners Lee and Quello stated, the choice of a system is in your hands. They will listen to your opinions. The selection of an AM stereo system is not meant to be a popularity contest, opinions should be backed up with technical and/or business reasoning. We urge all of you to write NOW to the Commission to express your views. The address is: FCC, 1919 M Street, N.W., Washington, D.C. 20554.

"I wanted to control my transmitter from three different points"

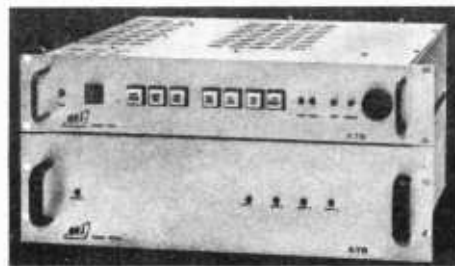
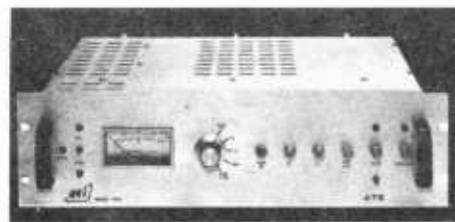
QEI's FM ATS did it

The fail-safe QEI FM Automatic Transmission System provides complete station control while reducing equipment and maintenance requirements. The availability of a number of alarm points allows you to use this control flexibility from locations limited only by your ingenuity.

The QEI ATS cuts weekly transmitter maintenance to monthly to give your staff or contract engineer more time for other work. It eliminates the need for a studio modulation indicator, remote control system as well as either manual or automatic logging of transmitter meter readings. And it even frees your SCA for programming instead of meter reading.

What's more, the QEI ATS is compatible with all FM transmitters, processors, formats and STL and telephone links. And installs easily in just one day.

Call or write for more information.



NORTHEAST BROADCAST LAB, INC.

P.O. Box 1176 South Glen Falls, N.Y. 12801
(518) 793-2181

Allied Number 1 in Broadcast Equipment

New



**LOUDEST
CLEANEST
BRIGHTEST**

The Multiband OPTIMOD-FM

Optimod-FM Model 8100A is a new, evolutionary audio processing system that can provide any format with the most favorable balance among Loudness, Brightness and Processing side-effects.

This is Orban's second generation compressor/limiter/stereo generator—our solution to the new audio processing problems brought about by the unique demands of today's recording technology, today's tastes in music and today's competitive marketplace. In 1975, we designed the 8000A Optimod-FM to be the loudest, cleanest, brightest FM processor possible. But, advances in engineering concepts and integrated circuit design, coupled with field feedback, have now led to a dramatically better Optimod-FM. Like the 8000A, the 8100A is a system of components working accurately together.

Optimod-FM does it all. No other processing

is necessary. It provides a consistent airtone—despite inconsistent source material and uneven gain-riding. But, the real proof is in the listening. Try it on your most difficult program material and compare the airtone with your prime competition. With Optimod-FM Model 8100A, your FM sound can be the best—the loudest, cleanest and brightest—that technology can legally provide.

Contact ALLIED for further information.

Standard Single-Unit 8100A \$3995.00*

*Dual-path STL and telephone-line-connected stations can take advantage of the also available 2-unit version of the 8100A which, even in the absence of composite STL, permits studio adjustment of modulation levels. Pricing to be announced.

**Allied
Broadcast
Equipment**

635 SOUTH E STREET - P.O. BOX 786 - RICHMOND, INDIANA 47374
Ordering Call 800-428-6954 In Indiana Call 800-382-6907
INFORMATION CALL 317-962-8596 CHICAGO SALES 312-784-2257
Washington State 800-562-0062 Western States 800-426-4254

More On VU Meter

(continued from page 5)

ing a loudness "peak" at the maximum tolerable clipping level. Increasing the input level beyond that point would actually reduce the clipping level. I would like to see all of this embodied in a FCC regulation. Well, there are a few seeds for thought—next month we'll discuss this issue in depth.

More on VU

I was pleased with the positive response on the VU meter build it project

(BEE March 1980). In that column I mentioned the National Semiconductor LED VU meter/bar graph IC and here are some tips on using it. The LM 3915/3916 devices are basically parallel (flash) analog to digital converters, that is voltage comparators which have their reference inputs tied to a series string of resistors which are connected to a reference voltage source. All of the individual comparators sense inputs are tied together and constitute the analog input.

The outputs are open collector transistors for LED drive.

Peak or Average Reading

Since the "Ballistics" of this flash converter are virtually instantaneous, and it responds only to DC, audio signals must be pre-conditioned before they can be displayed properly. Because the signal must be preconditioned anyway, choose the ballistic that suits your needs. The Precision Full Wave Averaging Detector is shown in figure 5 and has an integration constant (94 ms) which is somewhat faster than the standard VU meter. If you want a true VU response, use the circuit in figure 7. The Precision Full

Wave Peak Detector shown in figure 6 allows viewing of peak levels. A reader who is actually building this as a project will report on his experience next month.

Hot-Rod Optimods

This month's treat is a little goodie from Robert Orban on the subject of hot-rodding Optimods. Here is another helpful hint (approved by Mr. Orban). This modification immunizes the high frequency limiter against intermodulation by low frequency material. Simply disconnect one end of R263(R264) and insert a .1uf 10% polycarbonate or polypropylene capacitor in series with the resistor.

FOR BROADCAST AUDIO MEASUREMENTS, if you compare features . . .

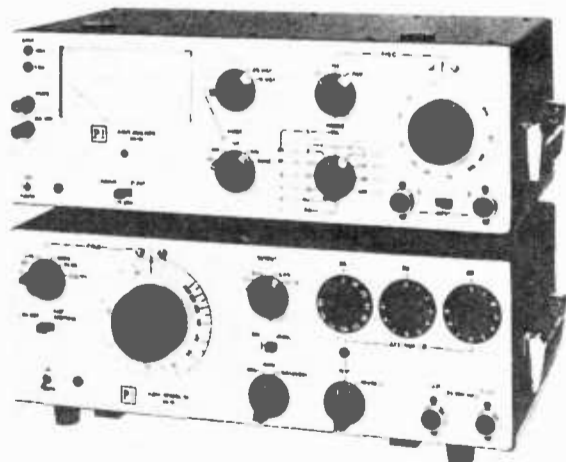
	Hewlett Packard 339A	Sound Technology 1710A	Potomac Instruments AT-51
AUDIO GENERATOR	Combined With Analyzer	Combined With Analyzer	Separate Unit
Intermodulation test signal	No	Option	Yes
Wow & Flutter test signal	No	No	Yes
Simultaneous L&R Outputs	No	No	Yes
600 ohms and 150 ohms Source	No	Yes	Yes
Stereo Matrix Switch (L,R, L+R, L-R)	No	No	Yes
Switch to remove signal and terminate line for S+N/N	No	Yes	Yes
10 dB, 1.0 dB, 0.1 dB Step Attenuators	No	Yes	Yes
AUDIO ANALYZER	Combined with Generator	Combined with Generator	Separate Unit
Harmonic Distortion Mode	Yes	Yes	Yes
Automatic Nulling	Yes	Yes	Yes
Automatic Set Level	Yes*	Option*	Yes
Intermodulation Distortion Mode	No	Option	Yes
AC Voltmeter Mode	Yes	Yes	Yes
Stereo Phase Meter Mode	No	No	Yes
L/R Amplitude Ratio Mode	No	No	Yes
Wow & Flutter Meter Mode	No	No	Yes

PRICE \$1,900.00 \$3,695.00¹ \$2,295.00²

* Limited to 10 dB capture range.

¹ Price includes options listed.

² Total price for Generator and Analyzer including protective covers and 4 test cables.



AT-51 AUDIO TEST SYSTEM

. . . there is only one logical choice!

NORTHEAST BROADCAST LAB, INC.
15 Charles Street, P.O. Box 1176 South Glen Falls, N.Y. 12801
(518) 793-2181



Circle 148 on Action-gram.

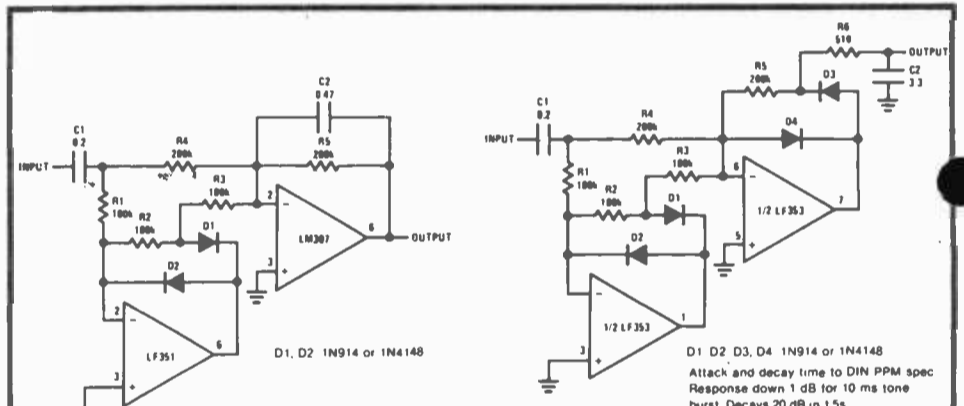
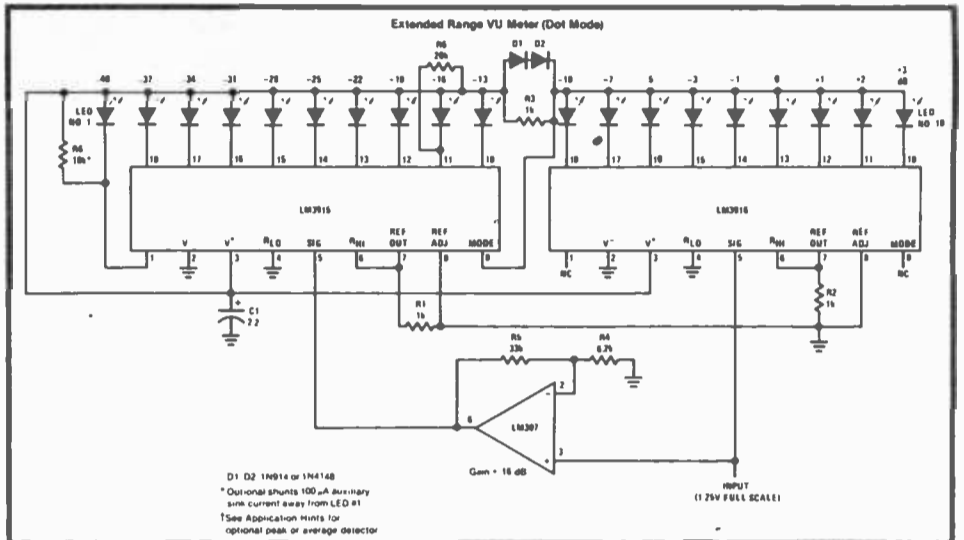


FIGURE 5. Precision Full-Wave Average Detector

FIGURE 6. Precision Full-Wave Peak Detector

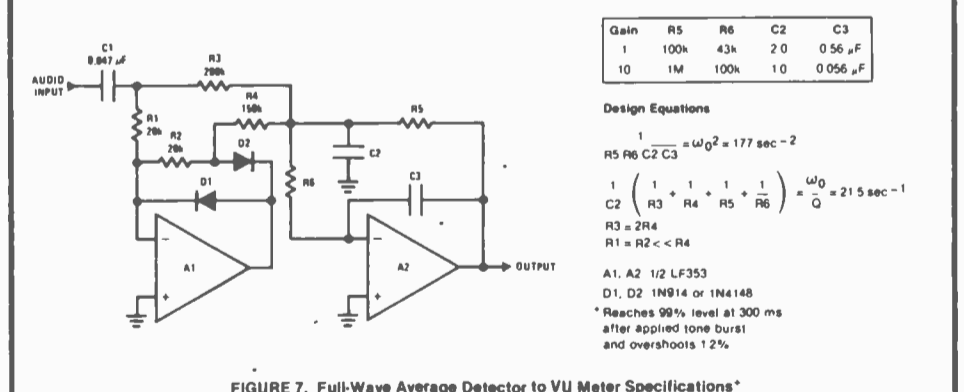


FIGURE 7. Full-Wave Average Detector to VU Meter Specifications*

OLDIES ON TAPE 1955 thru 1979

822 titles available to radio stations in mono or stereo. Call or write for information and free list of titles.



"THE MUSIC DIRECTOR"
PROGRAMMING SERVICE
Box 103 · Indian Orchard, Massachusetts 01151 · 413-783-4626

Circle 121 on Action-gram.

April FCC Developments

by B. Jay Baraff

Baraff, Koerner & Olender, P.C.

Washington, DC ... The FCC is proposing rules which would simplify applying for FM stations. The proposal includes eliminating population guidelines for channel assignments, deleting or modifying policy of basing class assignments on community size, re-examining preclusion standards and reviewing "Berwick" issues (arising when station is sought for smaller community when it appears its real purpose is serving a nearby larger community).

Large Settlement Fee

An FCC Administrative Law Judge approved reimbursement of \$1 million in the 18 year old proceeding for a new AM station in the Los Angeles-Long Beach area. A new corporation was formed in which five of the competing applicants participated. The Judge added that had the parties exercised a more determined effort toward settlement, this could have been resolved at an earlier stage by eliminating the heavy burdens of litigation which had been assumed.

Comply With Subpoena

The FCC required PTL to present

documents called for by an FCC subpoena as part of an on-going investigation from 1979 to determine whether PTL broadcast misleading and deceptive statements concerning fund raising for particular projects. PTL had originally refused to provide this documentation but it was submitted after agreement was reached between the Commission, the Justice Department and PTL's attorneys.

Equal Employment Requirements

The FCC has imposed equal employment opportunity requirements on 6 Washington, D.C., area stations including a short-term renewal for WHFS-FM, Bethesda, MD, for failure to employ an acceptable level of women and minorities. This is part of the Commission's increased efforts to ensure compliance with their equal opportunity requirements.

Suspension of Guidelines

The Commission has denied a request by the National Association of Broadcasters asking for suspension of the effective date of the FCC's new Equal Employment Opportunity guidelines for broadcast applicants. The FCC said that they do not consider these rules as a

sanction but just an opportunity for in-depth review of stations' equal employment opportunity programs and, therefore, procedural in nature. These guidelines became effective for renewal applications due on or after April 1, 1980.

AM Channel Spacing

The Commission's proposal to reduce AM channel spacing in the Western hemisphere from 10 to 9 kHz is still facing debate by 22 countries. The principal opponents are Canada and Argentina. Also, the NAB Radio Board has urged the conference for action on this proposal so a full factual record can be completed. Since this is inconsistent with the U.S. position, it has confused representatives of the Latin American countries.

Format Changes Reviewed

The Supreme Court has agreed to review the Commission's policy of allowing format changes to be left to the marketplace. The Court of Appeals has held that the Commission must consider diversity of programming in considering a renewal or assignment application that proposes abandonment of a format and that a hearing would be necessary if the format was unique and financially viable

and if a threatened loss would cause public concern. The Appeals Court had rejected the theory of marketplace regulation which the FCC apparently is applying.

Financial Reporting Revision

The FCC is planning to revise its Annual Financial Report (FCC Form 324) as part of a current rulemaking. Some of the changes proposed are deleting the employment and tangible assets requirement on the last page, restructuring the income statements to conform with accepted accounting principles, revising the income summary for FM stations filing a combined report with commonly owned AM stations. The FCC also wishes to consider whether it should treat radio different from television with respect to the amount of data reported and to separate program expenses into local and non-local categories. If you desire to file comments, the Commission will be releasing a comment date at a later time.

AVISO IMPORTANTE:

CON NUESTRA EDICIÓN DE JUNIO INICIAREMOS UNA SECCIÓN EN ESPAÑOL.



Si usted
lo necesita,
nosotros
lo tenemos.



Como representantes de los principales fabricantes de productos electrónicos, I.E.R. tiene lo que usted necesita.

El personal bilingue de nuestros departamentos de Ventas e Ingeniería le atenderá eficientemente ya sea que necesite un transistor o un transmisor.

Póngase en contacto con nosotros por que entendemos sus problemas y tenemos la solución.



TELEFONOS:

I.E.R. (714) 459-3691
T.S.D. (714) 459-3825
TELEX: 181756

I.E.R. 1205 Prospect, Suite 510
La Jolla, Ca. 92037

I.E.R. P.O. Box 1142
La Jolla, Ca. 92038

I.E.R. 12 de Octubre 106
Col. Escandón
México 18, D.F.
Teléfono: 516-5772

International Equipment Representatives

Circle 113 on Action-gram.

Kahn on the Marketplace

(continued from page 6)

importantly, they would have to be sure that someone in Hong Kong or (can you believe it) maybe in the United States will quickly come in and thwart their plans and make themselves a fortune. Free-enterprise works and it has worked

in our country for 200 years. It will work here if it is given a chance. The best system will survive.

BEE Some people have stated that General Motors will decide?

LK No way. GM knows what they are

doing. They will be the last group to make a rash move. They will wait and make certain which way the broadcasters go. They will not make a single receiver until they are certain that their customers will be able to tune in on stereo all over the country and they will want to be certain that stereo sounds good, no clicks or pops. They don't want the problem of having people bringing back Cadillacs to fix the radio, and then find they cannot fix it because they have clicks, pops, or stereo ghosts. The good businessmen at GM just will not put up with it. No, you can be sure that the broadcasters will make the decision.

BEE How will the public be represented in the "marketplace," who speaks for him?

LK The public's natural surrogate is the broadcaster, he speaks for them. The AM broadcaster is fighting for his economic life. He must do everything he can to satisfy his audience and even attract more listeners. He will do nothing that stands in his way to make his listeners happy. If his mono listeners suffer he will suffer; if he gets new stereo listeners and they don't like what they hear, he is in trouble. He is the public's natural

ally and he has the engineering expertise and experience to best represent the public. The foreign receiver manufacturers also wish to satisfy the public, but if they are wrong, it will not destroy them. They will end up selling something else next year. Actually, some receiver manufacturers may do better financially if AM Stereo and AM drops dead. They have already taught the American public that FM receivers get a better price and if they can get the public to buy new receivers at a higher price it is to their advantage. The AM broadcaster certainly doesn't feel this way. He knows what's in his best interest, satisfy the public. I believe that is why we are getting such strong support from major broadcasters. I don't know of a single major broadcast group that supports any other system.

BEE Then why does the NAB apparently oppose the "marketplace" concept?

LK That is an excellent question. It has been difficult for me to believe that NAB would do such a poor job on this matter. I recognize that they have other fish to fry (television has always been more important to them) and, of course, they

(continued on page 13)

UNIVERSAL BALANCED AUDIO AMPLIFIER MODULE

high slew rate, no transformer, ultra low transient distortion

SMPTE-IM distortion = 0.018% • 10Hz-25 kHz ± 0.5db

The UA-1 balanced building block allows one card to be used throughout the audio chain. Cuts your card inventory, speeds revamping and upgrading audio facilities. A combination line amp, distribution amp, phono preamp, mic preamp, tape head preamp, film sound preamp, and independently usable input/output stage for radio and TV stations, recording studios and professional sound systems. Both stages have on and off board gain control. Unbalanced break point with a current pump output between the input and output stages.

The plated-through double sided pc card with RF ground plane construction and heavy gold plating on the edge connector fits most standard audio card cages. Up to 16 cards in a 19 inch rack. Fully balanced input, eight isolated 600 ohm balanced distribution amp output, and a balanced current pump output. All on a single card. Optional input transformer available from Jenson.

Unit price \$210.00

(cash with order—one year replacement warranty)
Price & specifications subject to change.

SWA™

STRAIGHT WIRE™ AUDIO, INC.

2523 Wilson Blvd, Arlington, Virginia 22201 (703) 920-2239

Circle 117 on Action-gram.

ATTENTION FM BROADCASTERS

Bring Out The Natural Color
With The **EXR EX2** Psychoacoustic Audio Processor

(Especially suited for use with FM Optimod®)

The original concept behind the **EXR EXCITER** (not to be confused with an RF EXCITER for your transmitter) was to build an audio processing device which would make tape recorded material sound like it was a direct to disc recording. Electronic measuring equipment proved useless in the testing of the system so the first unit was designed and refined totally by ear. Only after thousands of

hours of listening and research was it understood how and why the unit worked. This understanding plus hundreds of hours of studio application led to the present model, the **EX2**, with its four enhancement settings. The **EXR EXCITER** restores natural presence, clarity, fullness and individual instrument definition lost in the reproduction and transmission process. It adds to the apparent

signal strength without noticeably triggering limiters or compressors, and its S/N ratio of better than 90db makes it welcome in any audio application. Since there are no multiplier effects or phase problems introduced to the broadcast chain, the **EXR EXCITER** is totally compatible with previously enhanced program material.

LIST PRICE **\$1690.**



15 day money back trial with prepayment

Call or write for full details on this and other sophisticated audio devices. We also stock DBX Noise Reduction Systems and pride ourselves in the technical support we offer the quality minded broadcaster.

BROADCAST INTERNATIONAL, INC.

1229 N.E. 37th St.

Ft. Lauderdale, Florida 33334

(305) 564-4422 Cable: BROADCAST

Se Habla Español



Circle 122 on Action-gram.

Clint Free on VTR's:

Erase Amp Problems

Knoxville, TN ... In recent months I have had a more than usual amount of erase amplifier problems. The most interesting problem concerned an open by-pass capacitor on the -26V line on a TR-60 erase amp: minus 26V is applied to the output stage through a 0.5 microhenry choke, and bypassed by a 50 microfarad capacitor.

The machine's symptom was the erase would not turn off and the erase head overheated; although it was not damaged, it was very hot to touch. The problem was compounded by a faulty module extender. The symptom disappeared with the module on the extender because one of the lines to the erase transformer was open. After repairing the module extender, the problem was easily recognizable. Prior to that, the problem had led us on a merry chase! There were 38 volts of 110kHz pulses on the bypass capacitor (1 volt p-p is normal) for the -26V line supplying power to the erase output stage. The combined inductance of the output stage input coupling transformer, the 0.5 microhenry choke and the output coupling transformer, and the gain of the output stage produced a high level 110kHz oscillation.

The most common erase problem has been low or no erase caused by an open or low value of the erase oscillator stage emitter bypass capacitor. The oscillator is a phase shift type producing a sinusoidal output. With the emitter bypass capacitor open, there is insufficient AC gain for the stage to oscillate. If its value decreases (the emitter bypass consists of a 1 microfarad electrolytic in series with

a 150 ohm resistor), the gain of the stage decreases.

Editing feature

There is now available an editing feature for RCA TR-60 and TR-70 VTRs which will speed up editing. Here is how it works:

1. The edit machine is rolled to the in edit point in play and stopped at the in edit time by the operator. The machine is then backspaced 12 seconds by counting control track pulses. When the machine stops, the actual number of seconds backspaced from the in edit time is in memory (stop is actuated by the 12th second but it takes several frames to actually stop).

2. The playback machine is stopped by the operator at the in edit time and it automatically backspaces 10 seconds and stops. The actual backspace time is in memory, as is the case with the edit machine, and the two numbers are compared. Whichever machine has the highest number will roll first.

3. The operator presses the edit push button, and the machine with the highest number rolls first. When this machine is passing the cue time of the second machine plus the start allowance, the second machine rolls. An edit command is produced at the appropriate time beginning the edit sequence.

4. An out edit can be activated manually or it can run a selected number of minutes, seconds and frames.

5. Third machine control can be added which will permit lap dissolves or effects by an operator. The first playback video is timed by the operator from

the in edit to the beginning of the lap dissolve, and this time is entered in memory where 10 seconds is subtracted. The second video source machine is then cued by the operator to the beginning of the dissolve. The machine then backspaces 9 seconds and stops. The actual backspace is then compared with 10 seconds and the difference, with start allowance, is added or subtracted to the adjusted time of the first video source. When the actual edit is in progress, the

Optimod Modifications

(continued from page 2)

Input Transformer

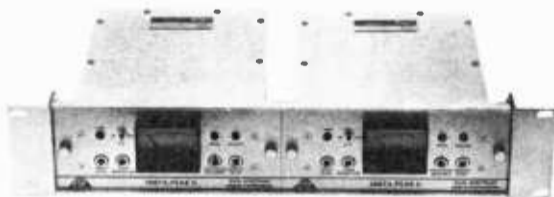
It has been suggested that the input transformer be replaced with a differential amplifier. This is OK, provided that one knows what one is doing. Any replacement must be a fully balanced instrumentation amplifier-type circuit with less than -123dBm equivalent input noise. In practice, such a circuit can be built with Signetics NE5534 opamps.

Be particularly careful about compromising RF suppression of the unit when this is done. If the 8000A is located in a high RF field, be prepared to fail, and make sure that the original RFI protection can be restored if the instrumentation amplifier doesn't work without buzz, noise, or other RF problems.

Editors Note:
See next month's BEE
for Part II.

THE SUPER MODULATION AUDIO PROCESSING GROUP

• THE INSTA-PEAK II • THE LEVEL GUARD • THE WIDE BAND LIMITER •



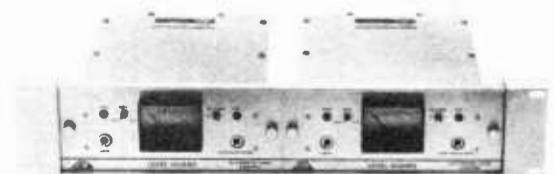
Insta-Peak II — AM-FM-TV

- Split Spectrum Optical Control
- Keyed Integrator — Low Distortion Limiting
- Peak Ceiling Control Circuit
- AM and FM Response Shaping



Wideband Composite Limiter Model WBL

- Stops all stereo filter and pre-emphasis wave-form overshoot
- Increased FM modulation 40% and 15% over any other system
- Phase coherent wide band for composite stereo
- WBL-M for mono to stop pre-emphasis overshoot



Level Guard Mod. AGC

- AGC for AM-FM-TV-recording
- Optical gain servo for inaudible control
- Optical control by modulation flasher
- Meets FCC ATS rules

Good audio processing does not have to be expensive and complicated. ESP products are value engineered, have operational simplicity and are maintenance free. Prices start at \$495 for the WBL-1, the original wide band composite limiter. The "Level Guard" \$545, the "Insta-Peak II" \$575. Add second unit for stereo applications.



ELCOM
SPECIALTY PRODUCTS, INC.

2810 REDDING AVE., #E
SACRAMENTO, CA 95820
(916) 453-0859 • CABLE "ELCOM"

Circle 129 on Action-gram.

second VTR rolls at the correct time and the operator switches to it by whatever method is desired.

Color field and cue tone control options are available with this editing method. This method is offered as a quick, non-precision, low cost alternative to time code, manual, precision editing. For more information call or write to me at 509 Bardon Road, Knoxville, TN 37919, tel: 615-693-4043.

**PRO
AUDIO
SEATTLE**

**WE'VE GOT
IT ALL
UNDER ONE
UMBRELLA**

MCI Recorders

MCI Consoles

MCI SMPTE

MCI Automation

And over 55 lines including:
AKG, Ampex, Annis, Auratone, Beyer, BGW, DBX, Deltalab, ElectroVoice, Eventide, Gauss, Ivie, JBL, Klipsch, Koss, Leader, Lexicon, Master Room, MRL, Neumann, Orban, Otari, Revox, Roland, Sequential Circuits, Scotch, Sennheiser, Shure, Sony, Sound Workshop, Stanton, STL, Tangent, Tapco, Tascam, Teac, Technics, UREI, Vega

PROAUDIO SEATTLE
Professional Audio Equipment and Services
(206) 367-6800
11057 8th NE, Seattle, WA 98125

Circle 145 on Action-gram.

... What Can it do for Me?

(continued from page 3)

A few cautions are in order here: interpretation of a modulation analysis is not as simple as reading a bar graph of oil prices or a road map of Taos, New Mexico. The program director is still going to need to rely on the technical expertise of his chief engineer, who is probably assisted by a consulting engineer trained in interpreting the data and graphs. And this method will not solve any problems with station sound: it's only a very sophisticated method of observation. But with a good analysis, one has the opportunity to make adjustments to one's audio chain and objectively analyze the result, rather than being forced into vague judgments of "sounds better" or "overcompressed." Being able to see the results of adjusting, for instance, the limiting threshold, is a major breakthrough.

Monitor vs. Analyzer

Let's again examine what's different about this technique. Current "modulation monitors" are devices which respond to the instantaneous modulation of the transmitted signal. In other words, unless one is airing pink noise or 1000 Hertz tone (useful signals, but not likely to increase one's market share), one's modulation monitor is bouncing all over the place, faster than the eye can follow. Under actual musical programming conditions, about all they're good for is to warn of an excess of peaks. A modulation analyzer, on the other hand, stores all those instantaneous modulation percentages and reproduces them so one can see how one's audio chain and transmitter are working through a piece of music.

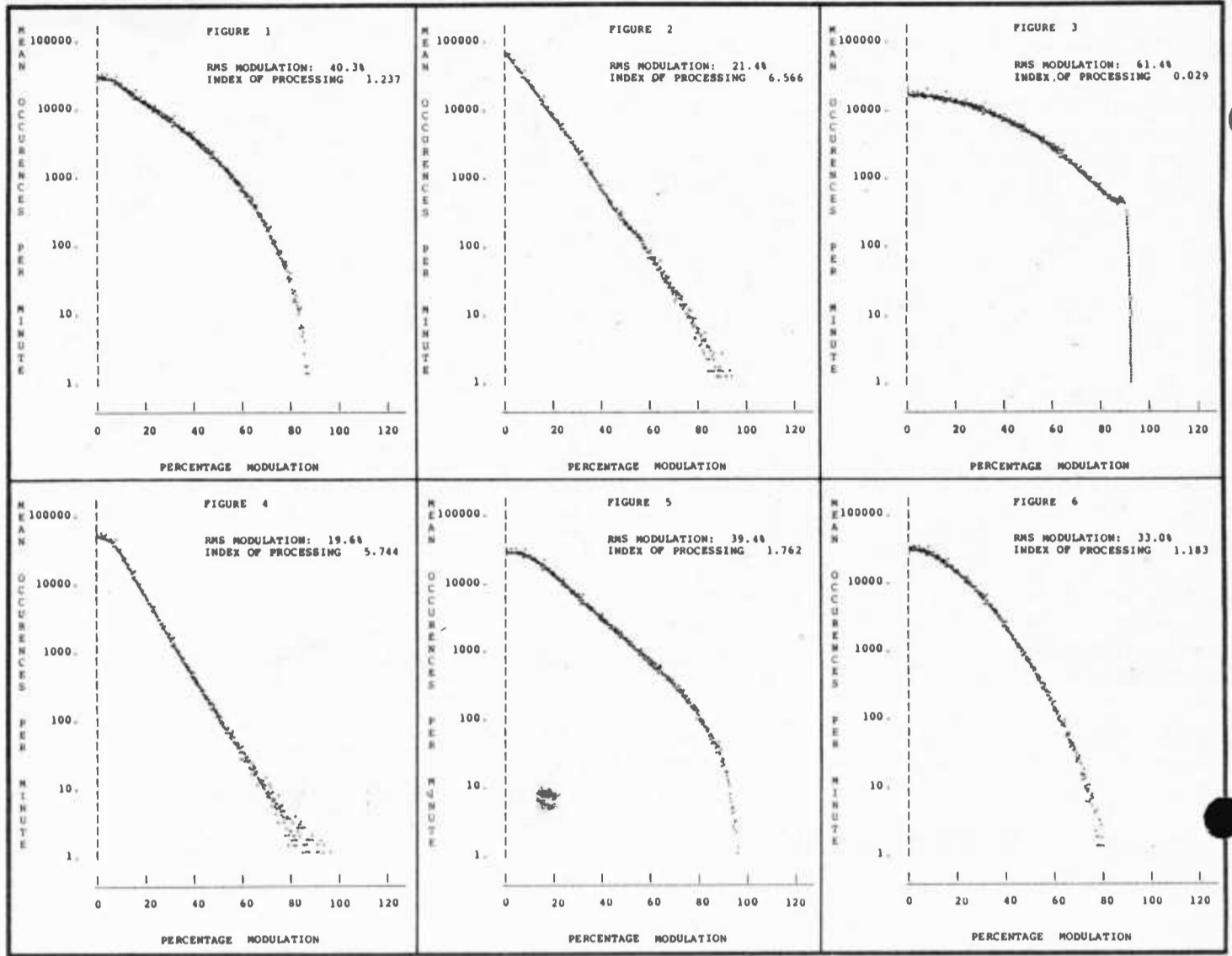
So far we've compared only two rockers and a disc; does this method produce significant visible differences between the modulation pattern of say, a classical music station and an AOR station? Look at figures 4 and 5. How about a beautiful

music station—see figure 6.

Future of Modulation Analysis

Further applications of modulation analysis await engineering development and the integrity of its users. But even in

its present form, it holds unmistakable promise of giving the broadcaster a better handle on the slippery workings of his audio chain, and a firm, rational basis for discussion of any station's air sound.



We're Known By The Companies We Keep!

- AMPEX
- AUDITRONICS
- OTARI
- TASCAM
- REVOX
- TELEX
- BROADCAST ELECTRONICS
- NEOTEK
- SCULLY
- U.R.E.I.
- TAPCO
- AKG
- KLARK-TEKNIK
- DBX

Manner's Pro Audio Industries

Serving the Broadcast and Recording Industries

INCORPORATED

Formerly a Division of Flanner & Haisos Music House. Ltd Est 1891

CALL (414) 259-9665

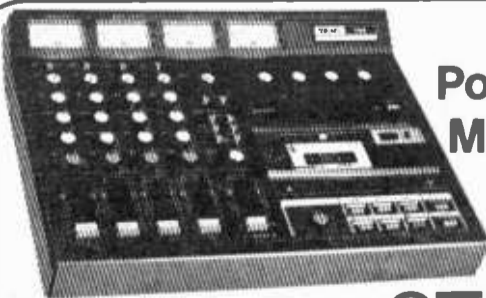
Mayfair Mall • 2500 N. Mayfair Rd. • P.O. Box 26005 • Milwaukee, WI 53226

- METEOR
- AMPRO
- JBL-PRO
- KLIPSCH-PRO
- ADS
- DELTA LABS
- SENNEISER
- CROWN
- McINTOSH
- EXR
- EVENTIDE
- ORBAN
- LEXICON
- ELECTRO-VOICE

SEND FOR COMPLETE LINE CARD

Staffed by experienced, professional specialists who represent one of the greatest selections of pro-audio products in the nation, we know we can help you with your pro-audio require-

ments. We stock most of the products we represent for fast service to you. Professional consulting, design, sales and service are offered. Call us for your next audio purchase!



Portastudio Model 144

TEAC

IN STOCK

Tascams new lightweight Portastudio is a complete portable studio combining a four-in, two-out mixer with a multi-track, high-speed cassette recorder. A creative recording system capable of making practice tapes with amazing ease and at low cost!



The Legendary SP-10 MkII

Technics

IN STOCK

The standard of the broadcast industry! This quartz-controlled direct-drive turntable offers extremely high torque, split-second start and stop, unwavering speed accuracy and rugged construction.

WE ALSO HAVE THE BASES IN STOCK!

Reader's Forum

(continued from page 4)

and measurements when used properly. The one advantage the Sta-Max has over other clipper designs is its amazing cleanliness at or below the clipping threshold—it's like it's not there at all.

The Sta-Max is probably one of the finest wideband DC amplifiers ever built but it's suffering from bad publicity, overuse, slander, and abuse. Had one of the opposing manufacturers come up with the product, wouldn't they be inclined to promote it as well? The industry is bad mouthing at its best and cut-throat at its worst. We should all cool down and save it before we lose it.

Very truly yours,
Chris Hood
Broadcast consultant &
Sta-Max designer
Pittsburgh PA 15205

BEE Replies:

Thanks for the letter, Chris. We intend to explore both sides of this rather controversial issue over the next few months. This month, Bill Sacks has a few comments on the topic in his column.

Kahn Interview

(continued from page 10)

have a problem in radio, the FM'ers are not too pleased about AM stereo. But anyway, I have had lengthy conversations with one of their two man engineering team. One of these chaps has been most effective in lobbying against this concept at the Commission, in fact he brags as having "done his thing" to the marketplace concept along with his friends at EIA and the receiver manufacturers. He bragged publicly, at the NAB Convention. We now understand, however, that a number of major broadcasters as well as influential broadcasters from smaller stations are putting pressure on NAB to think the matter out. Hopefully things will be changed real soon.

BEE But what reasons has NAB given you against the marketplace?

LK The main reason they gave us is that it is neater and simpler for the Government to make the decision. I was given the distinct impression that NAB, at least one spokesman, was not comfortable with the Broadcast industry making the decision. This chap is apparently under the impression that receiver

design engineers are better engineers than broadcast engineers and people who design broadcast equipment. As an engineer who has been in both fields, I know this is nonsense. There is very little innovation in AM broadcast receivers, they are just getting around to doing some of the things we did 20 years ago in communications receivers. Their main interest is in quality control and cost reduction. They assuredly haven't done a good job for AM receivers. Hopefully this will all change. But the point is, having dealt in both fields, I am delighted that the decision will be in the hands of the U.S. broadcast engineers, rather than receiver engineers outside the country. Even though I have run into some good ones from Sansui and Sony, they still do not know the broadcasting system. How NAB engineers would think anything differently is beyond me.

BEE So you believe that the "marketplace" decision will be made by the best qualified group to make the decision in the best interest of the public?

LK Absolutely.

BEE Therefore, you believe it is fortu-

nate that the AM broadcasters would be the marketplace judge?

LK Most certainly—absolutely.

BEE But won't the marketplace take a longer time than if the Commission decided to select another system. Wouldn't that be better in your opinion; what is wrong with that?

LK You might think I would be delighted with such a situation, particularly if they selected ours, but you have to think it out. I am reasonably certain that Magnavox and the other parties that would then be denied access to the marketplace will appeal and their appeals can take years. Therefore, the marketplace will be faster. It won't take long for the broadcasters to make up their minds. They are real quick and they are real tough and there is some serious dangers if proponents appeal.

BEE What dangers?

LK The danger is that a Federal Appeals Court may decide which system is best, and you know they have the full power to make their own system choice. Then who do you appeal to? I am not saying they will, but they can, and the best you can hope for is that they tell the Commission to go ahead with their plans or do a more thorough evaluation. The record isn't all that good and this could go on for years and years.

BEE But can't a party appeal a marketplace decision? I mean if the Commission OK's marketplace couldn't somebody appeal that decision?

LK Sure you can appeal anything, but that would be an admission that the proponent is afraid of the "marketplace," afraid of free enterprise. I believe that that appeal, if it were made, and I don't think it would be, would get quickly dismissed.

BEE Do you believe that the Commission will take heed to the apparent unpopularity of its April 9th preliminary action?

LK I do. If the broadcasters make their opinion known prior to a final decision, I am confident that we can get two more Commissioners to reverse their votes. FCC lawyers and engineering consultants, who know the history of the Commission, say there is plenty of precedence. Obviously, the Commissioners want to do what is best, but they got some poor guidance from EIA and, unfortunately, I have to say it, from NAB. Actually, it is in no broadcaster's best interest, and it is not really in the best interest of receiver manufacturers, at least if they only make AM sets to push the wrong system. The broadcasters have to get their opinions to the Commissioners. I note where one Com-

(continued on page 23)



Le solucionamos sus problemas de adquisición de equipo usado.



I.E.R. tiene la representación exclusiva

de Broadcast Equipment Exchange para proporcionar acceso inmediato al mercado de equipo usado.

Si necesita equipo usado a precios razonables para su estación, nuestro personal bilingüe le proporcionará directamente toda la información del equipo que se anuncia en esta publicación.

Ahorre tiempo y dinero,
póngase en contacto con
nosotros por que tenemos la
solución a sus problemas.



TELEFONOS:
I.E.R. (714) 459-3691
T.S.D. (714) 459-3825
TELEX: 181756

O ESCRIBANOS A:
I.E.R.
1205 Prospect, Suite 510
La Jolla, Ca. 92037

International Equipment Representatives

Circle 115 on Action-gram.

The Exchange The Exchange The Exchange

AMPLIFIERS

Want To Sell

MAC tubes, 30, 40, 75. Empirical Audio, 914-762-3089.
Crown D150A very clean, 3 yrs left on warranty. Key Code 5-29.
Crown M-600 (mono) 1000 watts into 4 ohms, mint cond. Key Code 5-69A.
Crown PSA-2 mint cond. Key Code 5-69B.
A-B Systems 205, 200 watt amp, new, reasonable. Key Code 4-31.
QRK Alpha II stereo pre-amp. Key Code 4-60H.
Marantz 240 stereo power amp, 250 watts, mint cond, reasonable. Key Code 4-31.
Cerwin-Vega Model A-3000I stereo power amplifier, need set of output transistors. Key Code 4-17.
Rust RF amplifier, model 0815A, serial #24, good for parts. Key Code 4-60G.
Dynaco 400 stereo power amplifier. Key Code 3-77C.
Gates utility amp. Key Code 3-72.
SWTP 210 A amplifier. 200w mono, solid state, excel cond, w/manual. Key Code 3-69A.
Dyna Co. amplifier stereo 70, also 75 mono. Key Code 3-53.
Crown D60 audio amplifier, rack mount. Key Code 3-32.
Kassino 200 amp and large built-in speaker w/matching extra speaker. Key Code 3-11.
Gates M5576 program amplifier. Key Code 3-53.
Marantz 240 power amp, 125 watts/channel, mint cond. Key Code 2-18.
MAC 30's and 40's w/tubes. MAC 2100, Crown D-75. Key Code 2-54.
Marantz 7T pre amp, mint cond. Key Code 2-18.
Johnson ST-4 SCA tuner, 67kHz, new. Key Code 2-41.
SAE XXXIB, SAE 2400, SAE 2500. Key Code 2-54.
Ampex 80-watt, new mono solid state. Broadcast type power amps that are new and in factory cartons. 19" R.M. Key Code 2-65B.
Op-amp Labs model SM 100 50 w/channel, like new. Key Code 2-25.
Altec 468 A equalizer amplifier. Key Code 2-61.

Want to Buy

McIntosh MI-75 amplifier, any cond. Key Code 5-48.
Marantz 1, 2, 5, etc, Mac and Quad II, tube amps/preamps, need to be operating, must be reasonably priced. Key Code 4-49.
McIntosh MC-3500, 350 watt tube amp, working cond. Key Code 3-78.
McIntosh MC-2300, 600 watt solid state, working cond. Key Code 3-78.
Fisher SA-100, 150 watt tube, working cond. Key Code 3-78.
Marantz 7T pre amp solid state, need many, working cond. Key Code 3-78.

ANTENNAS & TOWERS

Want To Sell

Scala Ch 80 UHF TV translator antenna, excel cond. Key Code 5-6.
RCA UHF filterplexer, ch 31, 12.5 KW rated 3 1/2" line, like new. Key Code 5-6.
Potomac PM 112-2 tower phase monitor, gd cond. Key Code 5-51B.
Andrew model 878 dry air pump, gd cond. Key Code 5-6B.
Andrew 1304 4-bay FM antenna, power gain of 3.6, horizontal, gd cond, complete. Deicers included, shipping weight 200 lbs, 3-1/8" input flange. Key Code 4-41.

ERI, 2 bay horizontal antenna, FMA-2, with heaters, tuned to 88.3. Key Code 4-43.
Andrew, 4 bay FM antenna #1304, tuned to 91.5. Key Code 4-43.
Andrew Hellax, 30' piece, new in orig box, HJ-5-50/RG-318/U. Key Code 4-2.
Phelps Dodge 6 bay HP, 94.1 MHz, used for 6 mos emergency. Key Code 4-48.
Shively 660, 6 bay horizontal antenna, tuned for 106.1 MHz, will handle 5kw RF input. Key Code 4-19.
Potomac Instruments, Model AM-19 (204), serial # 1363, day-night modes installed in unit, unit wired for 2 towers. Key Code 4-35.
Hellax 25' roll, Andrew #8414, 5/8" diam, slightly damaged outer insulation, no kinks or inner damage. Key Code 4-2.
RCA BTI-2H, 2 bay antenna, complete w/installation instructions, excel cond, tuned to 90.7 MHz. Key Code 3-29.
Cablewave coaxial cable 170 ft, 7/8" foam FCC 78-50J, new unused. Key Code 3-76.
CCA FM LP-2 antenna tuned to 91.5. Key Code 3-53.
Cablewave coaxial end terminal for FCC 78-50J cable (2), new. Key Code 3-76.
3 Bay FM antenna, vertical and horizontal polarization tuned to 103.1. Key Code 3-11.

Want To Buy

900' guyed tower for non commercial operation. Key Code 5-56.
TV antenna for ch 23, medium power. Key Code 5-44.
Guyed 160' steel tower for AM bdct. Key Code 5-27.
Hellax transmission line, 3"; Stainless G-36 tower sections (2 or 3, 20' sections), UHF TV antenna, ch 16, 17, 24, 33, 40, 45, or 55 and VHF TV antenna, any high band VHF antenna. Key Code 5-6.
Jampro, six or more bays CP antenna, prefer below 95MHz. Key Code 5-68.
Tower for UHF antenna, 600'. Key Code 5-44.
Channel 57 or channel 43 antenna, prefer slot type, 30KW rated input minimum. Key Code 5-65.
FM antenna 12 bay circularly polarized tuned to 88.1 MHz. Key Code 5-56.
Transmission line, 1/2" to 3/4", capable of 1kw at 103.1 MHz, any length, need 100-150'. Key Code 4-41.
RCA or Harris 8 bay circular polarized, tuned to or tunable to 106.1. Key Code 4-55.
Tower 50 to 300', self supporting or guyed, will arrange pickup, prefer on ground, but will disassemble also. Key Code 4-41.
8 bay circular polarized FM antenna for 98.3 MHz. Key Code 4-19.
RCA 8 bay circular polarized for 106.1 MHz. Key Code 4-19.
Tower, 80' to 100', any cond, for FM operation. Key Code 3-2.

AUDIO PRODUCTION (OTHER)

Want To Sell

Urel 1176LN mint cond. Key Code 5-69C.
Audio Development 706A SFX filter, case front looks nice, works great, no manual. Key Code 5-64N.
Audio patch panel, 3 double rows of 52 jacks each, in a 19" rack frame and wired to wire-wrap connection blocks, best offer accepted. Key Code 5-53.
Pultec EQP-1A, EQP-10S, \$500 each. Empirical Audio, 914-762-3089.
U.T.C. 3-A hi-low equalizer with cutoff and peak boost, very gd, no manual. Key Code 5-64O.
Tapco 4400 reverb, Teac AN-300, 4 ch Dolby, SAE 2800 parametric eq. Key Code 5-59.
Sound Craftsman audio frequency equalizer. Key Code 5-45.
Burwen Labs noise filter systems, Model DNF 1100. Key Code 5-43E.
Melcor AE-20, pre/eq, \$200 each. Empirical Audio, 914-762-3089.
Electrodyne 709L, modules, \$210 each. Empirical Audio, 914-762-3089.
Harris MSP-100 for FM stereo. Key Code 5-50A.
AKG BX10 reverb unit, excel. Key Code 5-46.
RCA BE-21B variable sound effects filter, clean, excel, manual. Key Code 5-64M.

SPECIAL SALE

AKG	List	Sale
Reverb BX 20 E	\$4500.00	\$3300.00
Mics C 414EB	695.00	450.00
D 224 E	400.00	280.00
D 12 E	225.00	155.00
D 140 E	185.00	120.00
NEUMAN		
Mics KM 88	1114.00	740.00
KM 86	1050.00	720.00
SENNHEISER		
Mics MKH 815	918.00	585.00
MD 421U	327.00	235.00
SONY		
Mics C 37 P	495.00	325.00
C 38 B	545.00	380.00
REVOX		
Recorder A 700	2999.00	1500.00

ALL EQUIPMENT IS NEW.

MERICKA AUDIO
 141 West 41st Street, New York, N.Y. 10036
 (212) 354-1470

Urel 1/3 Octave graphic equalizer 527-A, has 30 eq controls for all possible ranges, excel cond. Key Code 5-31.
DBX 122, like new cond. Key Code 4-60D.
Garron stereo phase enhancer, model STE-100, gd cond. Key Code 4-76A.
Sound Workshop 262, Mic-Mix SL-305 reverbs, new, reasonable. Key Code 4-31.
Allison Gainbrains (2). Key Code 4-20B.

DBX 124, like new cond. Key Code 4-60E.
Mobile studio, 1975 Dodge Sportsman, has Gates Studioette board, turntables, monitor amp for outside speakers, gd cond, camper conv to studio, van all in gd shape. Key Code 4-16.
CBS reverb unit complete. Key Code 4-32A.



FULL COMPASS SYSTEMS
 Edcor, Inovonics, Orban, Urel, Delta Labs, Technics, dbx, Lexicon, Eventide, Strand Sound, and Tapco. All available from Full Compass Systems. 6729 Seybold Rd, Madison WI 53719.
800-356-5811

SCA generator, Volumax 400, 100 tube-type receivers, two racks with 2 and 3 tape decks and switching gear, over 200 6-8 hr. tapes, everything needed for background music operation, all in gd to excel operating cond. Key Code 4-64.

DBX 158, new, reasonable. Key Code 4-31.
Farfisa VIP 345 organ. Key Code 4-20A.
DBX noise reduction, 8 trks 157 (rack mount). Key Code 3-15D.

Eventide Instant Phaser. Key Code 3-77F.
Pre-amp #M5530 (2), Gray model #602C (2) equalizers. Key Code 3-11.

Mellotron. Key Code 3-15E.
API equalizer 550A w/8 position API rack mount. Key Code 3-54.

DBX 142 noise reduction units (2), each stereo, used 1 yr. Key Code 3-12.

Eventide Omnipressor nearly new. Key Code 3-77D.

Non-Profit, tax-exempt Christian Corp. building radio station from ground up. Needs used equipment. Best price or tax-deductible donation basis. Key Code 3-31.

Quad 8, RV 10 spring reverb. Key Code 3-77E.
Audio Jack panels, rack mount. Key Code 3-32.

Audio Technica AT-706 electrostatic headphones, never used. Key Code 2-8.

Sound Workshop 262 reverb unit, new. Key Code 2-18.

Altec Lansing rotary attenuators, 600 ohm in and out. New and in factory cartons. RP series, 8-gang, 6-gang. RA series, 3-gang, single gang. Key Code 2-65A.

Loft 440 delay line/flanger, new. Key Code 2-18.

DBX 216-28 channels of noise reduction, with custom 5 strip patch bay and cables. Key Code 2-19A.

Urel 813 speaker systems, like new. Key Code 2-25.

Urel 567 P.A. processor, new. Key Code 2-58.

Gates model SA-40, includes table and all acces, works well. Key Code 2-61.

Ivie Audio Analyzer, IE-30s and ID-10s in stock. Triad Productions Inc, 1910 Ingersoll, Des Moines IA 50309. 515-243-2125.

Want To Buy

Kepelex 500 & RM 160 rack mounting unit. Key Code 5-12.

Urel LA4, LA3A, 1176N. Key Code 5-12.

Orban Optimod model 8000-A. Key Code 4-55.

Inovonics 355 or similar electronics for older (350) Ampex 2 ch. Key Code 3-22.

AKG BX-18 or BX-20 working or non-working. Key Code 3-8.

Orban dynamic sybillance controller. Key Code 2-33.

International Contact Section

For more information on any product listed in BEE contact the following companies. Importante para los radiodifusores de México, su suscripción a este periodico esta pagada por I.E.R.

In Canada: United Video Ltd
 1485 Triole Street
 Ottawa, Ontario K1B 3S4
 Canada
 613-741-5554

En Mexico: IER
 PO Box 1142
 La Jolla CA 92038
 Tel: 714-459-3691
 Telex: 181756

In Other Countries:

Broadcast Equipment Exchange
 PO Box 1238
 Arlington, VA 22210 USA

Tel: 703-525-0400
 TELEX: IMASINC 64593
 Cable: IMASINC ARLINGTON VA

BROADCAST
EQUIPMENT
EXCHANGE

ACTION-GRAM

MAY 1980
USE BEFORE
AUGUST 1980

Instructions: Use this form to take advantage of any of the services provided by *Broadcast Equipment Exchange*. Always fill in the Contact Section below first, then fill in the appropriate service section(s). Remember, BEE provides a FREE listing service for end-users. Listings are printed *without* the listee's name and address... A Key Code is used instead. Paid subscribers receive their issues of BEE with the matching Key Code list. Non-paid subscribers do not; they pay for the Key Code only when they order it (see the Subscription Section below).

CONTACT SECTION:

Name _____
 Title _____
 Company/Station _____
 Address _____
 City _____
 State _____ Zip _____
 Telephone _____
(Verifiable number must be provided)
 Signature _____

KEY CODE ORDER SECTION:

TOLL FREE KEY CODE HOTLINE

800-336-3045

In Virginia call 703-525-0400 collect.

...our Hot Line telephone number. When you call, we will give you any Key Code names and addresses and send you the full list with an invoice for \$5.

International Readers
See International Contact Section
on page 14

READER INQUIRY SECTION:

5/80

If you are interested in receiving literature from any of the advertisers, in this issue of the *Broadcast Equipment Exchange*, then circle the numbers as shown at the bottom of the ads, and we will be happy to forward your request to the appropriate company.

101	107	113	119	125	131	137	143	149
102	108	114	120	126	132	138	144	150
103	109	115	121	127	133	139	145	151
104	110	116	122	128	134	140	146	152
105	111	117	123	129	135	141	147	153
106	112	118	124	130	136	142	148	154

SUBSCRIPTION SECTION:

There are three ways of receiving BEE, so choose the way that suits you best:

1. FIRST CLASS MAIL WITH KEY CODE LIST. Avoid delay... get in on the action faster! For \$25 per year, you get BEE 1st class WITH the matching Key Code number list. (Enclose your check with your order and get 3 BONUS issues!).

- Bill me \$25 for a 1 year, 1st class mail subscription to BEE including the Key Code list.
 Check enclosed for 3 BONUS issues!

2. THIRD CLASS MAIL WITH KEY CODE LIST. Save better than 50% by reducing our handling costs! For \$12 per year receive BEE via 3rd class mail WITH the KEY CODE list included. (Enclose your check with your order and get 3 BONUS issues!).

- Bill me \$12 for 1 year, 3rd class mail subscription to BEE including the Key Code List.
 Check enclosed for 3 BONUS issues!

3. You receive BEE monthly WITHOUT THE KEY CODE LIST free via 3rd class mail if you send in this form at least once a year. You buy the Key Code lists for \$5 by using the Key Code order section above; only when you need it.

- Free without the Key Code list (I'll buy the list for \$5 only when I need it).

LISTING SECTION:

Broadcast Equipment Exchange provides FREE listings for all broadcast or pro-sound end users. Send in your "Want to Sell" or "Want to Buy" requirements, and we will list them in BEE for three full months. Hundreds of stations and companies have used us successfully. Why don't you? The

1. WTS or WTB, Category: _____

Text: _____

2. WTS or WTB, Category: _____

Text: _____

3. WTS or WTB, Category: _____

Text: _____

4. WTS or WTB, Category: _____

Text: _____

system is simple, just fill in your listing below, and send this form in by the 15th of the month preceding issue. Don't forget to fill in the contact section above before you mail the form. On each listing please circle either "Want to Sell" (WTS) or "Want to Buy" (WTB), and if possible please note in which category you would like the listing to be run.

5. WTS or WTB, Category: _____

Text: _____

6. WTS or WTB, Category: _____

Text: _____

7. WTS or WTB, Category: _____

Text: _____

8. WTS or WTB, Category: _____

Text: _____

IMAS BROADCAST EQUIPMENT EXCHANGE accepts no responsibility for the condition of the equipment listed.

Classified listings with contact information are available to manufacturers, dealers, brokers, distributors, etc. on a \$12 per listing basis. Call or write for complete details.

We make no attempt to evaluate equipment, but rather publish exactly what is sent to us by the listers.

FILL IN, REMOVE, AND
MAIL THIS FORM TO...



BROADCAST EQUIPMENT EXCHANGE
 P.O. BOX 1238
 ARLINGTON, VA. 22210 U.S.A.

The Exchange The Exchange The Exchange

CONSOLES

Want To Sell

X **RCA MI-4223-E** tube type 4 ch, new VU meter. Looks complete but listed for parts or museum. Key Code 5-64C.

25 **Yamaha PM-1000** board 16 in, 4 out, Master Room reverb, like new. Key Code 5-32.

X **Yamaha PM-1000**, 16x4 with shipping case; Optronics 3030 16x8+2 & 12x4+2. 3030s with 4 stage EQ+solo+2 cues+pan per ch, program sub-grouping, remix, VU meters. All consoles w/table system, patch bay, digital stopwatch, 4 remotes, producers desk. Key Code 5-17ABC

75 **Collins 12Z** remote tube mixer, works great, looks great, case is primed for painting, 1948 model, one owner, manual included. Key Code 5-64D.

X **RCA mono/mod-76C**, Raytheon mono/mod-RC-11. Key Code 5-22.

8 **Production and/or remote board**, includes Ramko DC 5MS stereo console, (2) CB1200 Gates turntables, Gray Research tone arms, Stanton 500 carts, 2 mono pre-amps, 700P & 700RP Tapecaster, Luxo boom, RE10 Electro-Voice mic, orange formica board w/short legs & long legs, in full operation w/manuals. Key Code 5-8.

100 **Heath TM-1626** stereo mixer, low Z bal XLR mic inputs (4). Hi Z-hi level unbal inputs (2). Mixbuss in/out, stereo out 150 ohms, manual, excel. Key Code 5-64E.

Ch **Sparta monoboard**, RCA stereo console BC18AS. Key Code 5-45.

2 **RCA console**, type BC-3C mint cond. Key Code 5-33.

Audiotronics 501, 28x24, 4 yrs old, w/NE5534. \$25,000. Empirical Audio, 914-762-3089.

Urei Mod 1 stereo console, 12 modules, 22 inputs, new no-lite lever switches, very excel cond, best offer or will trade for new or like new Ramko SC-5R and DC-8M mono consoles. Key Code 5-64V.

200 **Altec 230-B** mono 6 ch, 12 in, 1 out. Needs minor repair and a few switch knobs, fair cond/manual. Key Code 5-64A.

Panacoustic series 200 bdct console, 5 ch, tube-type, w/power supply. Key Code 5-58A.

Kelsey 8+3 like new w/road case & pwr supply. Key Code 5-29.

Hi quality 16 channel console, 20x16, X16, Melcor eq, Gotham faders, full patching, needs some work, \$7500. Empirical Audio, 914-762-3089.

Customote consoles (2), small type, one tube, one solid state, minor repair needed, gd sm boards for beginning school or small market station/manuals. Key Code 5-64B.

Huge 24x16x16 Electrodyne, Gotham, Audio Designs, 1200 pt patching, needs some work, \$7500. Empirical Audio, 914-762-3089.

Neve 8048 16x16 mint, discrete! \$35,000. Empirical Audio, 914-762-3089.

Gates Stereo Executive 10 ch solid state, excel cond. Key Code 4-65.

Peavey 8 ch. stereo board modified for 8 trk recording, excel cond. Key Code 4-52.

Shure SR 101 console. Key Code 4-46B.

Microtrak complete System D stereo mixer, TT's, cabinetry, excel cond, 1 yr old. Key Code 4-67A.

Altec 1220, 10 in mixer w/reverb, monitor mix, limiter, in flight case. Key Code 4-34.

Ramko 8 ch. stereo console, 32 inputs, includes interface for TT & tape remote starts, less than 2 yrs old, includes built-in digital clock and timer. Key Code 4-30.

Altec 9300 console, 16 input x 16 output, echo send/receive, eq, pre & post, XLR input & output. Key Code 4-78A.

Sound Workshop 1280B, new, reasonable. Key Code 4-31.

Altec 250T3 prod console, 8 rotary mic inputs, 4 stereo rotary line inputs. Key Code 4-78B.

RCA Audio console, old, no schematic, but in gd cond, eight ch plus master, Daven attenuators. Key Code 4-32G.

Gates Stereo Yard. Key Code 3-53.

Shure M675 bdct prod master used only two months, excel cond. Key Code 3-55.

Ampex MX-10 for parts. Key Code 3-57B.

Urei Model 1 console with 3, #13220 modules and 7, #25320 modules, like new. Key Code 3-34D.

Atlanta Electronics, 16 in, 16 out, recording console, slide faders. Key Code 3-41C.

Yamaha PM-1000, 16-in, 4-out, EQ, excel cond. Key Code 3-32.

RCA "New Look" consoles (6). Key Code 3-52.

Ashley 16x4 monitor board w/2-3 way crossovers, multipin connector, Anvil case, LED cliplights, variable gain etc. Key Code 3-57N.

Shure M-68 microphone mixer about 2 yrs old. Key Code 3-55.

Audio Concepts, Concept 1, 16 in, 8 out w/submasters, 6 pt eq, echo, cue, talkback, full patch bay, producers desk, 78" long oak, excel cond. Key Code 3-36.

Vanco MM-7 brand new in box. Key Code 3-46.

Gates 12 ch. Dulax w/split capabilities. Key code 3-11.

Gates 8x1 for parts #994-6699. Key Code 3-57J.

Ramko 5 ch. production console, new w/manual. Key Code 3-25.

Altec 1567. Key Code 3-57K.

RCA console. Key Code 3-72.

Ampex MX-10 mixers (2), four mic, two line in, two line out, tube type, gd cond. Key Code 3-69D.

CCA Futura 6S audio console. Key Code 3-53.

Ampex MX-10, gd cond (2). Key Code 3-57A.

Tascam Model 5 console, used very little. Key Code 3-34C.

Soundcraft 24/8 mixing console, 8 months old, used very little. Key Code 3-35F.

Cetec Series 10 stereo console, ten ch, extra mono program output, new, never used. Key Code 3-9A.

Ampex AM-10 Mixer, excel cond, \$395. Autodyne, Box 13036, Orlando FL 32859. 305-855-6868.

Ampex MX-35 Mixer, excel cond, \$195. Autodyne, Box 13036, Orlando FL 32859. 305-855-6868.

Spotmaster Consoles, new. Send for literature. Best package prices on trade-in surplus equipment. Autodyne, Box 13036, Orlando FL 32859. 305-855-6868.

Want To Buy

RCA 7A, 10 ch audio console with or without amps, must be repairable. Key Code 5-51.

Russco 505 mono or BE 4M50, must be in gd working order. Key Code 5-15.

GoBoes, Sugarloaf View, Criteria or equivalent design. Key Code 5-12.

API components. Empirical Audio, 914-762-3089.

Mixer 5 channel stereo, minimum, need not be solid state, must work. Key Code 5-63.

Russco 505 or similar, at least 8 input in gd working cond. Key Code 5-15.

Pultec 4 ch. line mixer. Key Code 4-69.

Stereo 5-ch board, at or near junk cond. Sparta, or similar, any brand for parts. Key Code 4-41.

Stereo broadcast consoles, one or more with 4 or 5 inputs, one with 5 or more, all with stereo output. Key Code 4-42.

Solid State Console, 8 mixer stereo. Key Code 4-19.

Altec 230B. Key Code 3-21.

Stereo console, 5 or 6 channel, in gd cond. Key Code 3-64.

Stereo console in working cond, for new FM. Key Code 3-2.

Collins 212B. Key Code 3-21.

DISCO & SOUND EQUIP.

Want To Sell

RCL Echo, spring, \$200. Empirical Audio, 914-762-3089.

Oberhelm OB-1 synthesizer. Key Code 5-37C.

DBX 187 w/front panel controls, \$787. Empirical Audio, 914-762-3089.

Altec 604E's, w/wo 612, some N1500A's, \$200 up. Empirical Audio, 914-762-3089.

Fender Rhodes suitcase piano. Key Code 5-37D.

Peavey PA-700 mixer/amp/graphic stereo unit, versital buy. Key Code 5-29.

Studio for sale, MXR digital delay, Space Station, Model 15, EV Sentry V's, JBL 110's, SAE MK31B, Peavey CS400, Crown D60's, RE-10, Senn 416, Sen 413, SM7, AKG 422, Model 1, Urei 10 band eq, MXR 10 band, Beyer 2X200's, Patch bay, Perc, Orban stereo synthesizer. Key Code 5-59.

Mixer, stereo with 2 mic, tape, 2 turntables and aux inputs, 1 yr old. Key Code 5-15A.

Super "C" Masteroom Echo 2 in/2 out, \$2000. Empirical Audio, 914-762-3089.

Fisher K-10 spring type, very excel, manual. Key Code 5-64R.

Lexicon 224 digital rev, 9 mos old, mint, \$5500. Empirical Audio, 914-762-3089.

EMT 240 Gold Foil, \$8000 each. Empirical Audio, 914-762-3089.

Eventide instant phaser. Key Code 4-72B.

Eventide omni-pressor, excel cond. Key Code 4-72D.

JBL 4341 monitor speaker system, 4-way, walnut cabinets, (pair). Key Code 4-74C.

Quad Eight RV-10 variable decay reverberation unit. Key Code 4-72A.

Sonn (2) 115 RH bass speaker cabinets, like new, excel. cond. Key Code 4-52.

Sensory-System custom built studio monitor speakers, 2-way system w/all Altec components, including active Altec crossover, sell as pair only. Key Code 3-65C.

Tascam 5 & 10 consoles, 8 trk and Ampex 2-trk, microphones, noise reduction system, limiters, compressors, everything. Key Code 3-35A.

Ampex & Scully recorders, 16 in 16 out console, complete recording studio, & all related equipment. Key Code 3-41H.

Portable Disco Console contains 2 Telex Viking 1/2trk stereo tape players, mixer w/2 mic and 2 phone/tape head inputs and headphone cue system. Key Code 3-1A.

Hammond B-3 modified for road use. Key Code 3-77A.

Altec 811B sectoral horns, no drivers, sell as pair only. Key Code 3-65D.

JBL 075 ring radiator, 2 to a box & twist lock connectors. Key Code 3-77B.

JBL 2440 drivers. Key Code 3-77.

MXR digital delay, brand new. Key Code 3-63A.

Fairchild 662 pre amp cards (20). Key Code 3-63B.

Emilar EH800 horns (12), like new. Key Code 3-34B.

LP Jacket Fabricating Plant, or will trade for electronic gear or video. Key Code 3-41A.

Burwen DNG 1100 noise reduction unit, prof model w/XLR connectors. Key Code 3-73A.

JBL 2350 (4) 90° radial horns. Key Code 3-77.

Altec 605, 15" two-way, just like 604. Key Code 3-57L.

Fairchild 664 equalizers. Key Code 3-63C.

Voice of the Theater copies (2), better made than Altec's A7's, includes Altec LF driver and E-V HF driver, sell as pair only. Key Code 3-65B.

Want To Buy

EMT 140 reverb plates, mono or stereo, EMT gold foil reverb, Pultec EQP-1, MEQ-5 tube type, Teletronix LA-2A limiters. Key Code 4-74.

Altec 604's or 515's, blown, must be reasonably priced, also blown Altec or JB hi-freq drivers, large or small. Key Code 4-49.

Altec 604 series raw speakers, blown, Altec hi-freq drivers, blown. Key Code 3-34.

Reverb, reasonable. Key Code 2-5.

Electro Voice #700 or #800, (Patrician) spk system, working cond. Key Code 3-78.

LIGHTING EQUIP.

Want To Sell

G.B.C. LK3 portable light set, 600 watt lights per set (3), w/stands and case (2 sets). Key Code 3-46.

LIMITERS

Want To Sell

Gates Sta-level compressor amplifiers (3), 2 excel, 1 fair, all operational, no hum and smooth specs, manuals. Key Code 5-64H.

Shure Level-Loc, excel, Hi-Z, hi level output modified to 600 ohm bal out, XLR connectors, in rack panel with manual. Key Code 5-64J.

Fairchild 666 with Auto-Ten, excel cond. Key Code 5-24.

CBS mono Volumax model 4300 in gd cond. Key Code 5-54.

Urei 176 tube type, excel cond. Key Code 5-24.

Collins Mod-26-U-1. Key Code 5-22.

RCA BA-146 AM sym/non-sym peak limiter, L.E.D. indicators, RCA's very latest design, super excel, manual. Key Code 5-64F.

CBS Audiomax 4440, ALC/Compressor, and Volumax 410, peak controller, all original packaging, manuals, and schematics, mint cond. Key Code 5-10A.

Collins 26W-1, tube type, new tubes, clean, very gd, manual. Key Code 5-64G.

CBS Volumax 400 w/manual. Key Code 5-38.

Harris ME-1 modulation enhancer, mint cond. Key Code 5-4.

Urei LA-3A, excel cond. Key Code 4-75C.

Urei LA-3A audio levelers (4), gd cond. Key Code 4-14.

Kahn Symetra-peak, cond unknown. Key Code 4-33.

CBS 4110 stereo FM. Volumax, excel cond. Key Code 4-76C.

Gregg Labs audio active filter network, series 2350, gd cond. Key Code 4-14.

Spectrasonics model 610 Complimiters, excel cond. Key Code 4-76D.

Collins mono limiter, works. Key Code 4-65B.

CBS Volumax 400, gd operating cond. Key Code 4-64.

CBS Volumax 411, excel cond, stereo. Key Code 4-54A.

DBX RM-160, new, Symetrix CL-100 (2), new, reasonable. Key Code 4-31.

C.B.S. Laboratories 4440 Audiomax and C.B.S. Laboratories 4110 FM Volumax, factory record. Key Code 4-73.

C.B.S., newer Thomson FM Volumax 4111, excel cond. Key Code 4-51.

CBS FM Volumax 4110, excel cond. Key Code 4-7A.

ITA LA-1B limiting amplifier (2). Key Code 3-53.

In the U.S. call 800-336-3045
For any Key Code Names and Addresses.

800-336-3045

New Listings are in *italics*.

The Exchange The Exchange The Exchange

TV FILM ... WTS ... CONTD.

I.T.V. Lens, 150mm, Soligor, F 1:3.5. Key Code 4-10.

RCA TP15B multiplexer, RCA TP15 extension for TP-7. Key Code 3-52.

Buhl multiplexer, stand and Graflex 16mm sound TV projector. Key Code 3-32.

RCA TK26C color film camera. Key Code 3-52.

Want To Buy

Film chain (color), slide proj, multiplexer, RCA TP-12 or 15, 16mm film proj (2), RCA TP-6 or B&H 614. Key Code 5-6.

VIDEO PRODUCTION EQUIP.

Want To Sell

RCA TA-9 video stab amps (2), gd cond. Key Code 5-6.

Vital processing amps, V-500 and V-1000. Key Code 5-6C1&2.

RCA UHF TV demodulator, MI-3402/MI-34004. Key Code 5-6.

Advent Videobeam-100, 7' color projection TV, excel cond, very little used. Key Code 4-66.

RCA TG-31 in field case. Key Code 4-53.

RCA TG-2. Key Code 4-53.

Telemet 3200 series video DA's (2), 8 DA's per tray, 4 outputs per video DA, 4 pulse DA's interchangeable also available, includes rackframes and power supplies, \$1100 per tray. Dave Castellano, Capitol Bdct Exchange, 3469 W Benjamin Holt Dr, Ste 525, Stockton CA 95207. 209-957-1761.

Telexecutive with mtg brackets. Key Code 4-53.

RCA BW-4 demodulator. Key Code 3-52.

Vidicon pan & tilt head, gd cond. Key Code 3-33G.

Setchell Carlson monochrome video monitor, model 10M915, mint cond. Key Code 4-28.

Remote Truck, JBE Olson aluminum body (Grumman), step van style, includes 3 13,500 Btu air conditioners, vehicle has approx 10,000 miles, originally planned for efficient 3 camera/2-AVR-2 system. Circuit breaker power dist installed, extra aluminum bracing on side walls & rooftop shooting platform, call for more information. Key Code 4-12A.

Ampex TASSB UHF Transmitter—55kw, good condition, ea. \$120,000
CVS 604B Time Base Corrector—Recently reconditioned, \$6,000
CDL VSE 741 Switcher—12 input, chroma key, \$4,000
Eastman 250 Projectors—Recently removed from service, ea. \$2,000
Eastman CT-500 Projectors—Optical and mag sound, ea. \$7,000
RCA TP-8 Projectors—Reverse, good condition, ea. \$1,000
RCA TVM-1 Microwave—7 ghz, audio channel, \$1,000
RCA TR-22 VTR—RCA Hi-band, DOC, one with editor, \$18,000
RCA TR-4 VTR—Hi-Band, velcomp, editor, \$12,000
Ampex 1200A VTR's—Amtec, colortec, West Coast location, each \$24,000
IVC 960C VTR's—Portable model, working good, ea. \$4,000

30 Brands of New Equipment—Special Prices We will buy your used TV equipment To buy or sell, call Toll Free 800-241-7878. Bill Kitchen, Quality Media Corporation in GA call 404-324-1271.

Chyron III System Font Compose Unit, including Keyboard, Disc Drive, Power Supply, Font Compose Unit, Easel, Camera Sync Generator & Monitor. Key Code 4-56A.
 3M video distribution amplifier. Key Code 3-32.

Rank zoom & focus control w/o cables, gd cond. Key Code 3-33H.

Gray Eng. Labs time code generator and reader. Key Code 3-32.

RCA XL-100, new, unlimited supply, complete RF circuits and board, video. Key Code 3-56B.

Video Data Systems T-100 character generator. Key Code 3-32.

Setchell Carlson triple 5 black & white monitor. Key Code 3-32.

RCA 21" master monitor, fair cond. Key Code 3-33F.

Want To Buy

Non-bdct quality equip for ITV, B&W or color, new or used. Key Code 5-70.

Color Video monitors, Black Burst generator, Ball Bros Mark VII color special effects generator card no. 3 & 4, color synthesizer card, Manual for CBS 526 NTSC Program Line Image enhancer (Photocopy OK), extender board for CBS 526 Image enhancer. Key Code 5-6.

RCA portable master monitor, contains 8" mono pix mon & 3" w/f monitor in portable case combo, gd cond, reasonable. Key Code 5-7.

VIDEO TAPE RECORDERS

Want To Sell

Ampex VR-7500 VTRs (3), color, 1". Key Code 5-6A.

Sony 2600 ¾" U-matic recorder players. Key Code 5-66B.

Sony SLO 340, portable ½" recording deck, used 10 times, mint cond. Key Code 5-61A.

JVC-VCR CR6100U, ¾" cassette. Key Code 5-1.

Sony 2000 VCR ¾" U-matic player. Key Code 5-66J.

Sony 1000 VCR ¾" U-matic player. Key Code 5-66D.

Sony EV-310 (5), 1" VTR's, rack-mount, gd to fair cond. Key Code 5-36.

Sony 2860 VCR ¾" U-matic modified for Convergence editing system, like new cond. Key Code 5-66E.

Panasonic 3020C, best offer or swap for Betamax, call BEE at 800-336-3045.

Recortec VTT series digital timers (2) for Ampex VR-1200 or 2000. Hours, minutes, seconds, frames, up-down counter, \$290 each. Dave Castellano, Capitol Bdct Exchange, 3469 W Benjamin Holt Dr, Ste 525, Stockton CA 95207. 209-957-1761.

Ampex 3000, spare head excel cond. Key Code 4-80.

RCA TR-5 VTR, low hrs, two head wheels. Key Code 4-53.

Ampex VR1200-2000 Capstan Motor with balanced flywheel. Brand new, \$275. Dave Castellano, Capitol Bdct Exchange, 3469 W Benjamin Holt Dr, Ste 525, Stockton CA 95207. 209-957-1761.

Ampex 1100 highband, 1200 electronics, DOC. Key Code 4-80.

RCA TR-50 VTR, Cavec, DOC, Editor, 5000 hrs, two head wheels. Key Code 4-53.

Norelco EL3401-A 1" B&W VTR, with accessories and reels of tape, very low hrs. Key Code 4-6C.

Ampex VR-3000 portable backpack qu LB/HB Color Record, mono playback, no batteries, battery charger(s) are available, currently in use by major prod house, 3 avail. Key Code 4-12.

JVC CR8300 ¾" machines (2) and one RM83V edit controller, gd cond, new heads. Key Code 4-9.

RCA Quad, TR-4, high-band color video tape machine w/electronic splicer & auto guide srvs, best reasonable offer. Key Code 4-5.

RCA Tr-2, two headwheels. Key Code 4-53.

RCA TR-22 factory high band electronic splicer, excel cond. Key Code 4-50.

IVC VCR 200XN, monochrome, plug-in color conversion avail, gd cond. (2). Key Code 4-38.

Ampex 1200 B, editor, sidecar monitor, spare head. Key Code 4-80.

IVC 600, VTR, colour 1", (2). Key Code 3-45.

IVC video head, new. Key Code 3-39B.

GE VTR, b&w, ½", Model 4 TD1B2, needs work. Key Code 3-45.

Sony 2850 convergence ECS-1 editor, read-out and interface (2). Key Code 3-32.

CVS 520 digital time base corrector. Like new. Key Code 3-32.

Ampex VPR 7900A like new. Key Code 3-39A.

VO-2860 color video cassette recorder with full electronic editing. Key Code 3-41B.

Want To Buy

Scanner for 800 series IVC color video recorder. Key Code 5-33.

RCA TR-3 or TR-4 tape recorders, hi/lo band color, 2" similar units at or near junk status, for parts also needed. Key Code 4-41.

Editing System, ¾" videotape, gd cond, all or part. Key Code 4-15.

Panasonic editing unit, complete, would consider other brand. Key Code 3-14.



SATELLITE TV PROGRAMMING DIRECT TO YOUR HOME!

Now! there is an exciting new way you receive special entertainment right in your own home. Through the use of our satellite Earth Station system, you can receive a multitude of television programs via satellite on your own television set. Even if you live beyond the reach of quality television, you can bring home a galaxy of satellite entertainment with unsurpassed clarity.

Some of the exceptional quality television programming that is available includes:

- ★ FIRST RUN MOVIES
- ★ NITE CLUB ENTERTAINMENT
- ★ CHILDREN'S PROGRAMMING
- ★ ALL SPORTS CHANNEL Showing over 6,000 games yearly
- ★ RELIGIOUS CHANNELS
- ★ INDEPENDENT SUPER TV STATIONS

MID-AMERICA VIDEO

P.O. BOX 511
 NORTH LITTLE ROCK, ARKANSAS/72115

(501) 753-3555

Circle 135 on Action-gram.

Available now from . . .

CLINT FREE BROKERAGE

RCA TCR-100 w/TR-61 for \$140,000
 Several RCA high band TR-22's, ranging from \$10-15,000

LLO modules for TR-3, 4 & 22 at \$750

MATC and CATC modules

Ampex HS-100 slo mo at \$16,500

Norelco PC-70, 3 available with 10:1 zoom at \$45,000 total

Two RCA hi band TR-4, two TP-6, 16mm projectors

Call Now . . . 615-693-4043

The Clint Free Company

509 Bardon Road
 Knoxville TN 37919

Circle 137 on Action-gram.

In the U.S. call 800-336-3045
 For any Key Code Names and Addresses.

800-336-3045

New Listings are in *Italics*.

Kahn Interview

(continued from page 13)

missioner says if he receives enough letters he will turn around. I note that Harris is writing to all of the broadcasters to get them to support a change. The only thing that worries me about that is that it may look like they are supporting Harris instead of the "marketplace". In any case, the Commission will listen.

BEE Now gettin back to your "universal" receiver concept. What can you tell me?

LK First of all I want to stress the fact that I am almost certain that universal receivers will never be built because I am positive that only one system will survive marketplace competition. But let us assume I am wrong. That two or even three systems survive, so that in say a few major cities there are at least one or two stations using different systems. Then the receiver marketplace will force superiority of the universal receiver and it will take over.

BEE How will it work? How does it take over the marketplace?

LK The public will make this decision directly and we should never underestimate their intelligence. They will go into a store and obviously the salesman will want to sell them a slightly more expensive device, and I mean slightly, and his sales pitch will be simple but effective. "This receiver gets you three stations but you never can hear the 4th station in stereo. So for a few dollars more I would recommend the universal receiver." I believe assuredly the universal receiver will take over. Nobody need worry about single system receivers under those conditions. I further believe that the set manufacturers will not even try to sell single system receivers under such conditions.

BEE But how will the universal receiver work? Will the listener have to switch modes?

LK No, the receiver will operate automatically. Fortunately all proponents have selected significantly different frequencies for their pilot tones. For example, Magnavox chose 5 Hz, Belar chose 10 Hz, we chose 15 Hz, etc. Therefore, it is easy to distinguish which mode the receiver should switch to, and this can be done economically.

BEE How cheap are you talking about?

LK Well, for example, an inexpensive car receiver, say \$100, would be increased (over the single system stereo mode which already would have the two speakers and the two audio amplifiers and one stereo decoder) by say \$4 to \$6. That is for this example 4% to 6%. By the way, that is about the cost of a single hair cut in big cities, excluding the tip.

BEE But I hear much higher prices.

LK I guess anybody could think of how to do it at a much higher price, but I can't conceive of the receiver designers not knowing better. If you are dealing with consumer items you must know how to do things economically, either they are not using their best engineers, or they have an axe to grind. In any case, we have done our homework. We have priced every single additional part required, and have had good cooperation from a major firm in the industry who gave us an IC price. It takes two for the universal, as opposed to one for the single, plus some ingenuity. We spent considerable time on the ingenuity bit and the price range is accurate. We even

went to the effort of reverse pricing a catalog receiver, an inexpensive unit. We bought the set and did a parts list and pricing, and actually our pricing was slightly higher than the catalog price. The standard price, not a sale price. We used the same techniques for the universal receiver, and therefore we believe our prices are somewhat conservative. I have to stress this is all academic because the marketplace will narrow it down to one system so nobody will ever make a universal receiver.

BEE If the Commission goes along with you on this marketplace concept, goes back to the recommendation of the

Broadcast Bureau, how long will it take Kahn Communications to get going and deliver units?





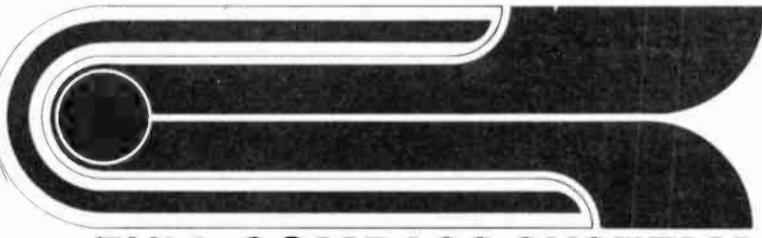
LK Two or three months. If the broadcasters get their letters in right away, two or three months after the Commission makes their vote in favor of free enterprise. It is possible that by the end of the summer AM Stereo will be going strong and there would be some receivers on the marketplace by Christmas. That would be a nice gift for AM broadcasters and the public.

BEE Thank you, Mr. Kahn.

LK Thank you.

DISTRIBUTOR DIRECTORY

The following is a listing of distributors that serve the broadcast industry and who would be glad to help you with any of your equipment needs. Contact any of them directly, or circle the appropriate number(s) on the Reader Inquiry Card and send it to IMAS today. We will forward your request to the distributors, and they will send you their literature or line cards.

<p>Audio Production Equipment Sales and Services</p> <ul style="list-style-type: none"> TASCAM AKG Tannoy Ampex Tape Omniralt Ivie Revox Technics Atlas Delta Lab BSC Beyer <p>TRIAD PRODUCTIONS INC. 1910 Ingersoll Des Moines, IA 50309 515-243-2125</p> <p>Circle 130</p>	<p>audiotechniques...</p> <ul style="list-style-type: none"> MCI Crown Leader dbx Lexicon AKG Technics Stanton UREI Dolby MRL Eventide <p>Serving the professional audio industry.</p> <p>652 Glenbrook Road Stamford CT 06906</p> <p>800-243-2598</p> <p>Circle 131</p>	<p> NORTHEAST BROADCAST LAB, INC.</p> <ul style="list-style-type: none"> Potomac LPB Inovonics Tapco Belar Technics Otari ESE Moseley B.E. Phelps Dodge Cablewave Q.E.I. Ampro QRK Autogram <p>Equipment Sales</p> <p>P.O. Box 1176 S. Glens Falls NY 12801 518-793-2181</p> <p>Circle 132</p>	<p> Reflection Audio</p> <ul style="list-style-type: none"> AKG Audio Arts BGW dbx Delta Labs EV Lexicon MRL Neutrik Otari Quantum ROR Shure Technics 3M tape <p>White</p> <p>704-375-1053</p> <p>1018 Central Ave Charlotte NC 28204</p> <p>Circle 133</p>
<p> UNITED TAPES of AMERICA</p> <p>Check our Prices on:</p> <ul style="list-style-type: none"> Agfa AKG Autogram Inovonics Otari Revox Shure Telex UREI Ursa Major <p>Box 1193, Grand Junction, CO. Call Collect: 303-242-0405</p> <p>Circle 139</p>	<p>Serving Over 3000 Stations in 26 States</p> <p>ELECTRONIC INDUSTRIES INC.</p> <p>distributors of electronic equipment and supplies</p> <p>"Call Spokeshaven Person to Person—Collect"</p> <p>19 East Irving Avenue Oshkosh, WI 54901 (414) 235-8930</p> <p>Circle 138</p>	<p> The Audio Group, Inc.</p> <p>Full Service Audio Brokers of New And Used Equipment</p> <p>Dealers: 3M, Dolby, Auditronics, MXR, Ivie, etc</p> <p>1780 Broadway, Ste 800 New York, NY 10019 212-765-7790</p> <p>Circle 118</p>	<p>SURCOM ASSOCIATES</p> <ul style="list-style-type: none"> CORNELL-DUBILIER MICA CAPACITORS ITT JENNINGS VACUUM CAPACITORS C.S.P. COILS & ACCESSORIES <p>MANY VALUES IN STOCK</p> <p>305 Wisconsin Ave Oceanside, CA 92054 714-722-6162</p> <p>Circle 144</p>
<p> FULL COMPASS SYSTEMS</p> <p>6729 Seybold Rd. Madison WI 53719 Phone: 608-271-1100</p> <p>NEW ... TOLL FREE 800-356-5811</p> <p>Circle 149 on Action-gram.</p> <ul style="list-style-type: none"> AKG Allison Research Ampex Atlas Audio Technica Beckman Beyer BGW Catrec Clear-Com Clone-Tone dbx Delta Labs Eddor ElectroVoice Eventide Inovonics JVC Lexicon Minicom Neutrik Orange County Orban Otari Pro-Tec Sennheiser Shure Sony Strand Tapco Tascam Technics Telex UREI Vega 			



THE TRADING POST



Bob Heffernan

We buy — sell — trade
all types and makes
of used broadcast
and cable TV
equipment.



Dino Di Marino

... WANT TO SELL ...

Sarkes-Tarzian Selectec 3, Model 2170-A, 21 input video production switcher (2 available) equipped with 3 mix effects busses, quad split and 2 auxillary busses. Effects include rotary wipes, bordered wipes, soft wipes, pattern modulators and positioners. Two 6 input RGB chroma keyers. Spare parts and manuals included, used 5 years, fully operational. \$25,000 each or best offer.

Danscoll TSP-101 processing amplifiers (excellent condition).

Quick set 5230 heads and 5450 pedestals (2). Excellent condition.

3/4" editing system consists of 2 Sony VO-2850's and one TRI EA-3 in excellent condition. Asking \$10,000.

3/4" editing systems consists of 1 Sony VO-2800, 1 Sony VO-2850 and TRI EA-3 Editor. Excellent condition, less than 100 hrs. of use. Asking \$11,000.

2 TRI PPC-1 portable production console c/w 3 colour monitors, 6 input video switcher, audio board and power supply to power portable camera. Excellent condition, asking \$7,000 ea.

G.E. TTC-95 Channel 5 XMitter 1961 Vintage retrofitted in 1967 and colorized.

✕ Ampex 352-1's, 1/4" playback tape decks w/solid state electronics. Good condition.

Trenka Conversion 16mm sound camera. Excellent condition.

LDH-1 cameras (3), complete w/10:1 zoom lens, viewfinder & 100' cable.

Tektronix 149 test signal generator.

Matched sets of 2/3" Plumbicon tubes.

Field Video production console.

Panasonic AK-900, 1" Plumbicon studio cameras with 10:1 zoom lens, fully loaded.

The above listed equipment is only an example of what we have available ...

This publication is distributed in Canada exclusively by United Video Ltd.

All equipment listed herein is available through us.

Call For Details (613) 741-5554



UNITED VIDEO LTD.

1485 Triole Street
Ottawa K1B 3S4 Canada

Circle 154 on Action-gram