KAHN COMMUNICATIONS, INC.
74 NORTH MAIN STREET
FREEPORT, NEW YORK 11520
(516) 379-8800

Subject: AM Stereo

Dear Sir:

The purpose of this letter is to bring to your attention a serious problem regarding AM Stereo.

As you are aware, there are five AM Stereo systems before the Commission (Motorola, Magnavox, Belar, Harris, Kahn/Hazeltine). Our analysis indicates that these systems have the following widely different performance characteristics:

(a) One of the systems substantially reduces stereo coverage relative to mono so that a transmitted 5,000 watt stereo signal has only the stereo coverage of a 359 watt mono signal.

(b) Three of the five systems introduce noise and interference bursts that will force AM broadcasters to reduce their modulation and even then will provide poor signals for stereo listeners who are not located close to the station.

(c) Four of the five systems, when subject to co-channel interference or skywave interference, suffer from a strange stereo image swaying motion akin to the cause of motion sickness.

Only the Kahn/Hazeltine system has been proven by actual on-the-air tests to be free of all of the above problems. Furthermore, only this system allows listeners the choice of immediately enjoying stereo using two conventional AM receivers, or purchasing newly developed stereo receivers.

Thus, if my analysis is correct, broadcasters should not only be concerned about getting AM Stereo authorized, but also about which system is approved.

The Hazeltine Corporation and Kahn Communications, Inc. submitted independent analyses to the FCC indicating that, because of the above mentioned problems, the Motorola, Magnavox, Belar, and Harris systems would severely reduce the stereo coverage of AM stations. One would have expected that the correctness of these analyses would have been proved or disproved by the NAMSRC tests*.

*In fairness, it should be stressed that my analysis does not show any serious loss in range for mono reception for these four systems. The Kahn/Hazeltine system is completely free of mono range loss.

However, instead of performing such tests at meaningful signal levels, including tests at the .5 millivolt per meter contour, the NAMSRC tests were performed at 25 millivolts per meter and 160 millivolts per meter. The ludicrousness of such tests becomes quite apparent if a broadcaster looks at his own contour map to locate his 25 and 160 millivolt contours. We have written to NAB about these tests and I have received a letter indicating that the NAB Engineering VP is reviewing the NAMSRC test procedures in light of our comments.

Thus, the Commission is now faced with the untenable situation of having to evaluate the practical performance of four of the five systems without any direct knowledge of their practical operating characteristics and must make comparisons almost completely relying on competing organization's paper analyses.

On the other hand, the Kahn/Hazeltine AM Stereo system was independently tested by two separate broadcast groups following normal operating test procedures and logging over 20,000 hours, over a 3-1/2 year interval, of practical on-the-air experience. (I believe that none of the other proponents have had more than 100 hours of proponent supervised on-the-air testing.) It is interesting to note that WFBR's final report of on-the-air experiments with the Kahn/Hazeltine system provides substantial discussion of tests performed at the .5 millivolt per meter contour.

It is just at the .5 millivolt contour where a system proves its worth and where I am certain your own engineers would have tested the system. Almost any system could perform satisfactorily at a signal power level equal to 100,000 times the equivalent .5 millivolt contour power:

$$\left(\frac{160 \text{ mv}}{.5 \text{ mv}}\right)^2 = 102{,}400$$

Not only were the NAMSRC tests performed at exceedingly high levels, but two of the systems were tested with roof directional antennas, roof amplifiers, and the receivers were tested in a shielded room. Such tests led one of the proponents who participated in the NAMSRC work, the Magnavox Corporation, to describe the tests publicly as "deceptive".

One NAB employee, who was directly involved in the NAMSRC tests, without the knowledge of NAB's management, publicly stated at the NAB '78 convention that he was using "various devious means" to make certain the Commission selects the "right" system. Although I have recently received a letter from the President of the NAB disavowing this employee's statement and unequivocally stating that NAB will not

take any position regarding the selection of a system, I believe that there is at least a possibility that a few of the people who claim credit for the NAMSRC tests may stubornly rely upon these "deceptive" tests to champion a system, supposedly on your behalf, and may attempt to "sell" that system to the Commission.

In view of the urgency and importance of this matter, may I ask your opinion on AM Stereo in general and what you think of relying on 25 and 160 millivolt field tests.

Also, if you are familiar with the various stereo systems please state which system would best satisfy your requirements. Finally, since some engineers claim that .5 millivolt contour coverage is not really important to broadcasters, I would appreciate hearing your opinion on this point. (Since our system has been proven to provide creditable stereo performance, at the .5 millivolt contour and beyond, I, of course, would be most interested in knowing whether you believe that this unique feature is of real significance.)

May I hear from you at your earliest convenience.

Sincerely,

KAHN COMMUNICATIONS, INC.

Leonard R. Kahn
President

LRK:rk

cc: Magnavox Co.
Belar Electronics
Harris Corporation
Motorola, Inc.

KAHN COMMUNICATIONS, INC.
74 NORTH MAIN STREET
FREEPORT, NEW YORK 11520
(516) 379-8800

February 1, 1979

Subject: AM Stereo/STA request for WABC

Dear Sir:

I am most pleased to enclose a copy of the ABC submission to the FCC requesting an STA for their flagship station, WABC, New York.

This submission details the reasons why ABC believes that the Kahn/Hazeltine ISB system, "has...the features and characteristics... that will provide for the growth and survival of AM Radio". It is especially noteworthy that ABC expects to demonstrate that our system will have "...stereo coverage area...comparable to the mono coverage".

We believe that this ABC expectation is fully supported by some 20,000 hours of practical on-the-air testing at XTRA in Mexico, which was received in stereo as far north as Anchorage, Alaska, and at WFBR Baltimore, which reported good stereo reception at their .5 millivolt contour.

As you know, the Commission has requested your advice and guidance on AM Stereo. They want to know what you think about AM Stereo and which system should be adopted. May I urge you to assist the Commission by sending a letter to: Secretary, Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554, using as the subject, AM Stereo Docket No. 21313. A few paragraphs will suffice and normal letter form may be used. I would most appreciate a copy of your letter. The deadline is February 27, 1979, so if your schedule allows, send your letter today.

If you have any questions about our system, or want to discuss your FCC letter, please call me at 516-379-8800.

Sincerely,

Leonard R. Kahn /EAO

Leonard R. Kahn
President

LRK:rk/sr
Encls.

American Broadcasting Companies, Inc. 1330 Avenue of the Americas New York, New York 10019 Telephone 212 LT1-7777

Dear Mr. Johnson:

American Broadcasting Companies, Inc. (ABC), licensee of Station WABC, New York, New York, herewith requests Special Temporary Authority (STA) to demonstrate the Kahn/Hazeltine ISB System for a period of ninety (90) days commencing Thursday, February 15, 1979.

The Kahn/Hazeltine independent sideband AM stereo system has already undergone more than 20,000 hours of practical on-the-air operation and evaluation. This has shown that the features and characteristics of the independent sideband system (ISB) are those that will provide for the growth and survival of AM Radio.

ABC Engineering has independently analyzed the ISB system and has evaluated the results of on-air tests and operation and has concluded on the basis of information presently available that the ISB system will best serve the interests of the Broadcasters and the Public. ABC also believes that additional test information under normal programming conditions, utilizing our flagship Station WABC, New York City, would be helpful to reach a final judgment on the Kahn/Hazeltine ISB System.

The STA here requested is to demonstrate that:

1) there is no reduction in present aural service area;

2) the stereo coverage area is comparable to the mono coverage;

3) the ISB system is fully compatible with all AM receivers currently in use; and

4) the introduction of AM stereo service using the ISB system will enable the public immediately to enjoy the benefits of stereo without additional expense while awaiting the introduction of new high quality AM stereo receivers

The Commission will be provided with a report containing the results of ABC's tests, which we believe will demonstrate all of the foregoing.

Very truly yours,

AMERICAN BROADCASTING COMPANIES, INC.

By _____
Assistant Secretary

Mr. Wallace E. Johnson
Chief, Broadcast Bureau
Federal Communications Commission
Washington, D. C. 20554

January 18, 1979

EXCERPTS FROM REPORTS OF TEST STATIONS TO FEDERAL COMMUNICATIONS COMMISSION CONCERNING KAHN/HAZELTINE SYSTEM

AND

COMPARISON OF THE FIVE PROPOSED AM STEREO SYSTEMS

KAHN COMMUNICATIONS, INC.
839 Stewart Avenue, Garden City, N.Y. 11530
(516) 222-2221

ADVANTAGES OF THE KAHN/HAZELTINE AM STEREO SYSTEM AS QUOTED FROM FINAL REPORTS TO THE FEDERAL COMMUNICATIONS COMMISSION BY STEREO TEST STATIONS

"During the six months of AM stereocasting WFBR did not receive a single complaint or comment regarding spurious emissions."

"When switching between stereo and mono there was absolutely no detectable difference in the air product which was off air monitored on a conventional AM receiver, amplifier and hi fidelity speaker combination."

"The Kahn AM Stereo System, as delivered and tested by WFBR, meets all of the technical requirements of Section 73.40 of the Commission's rules. It does not produce any detectable spurious emissions. The equipment operated in a stable and predictable manner during the test period. Stereophonic separation was excellent as transmitted."

"It has been many years since the United States has been credited with a major technical contribution to AM broadcasting. AM stereo as tested by WFBR offers an excellent opportunity to rectify this situation. AM stereocasting would also provide the 'shot-in-the-arm' AM broadcasters need to compete on a more equitable basis with the other forms of Federally controlled transmissions."

Chief Engineer
WFBR, Baltimore

"WABC had been on the air with stereo for about 2000 hours."

"One of our skilled auditors reported that the reception of the AM stereo transmissions was of excellent quality and that the KAHN system produced audible results very nearly equal to that

of some FM systems. In addition, the system used at WABC and the AM stereo receiver in use was 'transparent' enough that quality differences between older and newer cartridges was very evident."

"We believe, based on results of our tests and studies, that the K/H ISB system is one which, if adopted, could provide the basis for a satisfactory AM stereo system now and likewise permit the improvements that may result from utilization of present and future technology."

Station WABC
ABC Engineering

"...we reviewed all the proponents systems and elected to test the system proposed by Kahn/ Hazeltine (Kahn)..."

"Following that evaluation we felt that Kahn System could best meet our requirements for compatibility, the ability to fully modulate, good separation, and minimum sensitivity to adjacent channel interference, among other considerations."

"...No monophonic receivers experienced any tuning or reception difficulties when the station was transmitting stereo programming. The system was capable of being modulated to the full legal limit with no apparent degradation of performance. Separation was usable through the range of frequencies of interest. Full stereophonic reception with good separation was observed with signal levels down to 0.23 mv/m. which was as far away from the station as time permitted us to go. ...we observed a complete lack of the 'picket fence' effect frequently noted with FM automotive reception;..."

"We found the two-receiver approach to work quite well. In fact, Mr. Win Fanning in his column, 'On the Air,' which appears daily in the Pittsburgh Post Gazette, wrote on the subject of receiving the

KDKA test programming, 'two transistor portables or two tabletop sets about the same size will work. The transistor set up I used worked splendidly.' "

Engineering Department
Westinghouse Broadcasting

"...experienced good results utilizing the two receiver method for AM stereo.....good separation was observed utilizing the two receiver method."

"...we believe that a viable system of AM stereo is now available to the broadcaster and to the public and recommend a speedy acceptance of the Kahn/Hazeltine ISB system of AM stereo."

Vice President - Engineering
RKO Radio

"Modulation peaks up to 100% negative and up to 125% positive were easily obtained and caused no degradation of the stereo or monaural signals. ...no decrease was noted in monaural coverage area."

"...no change in signal fidelity or in measured signal strength was noted when the stereo signal was switched on and off."

"In our opinion, stereo coverage using the Kahn/Hazeltine system is 100% of the monaural coverage."

"...stereo reception during adjacent channel interference conditions was superior to monaural reception."

Chief Engineer
KHJ, Los Angeles, CA

"Enhancement of Mono Reception in Stereo". "...It was noted that the previously described interference from the adjacent channel station

moved from the total overall signal, to the left channel speaker. This change in the way in which the interference was heard moved the interference off to one side, into a listening location which appears to be less objectionable when listening to a mono signal on the test receiver in stereo."

"Skywave Reception. A test location....315 miles from the KFRC transmitter....night time skywave signal between .3 M/V to 1.0 M/V... It was evident that by conducting these A-B tests, that the stereo separation was still being maintained while listening in a remote skywave signal area."

Chief Engineer
KFRC, San Francisco

"AM stereo does work. The Kahn-Hazeltine System was capable of meeting its minimum technical specifications while not degrading the listenability of the station."

"Public response to AM stereo was gratifying. Nearly 100% of the respondents indicated that the two receiver method was satisfactory for receiving stereo and that quality of the signal had not been compromised."

"The difference in separation is apparent."

Vice President - Engineering
LIN Broadcasting
WFIL, Philadelphia

"The stereo transmission system was operated on the air continuously from April 13, 1979 until June 29, 1979."

No..."restrictions or special conditions imposed on the KTSA testing program by Kahn-Hazeltine."

"A unique and valuable feature of the Kahn-Hazeltine system is that it allows stereo reception utilizing 2 conventional mono receivers."

"Installation and tuneup...on the KTSA Continental 315/F took 6 hours"..."We are quite pleased with the performance of the Kahn-Hazeltine ISB stereo system."

Chief Engineer
KTSA, San Antonio

"The Kahn adapter is quite versatile in its adjustment capabilities. Recognizing that transmitters vary widely in electrical characteristics, the unit provides adjustments to correct for frequency response and phase differences between the audio and RF sections of the transmitter, which carry L+R and L-R information, respectively."

"We were quite impressed with the ease of installation."

"These measurements help substantiate the claim that the Kahn/Hazeltine system is compatible with existing envelope detector receivers."

"The opinion was unanimous that there was no perceptible difference when the transmission mode was changed between stereo and mono."

"Our conclusion is that the Kahn/Hazeltine system is completely compatible with existing receivers."

"We feel that this property of the Kahn/Hazeltine system is an extremely desirable one. The ability to modulate to the levels now permitted is very important to AM broadcasters. Any reduction in permissible modulation percentage will reduce the area where reception with acceptable signal-to-noise ratio exists, and will place a stereo station at a competitive disadvantage to monaural stations in the same area."

"...the mono compatibility, ease of installation and adjustment, compatibility with modern audio processing, and high modulation level capability without receiver difficulty that have been com-

pletely satisfactory with the Kahn/Hazeltine system."

Chief Engineer
KING

"When evaluating the five different AM stereo generating systems that have been proposed to the Commission, the most serious flaw of all of the systems, except the Kahn/Hazeltine system, is their sensitivity of phase shift of the carrier with respect to the sidebands. The stereo separation of these other systems can be completely destroyed by a shift of only 45 degrees of the carrier in relation to the sidebands."

"From the various tests, measurements and audio recordings of WOW and KCMO, the Kahn/Hazeltine system was insensitive to phase shift of the carrier with respect to the sidebands."

"During skywave reception of WOW, some 200 miles away, listening tests and recordings indicated no deterioration of stereo separation due to phase shift from various atmospheric phenomena. With a field strength of 0.1 Mv/M and less, there was no detectable difference in field strength or audio quality when WOW switched from stereo to mono. The Kahn/Hazeltine system will allow stereo reception of distant stations by means of the skywave."

"During stereo broadcasting at KCMO and WOW, the Kahn/Hazeltine system was capable of the same full modulation level as was utilized during their normal mono mode of operation. A duplication of the existing audio processing equipment was all that was necessary for the conversion to the stereo mode of broadcasting. No special audio processing equipment was required to maintain the 'sound' of the station, whether listening in mono or stereo."

"But the initial attempt to interface the Kahn/Hazeltine system to the RCA Ampliphase transmitter resulted in surprise figures. Separation figures reached 35 Db and distortion figures exceeded the original mono figures by less than one percent."

"It is apparent that the only AM stereo system capable of long-distance skywave reception, good fringe area stereo image, insensitivity to co-channel and adjacent-channel interference and perfect compatibility with present AM mono receivers is the Kahn/Hazeltine system."

"The Kahn/Hazeltine system offers the most compatible AM stereo system, gives the listener stereo with a minimum of distortion and allows the broadcasting of stereo without the loss of coverage or increased interference. Of all systems proposed to date, only the Kahn/Hazeltine approach will work to the satisfaction of the Commission, the broadcaster and the public."

"From the extensive data gathered and the satisfactory results obtained, Meredith Broadcasting recommends to the Commission that they approve the Kahn/Hazeltine ISB system for the transmission of AM Stereo."

Director of Radio Engineering
Meredith Broadcasting

AM STEREO SYSTEMS COMPARISON

(As originally filed with FCC as part of Reply Comments dated August 1, 1979 except for "Sibilant Ghost" comparison.)

PROPONENT	KAHN/HAZELTINE	MAGNAVOX	MOTOROLA	HARRIS	BELAR
Type of System	Independent Sideband	AM/PM	Modified Quadr Mod	Reduced Quadr Mod	AM/FM
Separation Achieved by	Frequency Separation	Phase Separation	Phase Separation	Phase Separation	Phase Separation
Mixed Highs Proposed	Yes	No	No	No	No (Both L and R 7,500 Hz limited.)
Pilot Tone For Stereo Lamp	15 Hz	5 Hz	25 Hz	55 Hz to 96 Hz	10 Hz
Separation Specifications	20 db 100 to 5000 Hz 23 db 400 to 2000 Hz 26 db at 1000 Hz	10 db 100 Hz 16 db 200 Hz 22 db 4000 Hz 26 db to 5000 Hz	20 db 400 to 4000 Hz	15 db 400 to 5000 Hz	(?) 14 db measured worst case 100 to 5000 Hz
Stereo Separation Phase Sensitivity $\left[\frac{\Delta \text{Separ, at 15 db to 20 db separation region}}{\Delta \theta}\right]$	0	1.32 db/degree	1.32 db/degree	1.32 to 3.13 db/degree	1.32 db/degree
(The following six characteristics are a function of the above Stereo Separation Phase Sensitivity.)					
Co-Channel Interference - Stereo Platform Motion	Best (no platform motion)	Poor	Poor	Worst	Poor
Directional Antenna Sensitivity	Best (same as mono)	Poor	Poor	Very Poor	Poor
Fading Sensitivity	Approximates mono (If synchronous detection is used better than mono.)	Poorer than mono.	Poorer than mono though better than Magnavox & Belar.	Poorer than mono due to platform motion though better during carrier fades.	Poorer than mono.

Receiver Phase Ripples & Phase Tracking	Best (same as mono)	Poor	Poor	Very Poor	Poor
Stereo Range	Best	Poor	Poor	Very Poor	Poor
Sibilant Ghosts*	Insensitive (Best)	Poor	Poor	Poor to Very Poor	Poor
Mono Range	Best -100% to +125%. Can tolerate overmod.	Some Loss -85% to -95% +125%	Some Loss -85% to -95% +125%	Slight Loss -98% to + 125%	Some Loss -85% to -95% to + 125%
Compatibility with AM Sets	Excellent	Excellent	Excellent	Good to Excellent	Excellent
Spectrum Utilization Factor (See Appendix A)	23.5 (mixed highs 5 to 15 kHz)	7.3	8.3	14.5	15.3 (with L and R limited to 7.5 kHz)
Increase in selling price of receiver over lowest (Belar). Assumes mass production price advantages. 1st year 2nd year (Assuming acceptance of public.)	+ $2.00 $ .40	+ $.25 $.10	+ $1.40 $ .20	+ $2.50 $ .50	+ $0 reference price $0
Two Receiver Capability	yes	no	no	no	no
On-the-air tested with Synchronous Stereo Receiver	yes	(?)	(?)	yes	no
Est. of hours tested in conformity with FCC NPR normal hours with normal program.	10,000 hours (20,000 hours earlier tests XETRA & WFBR)	700 hours	150 hours	150 hours	100 hours

*This factor not included in August 1, 1979 Kahn Communications Reply Comments filed with Commission.

KAHN COMMUNICATIONS, INC.
839 STEWART AVENUE
GARDEN CITY, N. Y. 11530
(516) 222-2221

July 23, 1980

Subject: AM Stereo FCC Docket 21313

Dear Sir:

On Friday, August 1st, just a few days from now, the FCC will make, possibly, its most important statement re AM Stereo.

The purpose of this letter is to provide you with an update of the FCC proceedings, and to request that you carefully consider the free enterprise "marketplace" approach towards selecting a single AM Stereo system that will best serve your needs.

As you may know, the Commission's April 9, 1980 initial tentative decision in favor of the Magnavox system drew a less than favorable response. Broadcasting's May 21, 1980 editorial stated: "If any conclusion may be distilled from all criticism it is that the FCC's selection of Magnavox among five systems in contention was the most unpopular choice it could have made." In the enclosed Technical Attachment, we list six engineering reasons why we believe the selection of Magnavox deserved its designation as a "most unpopular choice". (Included in the six is the shocking conclusion that Magnavox shares, with two other systems, a restriction to -58% modulation, not -95%, if stereo is to be free of clicks and pops at the 3 mv contour.)

We are delighted to report that on June 25, 1980 the FCC indicated that it plans to reconsider its tentative grant of an AM Stereo monopoly to Magnavox/Philips. However, there is no assurance that the FCC will not repeat its earlier error and still select a system that is unacceptable. (It is noteworthy that the Commission has not yet responded to our pleas for an Oral Hearing.) But, there is a solution to the AM Stereo problem that will guarantee the selection of a system acceptable to broadcasters and which will allow almost immediate implementation of AM Stereo.

In August of 1979, long before we would have guessed that Magnavox would be selected, we introduced into the stereo docket a discussion of the "marketplace" selection process. (Please see Broadcasting, May 12, 1980 and BEE, June 1980, for detailed "marketplace" discussions. Copies are available.)

The FCC's Broadcast Bureau, and Office of Plans and Policies made known their support of a "marketplace" decision at the April 9, 1980 FCC meeting at which AM Stereo was considered. Unfortunately, they were overruled and Magnavox/Philips was selected as the single system to be adopted as our national standard. Possibly they supported the free enterprise "marketplace" approach for the same following reasons we do:

a. Only way to avoid lengthy delay. Marketplace is the only approach that stands any chance of avoiding litigation. Litigation can delay the introduction of AM Stereo for years and still not insure selection of a system acceptable to AM broadcasters.

b. Only way that guarantees selection of a system preferred by AM broadcasters because broadcasters will actually control the marketplace decision. No receiver manufacturer will invest in mass production until broadcasters have proven by actual widespread operation that a system is acceptable. On the other hand, for the relatively small cost of an exciter and two or three sample receivers, a broadcaster can try the stereo system he believes will do the job. Actually, many stations have volunteered for such service and, indeed, some have already made extensive tests at the urging of the FCC. Just a few months after a "marketplace" program is approved by the FCC such pioneer stations will, by actual operation, indicate to the receiver producers that they can safely initiate mass production of the accepted system(s). (Some believe that General Motors will control the "marketplace". Can you see GM attempting to force a decision by installing a stereo system in their production cars that is unacceptable to broadcasters and which is not used by stations throughout the United States.)

It is, indeed, fortunate that AM stations will control the "marketplace" decision because their own future may depend upon their making a decision that best satisfies their listeners. Therefore, the public and the FCC can be assured of a wise decision.

c. Even if more than one system survives there is no serious receiver problem. We believe that only the Kahn/Hazeltine system will satisfy the AM broadcasters by offering good stereo reception out to the .5 mv contour and at the same time maintaining full mono performance.

However, even if 3 systems survive, a medium priced universal receiver costing only 4% to 6% more than a single system stereo receiver, can be manufactured.* This receiver will automatically switch to the correct mode by detecting the frequency of the transmitted stereo lamp tone which is different for all of the proposed systems. Thus, the listener will be unaware of mode selection. However, we believe that a universal receiver will not be required because within only 3 or 4 months the "marketplace" will have selected a single system.

*This pricing was confirmed by a major electronics firm with IC production capability. It is our opinion that, if the present IC price reduction rate is maintained, the price can easily drop to less than a 1% differential.

As Mr. George Capalbo, VP, RKO Radio stated to "Broadcasting", (April 14, 1980) "...the marketplace approach would have allowed the broadcasters to make the final determination...it would have taken a short time for the broadcasters to swing to the one that was doing the best job."

We are proud to announce that NBC has just informed us that if the FCC approves the "marketplace" they will use our system at all their music stations; WNBC, WMAQ and KNBR. As you may know, ABC, Westinghouse, RKO General, Meredith, Lin, Waterman, WFBR, XETRA, XEHL and Moffat CHED and CKY have tested and all issued favorable reports concerning our system to their regulatory agencies. I know of no network or major station group that favors any of the four other systems.

All we ask is the opportunity to immediately start to compete in the "marketplace" with our competitors so as to avoid years of delay and the expense of litigation and so that you, as an AM broadcaster, will be free to select a system that best serves your listeners and lets you best compete in the "marketplace" with your competitors, FM and tape decks. I hope that this letter clarifies our position in favoring the "marketplace" re AM Stereo docket 21313.

I hope that the August 1st FCC pronouncement does not deny or delay both of us the right to best compete in the "marketplace".

Sincerely,

KAHN COMMUNICATIONS, INC.

Leonard R. Kahn
President

LRK:rk
Encls.

cc: The President of: Magnavox, Belar, Motorola, Harris, EIA & NAB.

TECHNICAL ATTACHMENT

AM STEREO SYSTEMS COMPARISON

(As originally filed with FCC as part of Reply Comments dated August 1, 1979 except for "Sibilant Ghost" comparison.)

PROPONENT	KAHN/HAZELTINE	MAGNAVOX	MOTOROLA	HARRIS	BELAR
Type of System	Independent Sideband	AM/PM	Modified Quadr Mod	Reduced Quadr Mod	AM/FM
Separation Achieved by	Frequency Separation	Phase Separation	Phase Separation	Phase Separation	Phase Separation
Mixed Highs Proposed	Yes	No	No	No	No (Both L and R 7,500 Hz limited.)
Pilot Tone For Stereo Lamp	15 Hz	5 Hz	25 Hz	55 Hz to 96 Hz	10 Hz
Separation Specifications	20 db 100 to 5000 Hz 23 db 400 to 2000 Hz 26 db at 1000 Hz	10 db 100 Hz 16 db 200 Hz 22 db 4000 Hz 26 db to 5000 Hz	20 db 400 to 4000 Hz	15 db 400 to 5000 Hz	(?) 14 db measured worst case 100 to 5000 Hz
Stereo Separation Phase Sensitivity $\left[\frac{\Delta \text{Separ. at 15 db to 20 db separation region}}{\Delta\theta}\right]$	0	1.32 db/degree	1.32 db/degree	1.32 to 3.13 db/degree	1.32 db/degree
(The following six characteristics are a function of the above Stereo Separation Phase Sensitivity.)					
Co-Channel Interference - Stereo Platform Motion	Best (no platform motion)	Poor	Poor	Worst	Poor
Directional Antenna Sensitivity	Best (same as mono)	Poor	Poor	Very Poor	Poor
Fading Sensitivity	Approximates mono (If synchronous detection is used better than mono.)	Poorer than mono.	Poorer than mono though better than Magnavox & Belar.	Poorer than mono due to platform motion though better during carrier fades.	Poorer than mono.
Receiver Phase Ripples & Phase Tracking	Best (same as mono)	Poor	Poor	Very Poor	Poor
Stereo Range	Best	Poor	Poor	Very Poor	Poor
Sibilant Ghosts*	Insensitive (Best)	Poor	Poor	Poor to Very Poor	Poor
Mono Range	Best -100% to +125%. Can tolerate overmod.	Some Loss -85% to -95% +125%	Some Loss -85% to -95% +125%	Slight Loss -98% to + 125%	Some Loss -85% to -95% to + 125%
Compatibility with AM Sets	Excellent	Excellent	Excellent	Good to Excellent	Excellent
Spectrum Utilization Factor (See Appendix A)	23.5 (mixed highs 5 to 15 kHz)	7.3	8.3	14.5	15.3 (with L and R limited to 7.5 kHz)
Increase in selling price of receiver over lowest (Belar). Assumes mass production price advantages. 1st year 2nd year (Assuming acceptance of public.)	+ $2.00 $ .40	+ $.25 $.10	+ $1.40 $ .20	+ $2.50 $ .50	+ $0 reference price $0
Two Receiver Capability	yes	no	no	no	no
On-the-air tested with Synchronous Stereo Receiver	yes	(?)	(?)	yes	no
Est. of hours tested in conformity with FCC NPR normal hours with normal program.	10,000 hours (20,000 hours earlier tests XETRA & WFBR)**	700 hours	150 hours	150 hours	100 hours

*This factor not included in August 1, 1979 Kahn Communications Reply Comments filed with Commission.

**As of July 1980 at least a total of approximately 40,000 hours of commercial on-the-air operation has been logged.

TECHNICAL ARGUMENTS

In Response to Magnavox 5/27/80 letter to AM Stations

Basic Flaws in Magnavox/Philips System

The Magnavox system shares with Belar the advantage of allowing use of a slightly less expensive receiver (see preceeding chart $1.75 less first year, 2nd year $.30) but the penalties are as follows:

1. Very poor stereo coverage due to clicks and pops. The severity and rate of occurrence of these clicks and pops increases as you go further away from the station.* RCA tried to find a practical, inexpensive solution to this problem for both AM/FM and AM/PM systems for almost 20 years. (This click and pop problem is also experienced by Belar and Motorola. Only Kahn/Hazeltine and Harris are free of it but Harris has by far the worst full stereo noise problem of all 5 systems.)

2. Severe loss of both mono and stereo fidelity if present interference levels are to be maintained. With the present 10 kHz spacing of carriers, the frequency response must be limited to 5 kHz, and for 9 kHz spacing 4.5 kHz.*

3. Loss of mono range due to strict limitation of modulation to -95% and under practical operation much less. (Also true for Belar and Motorola.) If stereo reception is achieved, without clicks and pops, just out to your 3 mv contour you will have to limit modulation to -58%!* (That is why in June 1978 we attacked the EIA/NAB sponsored NAMSRC for testing at 160 and 25 mv/M. Unfortunately, the FCC apparently relied heavily upon these tests and apparently ignored tests controlled by broadcasters (rather than by proponents) to make their tentative decision.

4. Stereo "Platform Motion" when co-channel interference is present. (Motion also occurs with ground wave/sky wave interference.) See August 1, 1979 Kahn Communications' submission. (Motorola, Belar and Harris also have same problem. In addition, Harris suffers from further co-channel interference due to their pilot system extending from 55 to 96 Hz.)

5. Susceptible to "Sibilant Ghosts" in medium and high fidelity receivers. (See Kahn Communications, November 30, 1979 submission.) (Again, Motorola, Belar and Harris share problem.)

6. Very poor separation with directional arrays. (Also with receiver tracking errors and IF selectivity phase distortion.) KRMG reported that 34 db dummy separation at 2 kHz dropped to 12 db at 2 kHz on antenna at one lobe. (Again, Motorola, Belar and Harris have problem.)

*See details re points 1, 2 and 3 in following pages.

And, adoption of the Magnavox system would permanently deny those who cannot afford new stereo receivers the opportunity to enjoy stereo with two mono sets. This procedure has been proven successful in tests at a number of stations. For example, an engineering consultant reported better stereo sound with our system using two unmatched mono receivers than from a special demonstration record made with a competitive system (Harris) using a very expensive special reciever.

The "cocktail party" spatial selectivity effect (also unique to the Kahn/Hazeltine system) will not be available to decrease adjacent channel interference effects.

Magnavox attempts to deny the seriousness of their system's limitations by, for example, equating "clicks and pops" to "dust" on a record. (One C.E. who ran tests on the Magnavox system on reading the Magnavox 5/27/80 letter said the dust was "more like a sand storm".)

Magnavox also claims that their system, with its reported modulation problems, and its, at best if stereo is to be limited to 25 mv/M locations, -95% modulation limitation has better capabilities than the Kahn/Hazeltine system. But, every single station that tested the Kahn/Hazeltine system (all 14 of them) reported full modulation and absolutely no loss in mono coverage.

For example, "...at KCMO and WOW the Kahn/Hazeltine was capable of the same full modulation level as during the normal mono mode of operation." Meredith Broadcasting. "Modulation peaks up to 100% negative and up to 125% positive were easily obtained and caused no degradation of the stereo or mono signals..." KHJ, RKO General. "The system was capable of being modulated to the full legal limit..." KDKA, Westinghouse. "When switching between stereo and mono there was absolutely no detectable difference..." WFBR.

And possibly the strongest statement was by deed rather than by word. WABC (ABC New York) operated with the Kahn/Hazeltine system 24 hours a day without a single stereo announcement right through their most critical rating period.

ATTACHMENT

Frequency Response of Magnavox System

Magnavox's President states in his letter that their system will not "reduce the 15 kHz audio bandwidth now permitted". But his own engineers have stated (5/15/79 FCC report):

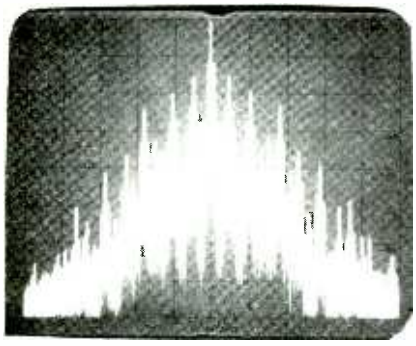
> "For stereophonic receiver operation, a 5 kHz filter in the left and right channels appears to be necessary in order to maintain the protection ratios currently obtained in monaural receivers."

In order to determine which statement is closer to the truth, three spectrum photos are reproduced on the next page. Figs. 1 and 3 were reproduced from the Magnavox FCC report. A comparison photo of the Kahn/Hazeltine system (Fig. 2) is provided. Fig. 2 was recently made with a Kahn stereo exciter except the filtering in the L-R branch for mixed highs operation was removed. Thus, the system tested had full 15 kHz response in the L+R and L-R channels.

All tests used laboratory transmitters and the NAMSRC four tone test signal. However, the peak envelope modulation for Figs. 1 and 3 (Magnavox) was 85% and Fig. 2 (Kahn) used 100% as per following chart:

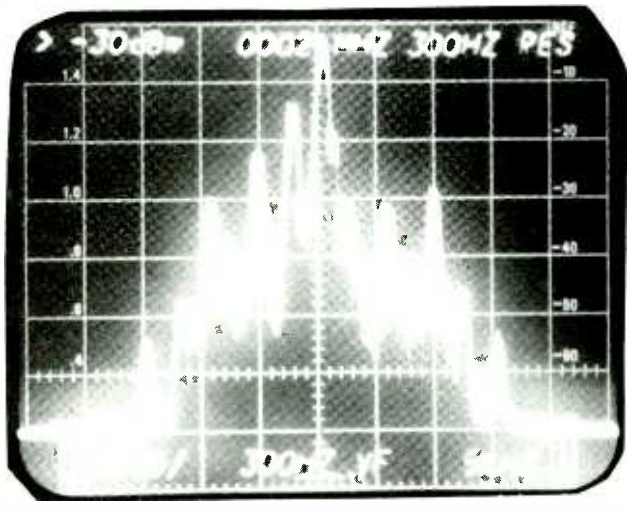
Tone Frequency	Magnavox % (Figs. 1 & 3)	Kahn % (Fig. 2)
400	35%	41.2%
2,500	25	29.4
5,500	15	17.6
9,500	10	11.8
Peak Modulation	85%	100%

Fig. 1 (Magnavox) and Fig. 2 (Kahn) can be directly compared as they both use full 15 kHz L+R and L-R response. Fig. 3 (Magnavox) uses 5 kHz LPF in both L and R input circuits. (All figs. 10 db/vert. div. and 5 kHz/hor. div.)



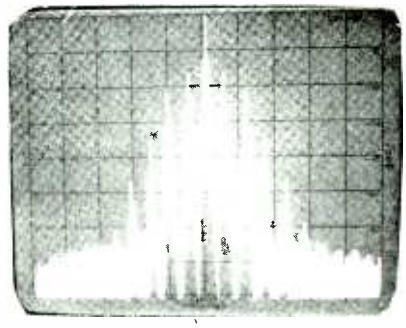
L Channel 85% Envelope

Fig. 1 Magnavox



L Channel 100% Envelope

Fig. 2 Kahn/Hazeltine



L Channel 85% Envelope

Fig. 3 Magnavox using 5 kHz Filters

A comparison of Figs. 1 and 2, especially at 15, 20 and 25 kHz points, shows significant spectral advantage of the Kahn/ Hazeltine system. Comparable spectrum was achieved only when Magnavox reduced fidelity to 5 kHz at 85% modulation (Fig. 3).

It should be stressed that while the FCC requested tests in excess of 85% modulation, the Magnavox tests were made at 85% modulation and lower. On the other hand, the Kahn tests were made at full 100%. Indeed, we recently performed tests of over-modulation by increasing level 2 db above 100%. The resulting spectrum was still well confined and at 20 kHz all components were better than 60 db below carrier and at 30 kHz were approximately 70 db down.

It should also be stressed that Magnavox, in common with Motorola, Belar and Harris, cannot provide spatial selectivity (cocktail party effect). RKO stations and others have reported on tests of the Kahn/Hazeltine system showing that the "cocktail party" effect significantly reduces adjacent channel interference.

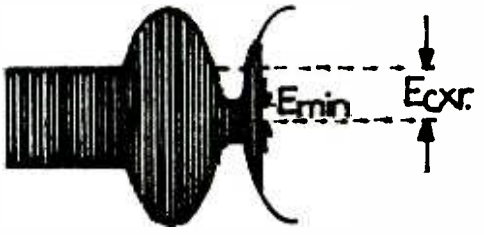
Finally, in a study of spectrum utilization performed by Kahn Communications (see August 1, 1979 Reply Comments to FCC) we found that Magnavox had the poorest rating. This analysis considered both co- and adjacent channel interference. The analysis also considered susceptibility to interference as well as systems' production of interference. The systems rated in the following order: Kahn/Hazeltine, Belar, Harris, Motorola, Magnavox. Belar was credited with spectral improvements due to their self imposed 7.5 kHz fidelity restriction. Without their 7.5 kHz restriction Belar, Magnavox, and Motorola would have ended in a virtual tie for last place. This study was performed before we, and many broadcast engineers, believed Magnavox had any real chance of being selected by the FCC.

Magnavox -95% Modulation Limitation

Magnavox has called for a -95% modulation limitation. It is important that one considers just what this proposed specification means.

The only apparent advantage of the Magnavox system is its ability to use a cheap decoder utilizing a limiter and an inexpensive phase detector to demodulate the L-R component. This limiter-inexpensive phase detector combination operates so that when the signal just drops below the level of the noise a click or pop is produced. This S/N problem is innate to Magnavox's inexpensive receiver method and can only be alleviated by abandoning the cheap receiver concept eliminating the system's only advantage. And the system would then still suffer from all of its other basic defects enumerated in the attached letter.

The following waveshape helps to show the problem:



$$E_{MIN} = \left(1 - \frac{NEG\%}{100}\right) E_{CXR}$$

$$\therefore AT\ -95\%$$

$$E_{MIN} = \left(1 - \frac{95}{100}\right) E_{CXR}$$

$$= .05\, E_{CXR}$$

Since power is a squared function of voltage a 5,000 watt station produces 12.5 watts at the -95% point (and a 250 watt station produces 625 milliwatts). This small amount of power must be stronger than the noise if clicks and pops are to be avoided.

The following table assumes that a station produces just enough signal voltage to slightly exceed the receiver's internal noise and the ambient noise at a 25 mv/M point when the transmitter is strictly limited to -95% modulation. Assuming the ambient noise is constant at the various points the following table shows what modulation level restrictions must be maintained if noise clicks and pops are to be avoided. No consideration is given to increases in effective modulation caused by directional antenna patterns which tend to increase the sideband to carrier ratio. Such increases can substantially further degrade performance.

Location	Maximum Negative Modulation Allowed to Avoid Clicks & Pops
25 mv/M	-95%
12.5	-90%
6.25	-80%
5.0	-75%
3.0	-58%
1.56	-20%
1.25	0%

Thus, if you wish to serve stereo listeners at your 3 mv contour you must restrict your modulation to -58%. And if you wish to serve 1 mv listeners you cannot use any negative going modulation.

It should be noted that equivalent noise problems, in the L-R channel, are experienced by at least two of the other proposed systems.

On the other hand, the Kahn/Hazeltine system is free of such problems and successful on-the-air tests at .1 mv/M have been reported with -100% and +125% modulation.

It is also noteworthy that the NAMSRC tests, as sponsored by EIA and NAB, at 160 mv/M and at 25 mv/M completely covered up this problem as well as other medium and weak signal problems. As Magnavox itself originally stated, these NAMSRC tests were "deceptive". Unfortunately, the Commission's OST staff apparently almost completely relied upon the NAMSRC tests and apparently ignored the reports of realistic tests performed by the few stations that were in control of tests (not proponents) such as WJR and the 14 stations that tested the Kahn/Hazeltine system.

MAGNAVOX
CONSUMER ELECTRONICS COMPANY
INTERSTATE 40 AND STRAW PLAINS PIKE • P.O. BOX 6950
KNOXVILLE, TENNESSEE 37914

KENNETH C MEINKEN JR
PRESIDENT

615-521-4301

July 15, 1980

Dear General Manager:

At the end of May, I wrote to you in some detail about the Magnavox AM stereo broadcast system, which was recommended in April by the FCC as the industry standard.

Since that time a number of articles explaining our system have been published in trade magazines. One piece, in Audio Times, is a particularly thorough account, and as additional background I am enclosing a copy.

You have no doubt been following some of the activity relative to AM stereo and in this letter I want to try to keep you up to date on the status of the proceedings before the FCC, as we view them at Magnavox.

First let me assure you that our company has worked with the FCC over a period of many years, and we have always made it a practice to work within the Rules of that Commission, generally with a very low profile. However, a low profile should not be mistaken for a bowed head.

We have urged the FCC (in a letter dated June 30 and copied to all parties to the proceeding) to issue a final report and order in the AM stereo proceedings. We noted that extraordinary efforts being made to influence the Commission long after the cut-off date were improper and that a prompt final order would permit proper procedures under the rules to be resumed. The Wall Street Journal reported on June 27, 1980, what you already know, that Motorola and Harris each sent letters to more than 4,000 stations urging broadcasters to ask the FCC to reconsider its decision. In response to these two mass mailings, broadcasters sent only 70 odd letters. These letters are on file in the FCC's Public Documents Room; a reading shows great similarity of words and phrases used. They merely repeat and paraphrase the same misinformation.

We hope that this campaign will not cause the Commission to waiver or step back from its earlier decision. We have every confidence that a reexamination by the Commission of the voluminous filings made by Magnavox (and other system proponents) over more than three years will result in a recommendation of our system once again. It is, however, an assessment we find unfortunate at this time, since it delays the orderly process of hearings which would normally follow any final order from the FCC.

We are concerned that if the proceeding is reopened that you and your engineers will again be besieged with requests to contact the FCC either to oppose one system or to support another. Let me assure you we are not about to ask you to write to the FCC in our behalf. To do so would violate the Commission's rules against improper ex parte contacts with the Commissioners or the staff. We believe, fervently, that the selection of a system of AM stereo broadcasting ought to be made on sound technical grounds and not on the basis of a letter-writing popularity contest.

If you, or members of your staff, have any questions regarding the Magnavox AM stereo system, please direct them to Mr. Charles Dolk, Vice President, Product Management at this address.

Sincerely,

K.C. Meinken, Jr.

TECHNICALITIES by Len Feldman

How Does AM Stereo Work?

A Guide To The Magnavox System

As you have probably heard by now, the Federal Communications Commission has finally chosen a system that AM radio broadcasters can use to transmit two-channel stereo programming. The decision, announced on April 9, came precisely 10 days short of nineteen years after the Commission approved a system for stereo FM broadcasting. This seemingly long period between the adoption of stereo FM and stereo AM occurred not because of any lag in technology, but because AM broadcasters initially showed very little enthusiasm for stereo back in the early 1960's (when the subject of stereo AM was first broached). The FCC, in January 1962, decided against all stereo AM proposals put forth prior to that date and instead encouraged the growth of stereo FM broadcasting.

A few years ago, AM broadcasters became increasingly concerned with the sudden popularity of FM, a popularity which many feel was a direct result of the stereo broadcast capability granted to FM stations. Today, FM stereo broadcasters win top ratings in most major metropolitan markets, even against strong AM competition. This is all the more remarkable when you consider the poor penetration of FM signals into fringe areas (compared with AM) and the multipath/noise encountered by so many listeners who try to listen to stereo FM in moving vehicles.

The National AM Stereophonic Radio Committee (NAMSRC) was formed on September 24, 1975, "for the purpose of studying AM stereophonic broadcast systems in response to a growing interest by industry, broadcasters, and the FCC." The committee was jointly sponsored by the Electronic Industries Association (EIA), the National Association of Broadcasters (NAB), the National Radio Broadcasters Association (NRBA), and the Broadcast, Cable and Consumer Electronics divisions of the IEEE.

On December 19, 1977, the NAMSRC's efforts produced a final report that was published by the EIA and submitted to the FCC. The report contained analyses and field test results for three systems: Belar, Magnavox and Motorola. Two other proponents submitted proposals directly to the FCC, independent of the NAMSRC. These were Harris and Kahn Communications. Kahn's system was later endorsed and supported by Hazeltine Corporation. The FCC issued a Notice of Inquiry concerning stereo AM on June 22, 1977, seeking industry opinions regarding AM stereo and, ever since March 1978 (the closing date for comments to the FCC) the industry has been awaiting a decision.

In the last month, there had been rumors that the FCC was, in fact, not going to endorse one system over another but was going to "leave it up to the marketplace" to decide. As matters have turned out, these rumors proved to be unfounded, for the FCC, upon the advice of its engineering experts, has chosen the stereo AM system proposed by Magnavox.

How The System Works

The system for AM stereo broadcasting proposed by the Magnavox Company employs a combination of amplitude modulation and true linear phase modulation. Stereophonic program material is matrixed into left-plus-right (L + R) and left-minus-right (L-R) signals prior to transmission, in much the same way that left and right channel information is matrixed during stereo FM broadcasting. The L + R signal amplitude modulates the station carrier while the L-R signal phase-modulates the same carrier. Also incorporated in the composite signal is a five Hz FM signal on the carrier which allows for automatic identification of stereo broadcasts in much the same way that the familiar 19kHz pilot carrier signal used in stereo FM has been almost universally used for lighting up some form of indicator on the front panel of FM tuners or receivers to indicate that the signal being received is stereo. Automobile radio manufacturers were particularly keen on having such an indicator to identify stereo AM broadcasts. Without this feature, auto makers were said to be disinterested in stereo AM because all of their potential customers expect visual feedback, based upon years of experience with stereo FM.

A three-step process, capable of producing any frequency in the AM

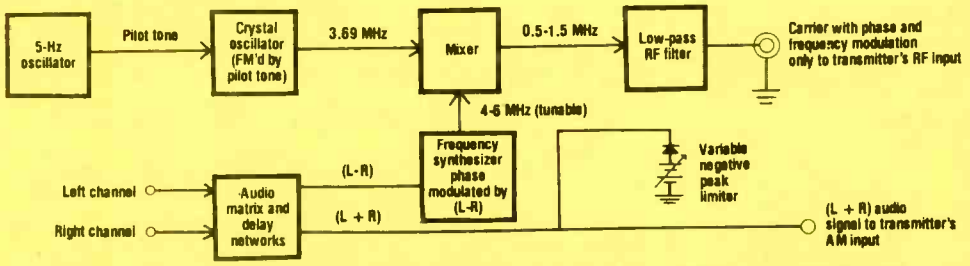


Fig. 1. BLOCK DIAGRAM OF MAGNAVOX STEREO AM SYSTEM TRANSMISSION

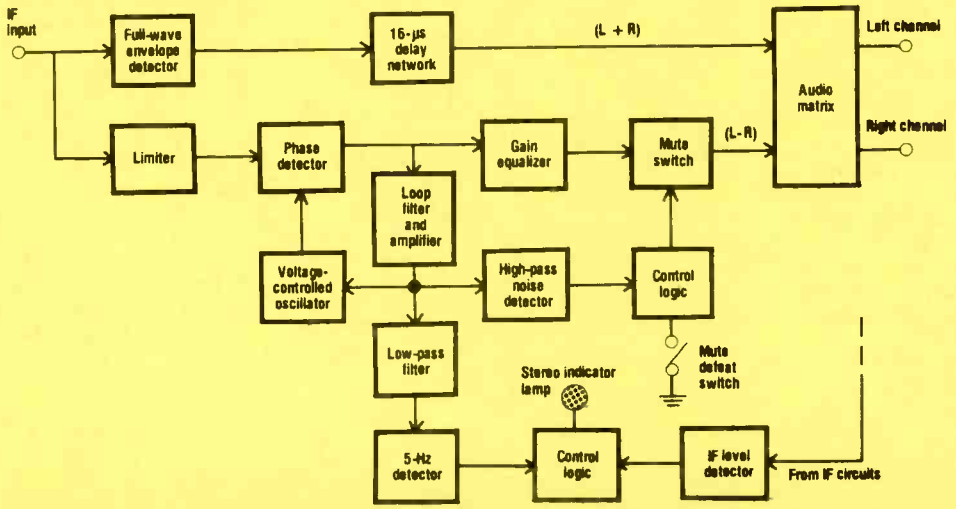


Fig. 2. BLOCK DIAGRAM OF RECEIVER CIRCUITRY REQUIRED TO DECODE NEW FCC-APPROVED STEREO AM SYSTEM PROPOSED BY MAGNAVOX.

TECHNICALITIES

"It was rumored the FCC would leave a decision up to the market."

broadcast band generates the Magnavox AM/PM signal, as illustrated in the block diagram of Fig. 1. First, a 3.69 MHz oscillator is frequency modulated with a five Hz stereo identification tone. The modulation amounts to four-radian phase deviation. Next, a phase modulator adds the L-R audio component as phase deviation to the output of a tunable (four MHz to six MHz) frequency synthesizer, with peak deviation contributed by the L-R program held to no more than one radian. The two modulated signals are hetrodybed (converted down) to the desired broadcast band frequency of the particular station and then applied to a standard AM transmitter's RF input.

The amplified carrier is also amplitude modulated by the L + R component using the modulation circuitry already present in the standard AM transmitter. A delay network equalizes the time delays encountered by the L-R and L + R signals prior to transmission.

The receiver configuration required for stereo AM reception using the Magnavox system is shown in the block diagram of Fig. 2. According to Magnavox, the receiver configuration is one of the main advantages of their AM/PM system. It is a single IF system, and uses a standard envelope detector for the amplituded modulated channel. Since carrier level is maintained for all program material, an automatic gain control (AGC) system, which is capable of holding the L + R output nearly constant over a wide range of RF signal levels, can be realized. This will allow for proper matrixing of the L + R and L-R signals to achieve highest levels of stereo separation under a variety of signal conditions.

The phase modulated (PM) information is recovered by sampling the IF signal, limiting it, and detecting it with a phase-lock-loop configuration. Existing IC chips already can handle the phase-lock-loop elements of the receiver, which in Fig. 2 include the blocks identified as phase detector, voltage controlled oscillator, loop filter and amplifier, and even the limiter.

The stereo identification tone is regenerated by recovering the audio tone present between the main voltage controlled oscillator and the loop filter, as a by-product of the phase-detection process. This signal is passed through a second phase-lock-loop circuit to drive an indicator. The left and right channel program information is recovered from a standard L + R/L-R matrix. For those untamiliar with this dematrixing process (which is identical to that used in stereo FM decoding), the following two simple algebraic equations shows how recovery of separate "L" and "R" signals takes place: (L + R) + (L-R) = 2L, and (L + R) - (L-R) = 2R.

An automatic switch can be incorporated to switch receivers from mono to stereo in the presence of a stereo AM transmission, driven by the same circuitry which drives the front-panel stereo indicator. As an additional benefit of the Magnavox system, the five Hz identification tone could also be used someday as a slow-scan generation mode for digital information which could provide station numeric identification, weather reports, etc.

In Magnavox's original proposal to the FCC they listed several advantages of their system. Among these were the following:

- The existence of an identification tone for use in driving a stereo indicator. This tone is transparent to the phase detected audio and is obtained as a by-product of the phase detection process in the stereo receiver.
- Excellent compatibility with existing equipment due to exponential modulation, which produces no distortion in an envelope detector, and reduced slope detection of IF skirts due to reduced maximum frequency deviation at low frequencies, where the highest concentration of program energy occurs. The system also provides for a nearly-constant carrier level for use in driving receiver AGC (automatic gain control) circuitry.
- The system requires a receiver design which is suited to and already well-supported by current integrated circuit technology; an important cost consideration for potential receiver manufacturers.
- The system has the capability at a future date of slow-scan digital station identification.

While the way in which stereo AM has been studied and approved by the FCC has many things in common with the way stereo FM began nearly two decades ago, there are several differences, as well. For example, when stereo FM was first approved, many manufacturers immediately set out to manufacture so-called "multiplex adaptors" which could be connected, either via a jack or by a minimal amount of wiring, to an existing FM tuner or receiver. Such adaptors are not very likely to be developed in the case of stereo AM. The approved system simply does not lend itself to circuit conversion or adaption. That means that anyone wishing to receive stereo AM will have to purchase a completely new AM set. For owners of stereo high fidelity components, there is not likely to be much of an inducement to discard existing high-quality FM/AM tuners or receivers in order to replace them with stereo AM/stereo FM tuners or receivers. Serious audio fans are only too well aware that just because AM radio will now have stereo capability does not mean that it will also suddenly become a high fidelity program source. One possible product which may appear for those who do wish to hear stereo AM but are not ready to scrap their systems might be an inexpensive stereo AM tuner. The outputs of such a new product might well be plugged into the seldom used "auxiliary" inputs available on most receivers, preamplifiers and integrated amplifiers already owned by hi fi enthusiasts.

"Anyone wishing to receive stereo AM will have to purchase a new AM set."

As for stereo in cars, the situation promises to be quite different and dynamic. In addition to the already healthy demand for better quality car stereo units in the aftermarket, there will now be a whole new market for those car owners who will want to replace existing equipment (be it factory installed or aftermarket) with receivers that can pick up and decode the new stereo AM transmissions.

Unlike the stereo FM decision handed down in 1961, the current FCC decision, at least as announced a few days ago, does not set an effective date for the beginning of stereo AM broadcasting. The EIA feels (and will be recommending) that a nine-month postponement of actual broadcasting would be a good idea, since that would permit manufacturers to design and manufacture reliable stereo AM receiving equipment and would encourage an orderly transition in the marketplace. In 1961, the announcement of stereo FM and its implementation date were one and the same, a situation which resulted in a chaotic scramble on the part of broadcasters and receiver makers to be "first" in the marketplace. Needless to say, some less-than-perfect equipment soon found its way onto dealers' shelves, much to the consternation of consumers who also wanted to be "first on the block" with stereo FM.□

ANTENNA BANDWIDTH AND AM STEREO

Grant Bingeman

AM stations are strongly competing for today's quality conscious listeners, and station engineers are being called upon more often to help create and maintain a competitive edge. In efforts to improve the station's sound, engineers are taking a closer look at the last link in the broadcast chain—the antenna system. Also, although AM transmitting system performance is currently measured against monaural signal criteria, engineers are now taking into consideration the advent of AM stereo, and the new dimension of stereo separation, when checking out their antenna systems. In this article we will take a look at antenna bandwidth and the bandwidth requirements for AM stereo.

When an antenna engineer talks about bandwidth, he is really talking about two different things: impedance bandwidth and pattern bandwidth. The first refers to the range of frequencies over which the antenna impedance and VSWR are acceptable; the second refers to the frequency band for which the radiation pattern is satisfactory.

Impedance Bandwidth

Common-point and tower impedance are a function of frequency. A convenient yardstick for measuring impedance bandwidth is VSWR. In general, as you move away from the carrier frequency, VSWR increases. If the VSWR within ±7.5 kHz of your carrier is less than 1.2 (assuming 1.0 at carrier), you should be able to make an acceptable set of transmitter audio performance measurements for your annual "proof" per FCC 73.40 (a) (3). However, the FCC 7.5% harmonic distortion ceiling is considered a bit too high by some engineers.

If the VSWR is greater than 1.2, or if the 7.5% THD is too much for you, the phase rotation technique (sideband impedance symmetry) may yield acceptable results. If the VSWR is greater than about 1.5, you may need some broadbanding in addition to phase rotation. If the VSWR is greater than about 2.0, there may not be a cost-effective solution. However, in some cases corrective adjustment of the antenna networks can yield surprising improvements in audio performance without the need for line-stretching (phase rotation) or bandwidth compensation. Remember that when computing NONDA tower sideband VSWR, you must first resonate the tower. Otherwise the VSWR numbers you get will be misleading.

Keep in mind that you will get different distortion and depth-of-modulation numbers for different types of RF samples. Where you sample and how you sample for your mod monitor becomes increasingly important as sideband VSWR increases. This is why it is often desirable to use some broadbanding techniques along with phase rotation.

The formula for calculating the sideband VSWR is:

$$VSWR = \frac{1 + K}{1 - K}$$

$$K = \frac{\sqrt{(R^2 + X^2 - Z^2)^2 + 4X^2Z^2}}{(R + Z)^2 + X^2}$$

R = Sideband Resistance

X = Sideband Reactance

Z = Transmission Line Characteristic Impedance

Most Harris AM transmitters have the capability of actually broadbanding your antenna. For example, an antenna sideband VSWR of 1.5 can typically be reduced to 1.2 by the standard output network of a Harris MW-50A, 50 kW AM transmitter. This capability is used in conjunction with the phase rotation technique. Figure 1 demonstrates the improvement possible at the PA of an MW-50A with proper adjustment.

Pattern Bandwidth

The other side of the coin is pattern bandwidth. The pattern size and shape are a function of

The purchase included five MW-50A, fifty kilowatt AM transmitters; one FM-20K, twenty kilowatt FM transmitter; one MW-5A, five kilowatt AM transmitter; plus associated equipment—for Pittsburgh, Philadelphia, Los Angeles, New York and Ft. Wayne. Previously, Group W had purchased four MW-50 transmitters, one MW-5A transmitter, and two TV transmitters from Harris.

According to Charles G. (Buck) Perry, Group W Vice President of Operations and Engineering, the recent purchase is part of an overall program of transmitter plant modernization to improve service to Group W listeners. In planning the purchase of the new equipment, Mr. Perry stated that several different products were examined and considered, and outside sources were consulted, before Harris transmitters were chosen.

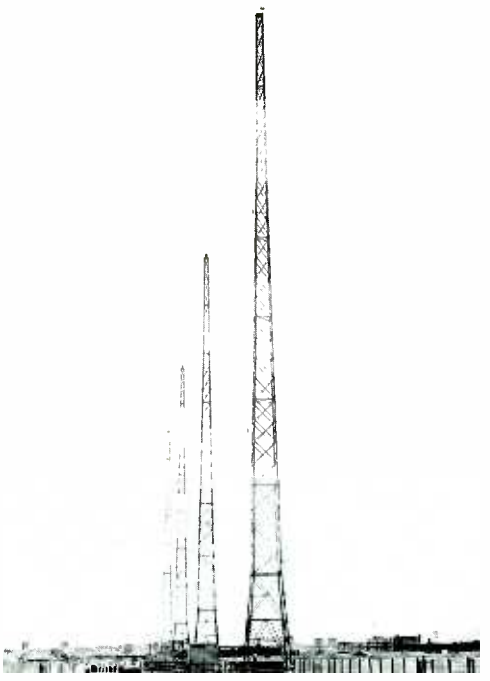
"It was decided," says Mr. Perry, "that these were the transmitters that most closely met our state-of-the-art requirements . . . they are products that we would like to be using for the next ten to fifteen years." Plans call for all of the new transmitters to be installed and in operation by the end of 1979.

Looking Back . . . And Ahead

The Group W/Harris association brings together two "old hands" in the broadcast field—for only two years after Westinghouse had presented its historic broadcast in Pittsburgh, Harris (then Gates Radio) began developing and marketing a line of broadcast equipment in Quincy, Illinois. Both have grown with the broadcast industry since its infancy, and today both are recognized leaders in their respective areas.

It all started on a rainy election night in Pittsburgh almost 60 years ago, and the final returns are not yet in. According to recent articles in the New York Times and in Advertising Age, quoting Mr. Daniel L. Ritchie, President, Group W, there are several major plans for the near future. These include: expansion to the full complement of FM radio and UHF-TV stations allowed by the FCC; significant expansion of Group W's current CATV operations; and installation of receive-send earth stations at all Group W TV stations to capitalize on rapidly expanding technologies in satellite communications.

From the past to the present, Group W has been leading the way for many years—and plans to keep on pioneering in the future to bring its audiences the finest programming and the finest signals available in the medium of broadcasting.



WINS(AM), New York, was the first major station in the United States to switch to an all-news format. The station's MW-50 transmitter installation and four-tower directional array (shown above) are located in the New Jersey Meadowlands, and provide the strongest AM signal in Manhattan.

Charles G. (Buck) Perry (center), Group W Vice President of Operations and Engineering, signs the one million dollar order for Harris transmitting equipment at the Group W headquarters in New York City. With Mr. Perry at the signing were Hal Kneller (left), Harris District Radio Sales Manager, and Mr. Alton Stalker, Director of Transmitter Engineering for Group W.

INTRODUCING HARRIS' NEW CYCLOID 90 FM ANTENNA

Field-proven new FM antenna offers broadcasters ideal choice for regular, multi-station, directional operation

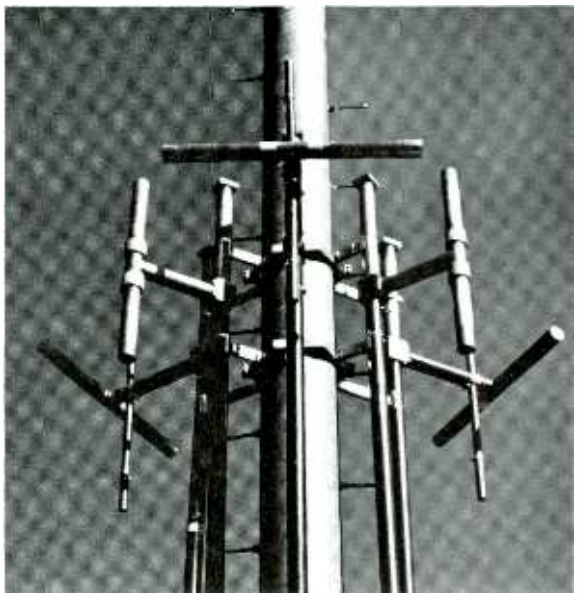
Rolland Looper

A positive impact on your bottom line is one of the reasons behind each new product introduced by Harris. It is this dedication to your needs in broadcasting that has led to the development and introduction of yet another major advance in FM antenna technology . . . the new Harris Cycloid 90 FM antenna.

As we review the features and advantages of the Cycloid 90, keep in mind that each represents either a savings in cost or an effective tool to use in increasing station revenue. You'll find, as some already have, that Harris' technical superiority in bandwidth, circularity and power handling capabilities can improve your sound and your coverage.

Construction

Each bay of the Harris Cycloid 90 FM antenna is composed of six radiating elements, three horizontal and three vertical. The three horizontal radiating elements are straight dipoles equally spaced 120° apart around the supporting pole with the three vertical radiating elements, also straight dipoles, interspersed 120° apart around the pole equally between the horizontal elements.



Each bay of the Cycoid 90 has a power input rating of 30 kW, and includes 3 vertical and 3 horizontal radiating elements of high-strength brass.

Each of the six radiating elements in each bay, or layer, is fed individually from a six-way power divider. Multi-bay antennas have vertical interbay lines affecting the corresponding element in each bay. The six vertical interbay lines are either end fed or center fed from the six-way power divider by equal lengths of semi-flexible line. It is also possible to use two three-way power dividers, one feeding the horizontal elements and the other feeding the vertical elements.

The radiating elements, the element feed stems and interbay lines, and the power divider are all made of high-strength brass. The feed lines from the power dividers to the six interbay lines are made of copper with a heavy polyethylene jacket. All of the mounting brackets and hardware are made of stainless steel. This rugged construction enables these antennas to withstand the most severe weather extremes and wind velocities up to 150 mph. The feed point of each element is completely internal, with a pressurized environment throughout the radiating elements.

The radiating elements, feed stems and interbay lines are all 3⅛ inches in diameter. The semi-flexible feed lines are either 1⅝ inches or 3 inches in diameter, determined by the power input. The power divider is either 3⅛ inches or 6⅛ inches in diameter, again depending on power input.

The power input rating is 30 kW per bay, and the maximum power input rating of a multi-bay antenna is 150 kW.

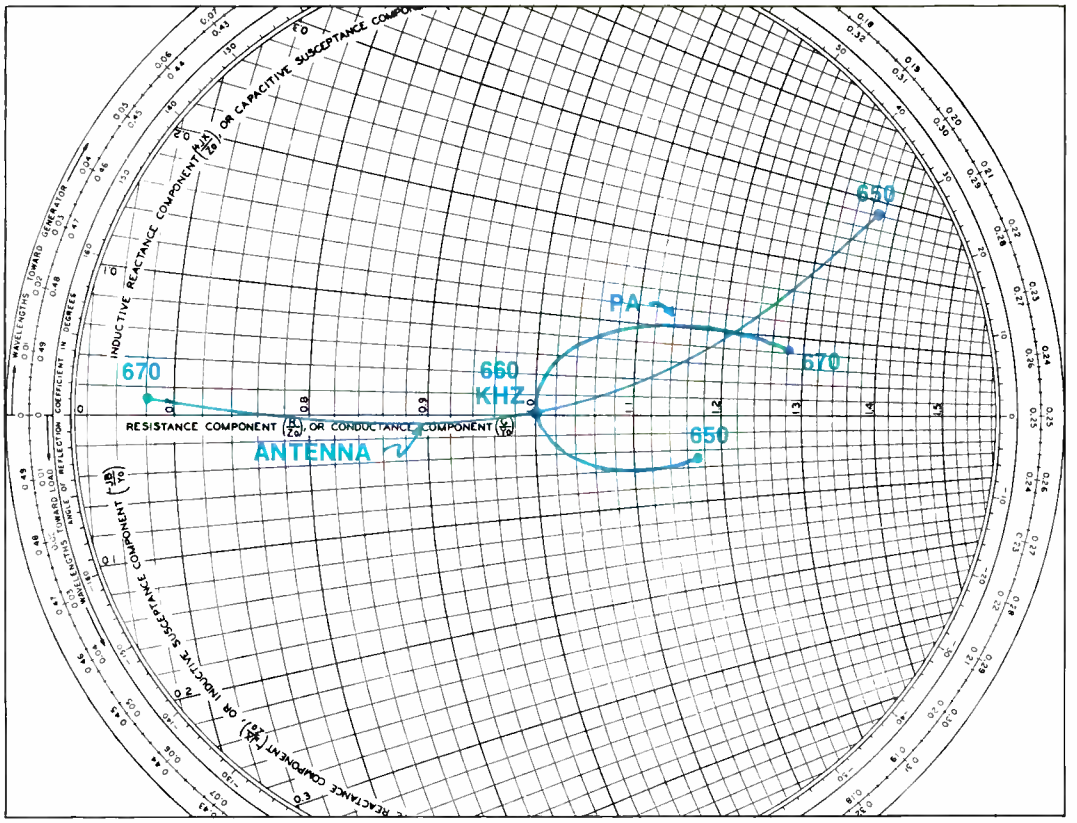


FIGURE 1.
MW-50A OUTPUT NETWORK (IMPEDANCE COORDINATES)

frequency. The null areas of the pattern are much more sensitive to frequency than the major lobes. Assume that you measure 100% depth of modulation several miles from your antenna on the radial of maximum field strength. As you move away from that radial, keeping the same distance from the antenna, depth of modulation will drop and distortion will rise. A well designed antenna system will not exhibit significant signal degradation due to pattern bandwidth over a carrier field-strength range of 50% to maximum. Naturally, antenna bandwidth performance should be optimized in the major coverage areas, not in the null areas. During non-directional operation, pattern bandwidth is not a factor except near parasitic reradiation (e.g.: water towers, power lines).

AM Stereo

The performance of Harris' Compatible Phase Multiplex (CPM) AM stereo in limited bandwidth systems is basically the same as that of conventional mono. Of course, CPM has the additional parameter of separation. Stereo separation is also a function of impedance symmetry. In the previous example, as one moves away from the maximum field strength radial, separation will decrease gradually.

If the transmitter PA impedance load has been adjusted for symmetry, both mono and CPM stereo performance will have been optimized for the particular bandwidth at hand (not so for other AM stereo proposals). Actually, CPM stereo has one great advantage over mono. If you are listening with a synchronous detector (all CPM receivers will have this), most of your mono and stereo distortion will disappear. Even if you are listening to a conventional mono station, a CPM receiver will eliminate the distortion inherent in non-symmetric transmission systems.

As a final note, the new dynamic CPM, Variable Angle CPM, produces the largest stereo coverage area to date. As a point of reference, conventional FM stereo coverage is 22 dB below FM mono coverage. Variable Angle CPM stereo coverage is typically only 1 dB below conventional AM mono coverage.

In summary—if you optimize your antenna system for mono AM, you are all set for Harris' Variable Angle CPM AM Stereo!

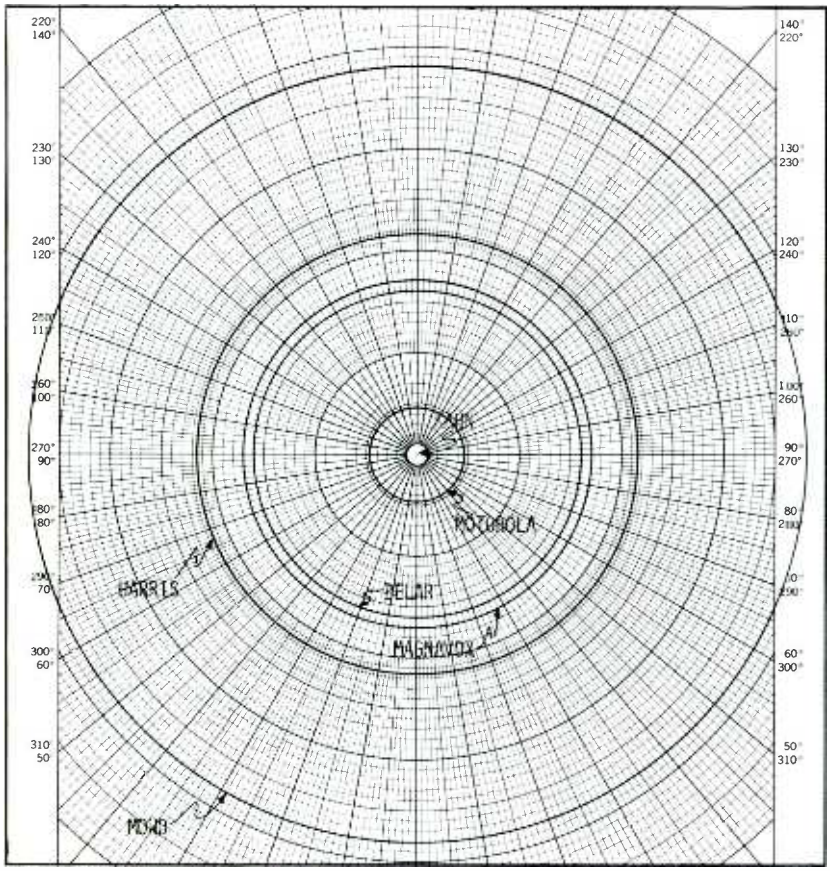


Figure 1. Calculated stereo coverage areas for the five proposed AM stereo systems, with 95% modulation . . . worst case condition of L or (L+R) modulation at 2 kHz.

areas due to reduced modulation levels and other system side effects.

Let's now concentrate our attention on stereo coverage. Figure 1 compares the stereo coverage areas of the five systems. This comparison is based on 95% modulation with a 30 dB stereo receiver signal-to-noise ratio. The calculations are also based on worst case stereo transmission conditions for each of the systems. As you can see, the Harris CPM system offers the best stereo coverage under these conditions. Harris feels these worst case conditions will often occur and should not be ignored.

FCC Clears The Way

On September 14, 1978 the Federal Communications Commission voted unanimously to ask the industry to select a system from the five proposed systems. Comments are due the Commission by December 29, with replies to be filed no later than January 31, 1979. The FCC staff will then require additional time to study the comments and announce a decision.

AM Stereo Radios—How Soon?

The leading receiver manufacturers have also been busy. Pioneer and Sansui have recommended to the FCC that it adopt a Harris-type AM stereo system because of its many technical advantages. The Harris CPM system has been found to be superior, with no increase in occupied bandwidth or spectral density; with virtually no distortion in stereo receivers under any reception conditions; with a pilot tone transmitted for stereo I.D. tone; and with economical and simple receiver implementation not requiring special IF sections.

The receiver manufacturers, however, are taking few chances, and have breadboarded most systems. They plan to have their AM stereo radios on the market three to four months after the final FCC approval.

Getting Ready

Harris is expecting a rush once AM stereo receives the final green light. In efforts to forecast the demand, Harris is currently offering contingent orders on AM stereo transmitter conversion equipment. Many broadcasters have taken advantage of these contingent orders to make sure they receive early delivery on the necessary equipment.

The FCC's decision to adopt AM stereo will undoubtedly have an enormous impact on the radio-listening public. The repercussions are expected to be similar to those at the time the FCC approved color television. It may be just a few months before AM broadcasters will be offering the two-channel sound now found only on FM!

DESIGN YOUR OWN AUDIO CONTROL BOARD WITH THE HARRIS M90

W. J. Kabrick

The Harris M90 Modular Audio Control Console has a rare combination of practically every useful feature desired in a control board—and is very easy to assemble into your individual design. Furthermore, you are not locked into a particular configuration if you overlooked something or if your requirements change. The M90 is easily changed by relocating existing modules and procuring new modules at a modest cost.

Start Simple

Will your ultimate needs exceed 18 input channels? This is one of the few questions with an unforgiving answer, if you are wrong, in the design of your modular console. The basic choice is between 18 and 26 maximum input channels. Equally important is the choice of 2, 4 or 8 output channels.

Start with only the number of input channels needed for your initial requirements. In addition to keeping the cost down, this will allow a more logical expansion to your exact needs when they arise by the purchase of the type of modules required. Also, a period of operation and familiarization may suggest changes in your design configuration.

If you want to restrict the board to mono air use, with little or no effects, the 2-channel output size is more than adequate. With AM stereo around the corner, you may well consider adding a 3rd VU meter and line amplifier in a hard-wired sum channel for a visual indication of correct phasing and excessive center channel build-up. This also provides a convenient feed into the monitor amplifier—remember that some of your listeners will hear you in mono for years.

The 4-channel output size provides a lot more flexibility, especially if there is a possibility that the board may be used for production. What if your station goes to part-time or full-time automation? You could suddenly find yourself wishing for another output channel or two for effects—sel sync, reverb, etc.—to keep you abreast of, or ahead of competition. The 4-channel console contains a simple switch change from 4 discrete to Mono, Left, Right and Sum channels. This permits a 4:2 mix on output channels 2 and 3 with simultaneous Sum output from channel 4 and an independent use of channel 1. Also, a 2:1 mix from channel 4 is equally convenient.

Outstanding Performance And Convenient Operation

The Harris M90 is highly competitive in audio performance specifications, and has good frequency response, distortion and transient response—and a good signal-to-noise ratio. Crosstalk and RFI immunity are parameters in which the M90 excels, with both −80 dBm or better in tough environments @ 1 kHz and at least −65 dBm @ 10 kHz. Widely varying input levels are easily accommodated in the M90, with the 11-position gain trim switch compensating for levels from −70 to +20 dBm.

The Solo switch and LED with the associated solo feed from any of the input modules, or any combination of them, is much more convenient than a cue position on the input fader. It may be strapped on each module to be picked up from the input of the fader (as it is on faders with a cue position), or from the output of the IME, IM and SIM input modules just ahead of the On/Off switch. The Solo buss is bridged into the Left control room monitor feed and is muted when the control room mic is on. Two summing networks are used in the SIM stereo input module, one just ahead of the fader and the other at the output, for L+R feed into the Solo switch.

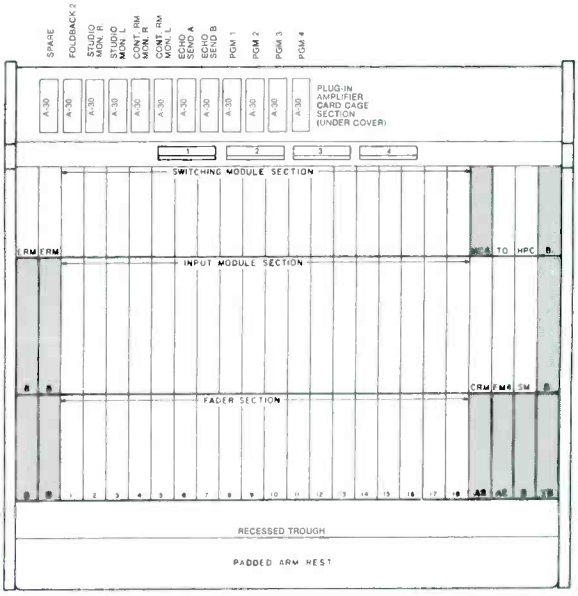
Talkback into the studio, news booth, etc., is an important function, easily accomplished with no additional expense in M90 boards that include the studio monitoring module and amplifiers. A quality talkback mic is included on the SM module and a pushbutton is located on the lower right panel to activate this function. Speaker muting logic is also built in.

Foldback switching and level control are built into the mono input channels, requiring only an inexpensive line amplifier (plug-in) to complete the feed into the studio monitor and headphone control modules. While this is more commonly used in production, you will probably find occasions where it is handy on an air board. For a few hundred dollars you can add a second foldback function that permits feeding the program output lines or tape playbacks to the control room monitor as well as the studio monitor and headphones. This can be easily added if the board is changed from air to production use.

Finish With A New Patch Panel

Patching increases the flexibility of your board several times, and is conveniently available in a 24 x 6 row panel/enclosure that uses a plug-in interconnecting cable to the board. Important intermediate points in the board may be connected, as well as the inputs and outputs with normals and mults to give complete access to the system.

Write to me for a copy of the Harris M90 Modular Audio Control Console brochure. It provides a complete shopping list that will let you build the board you have been wanting—at a price you can justify!



Module placement, M90 Console—2- and 4-channel output (18 fader maximum). Shaded modules are supplied and included as part of the basic main frame.

A Harris M90 console is shown in the new studios of Station WKEZ-FM, Norfolk, Virginia, where it is used as an on-air and a production board . . . often simultaneously.

New features for Harris' TC-80 color TV camera

DIODE GUN PLUMBICON® PICK-UP TUBES AND HIGHLIGHT HANDLING

C. F. Smiley

Two of the most useful recent developments in TV camera technology, Diode Gun Plumbicon®* pick-up tubes and Highlight Handling, are now available with the Harris TC-80. The new tubes demonstrate better resolution, better lag characteristics and improved overbeam capability—while the Harris-developed Highlight Handling system relieves the broadcaster from objectionable comet-tailing and blooming from specular reflections, even on difficult sets where spot highlights and area overexposures are common.

These advanced features maintain the TC-80 at the forefront of performance technology—namely, better lag and a dramatic reduction in comet-tailing and blooming. Also, improved resolution of the Diode Gun tubes reduces the amount of aperture correction necessary to adjust picture crispness to the taste of the director.

The New Pick-Up Tube

The improved specifications of the Diode Gun tube are due to a recent improvement in electron gun design, which eliminates the beam crossover in the triode gun of the standard Plumbicon tube. The gun structure of the Diode Gun tube produces a laminar flow of electrons in the beam, which results in a more consistent energy distribution of beam electrons. This improved gun structure provides better resolution, lag and overbeam capability so that the broadcaster can produce excellent pictures even in uncontrolled environments, such as low-light-level action scenes and high contrast situations. Physically interchangeable with the standard XQ1070 1-inch broadcast Plumbicon tube, the new S73XQ Diode Gun tube is available for replacement of green, blue and extended red tubes.

BETTER RESOLUTION. As a direct result of better beam focusing for a smaller spot size on the target, typical resolution at 400 TV lines has been improved to better than 65% in green, 65% in blue and 60% in red. Typical specifications show that resolution of the 1-inch Diode Gun Plumbicon tube is now better than that of available 1¼-inch tubes!

BETTER LAG. The Diode Gun tube also demonstrates an improvement in lag—which is the transient time response of the signal level due to changes of intensity of faceplate illumination. Bias light, or very low level target illumination, is incorporated into the TC-80 prism to provide a large improvement in lag, but the Diode Gun tube

*Trademark of N. V. Philips of Holland

MEASUREMENT OF LAG IMPROVEMENT OF THE S73XQG DIODE GUN PLUMBICON

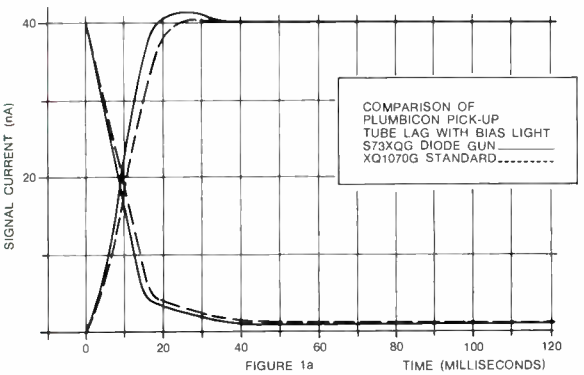


FIGURE 1a

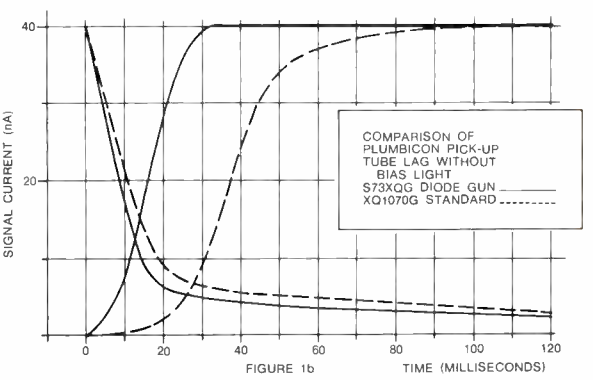


FIGURE 1b

ERAS--A WINNING COMBINATION N DECATUR, IN DANVILLE, IN . . .

tion at sister station WMBD-TV, Channel 31 in Peoria, Illinois.

Improved Production Quality

"We are so pleased with the improvement in the quality of our commercial productions that we are going to put a picture of a TC-80 on our rate card," says Darrell Blue, WCIA-TV Production Manager. "Since we installed the TC-80's client comments have been very favorable," he continues, "and producers are now bringing in prospective clients regularly to show them what we can do."

Station WCIA-TV currently has a very sizable commercial production schedule, and according to Mr. Blue, the cameras are performing beautifully even under the heavy work load.

Mr. Blue is also very enthusiastic about the "new look" of the news. "When we switched to the TC-80's we decided that our Newscenter needed a change, too, so we designed a new set. We're proud of the fact that we have the highest rated news program in central Illinois, and we wanted a special set to go with the new cameras. We took a lot of care in the design, too, because everything shows up in such detail with the TC-80's that you have to pay a lot of attention to even the smallest items."

Few Shakedown Problems

When the TC-80's were installed at WCIA-TV last spring, there were fewer trouble spots than expected, according to Mr. Fleming. "You anticipate many shakedown prob[illegible]s with any new camera," he says, "but there surprisingly few with our TC-80's, and we had them set up and ready to go in a relatively short time. We find now, too, that our daily set-up takes a minimum of time as the cameras are very stable."

All TC-80 set-up and operating controls are centralized at the camera control unit, so that a single video operator can easily handle the set-up of several cameras. "This remote set-up saves us a lot of time, and gives us better consistency, as the individual cameramen do not have to do any adjusting at the camera head," says Mr. Fleming.

"We are very happy with the overall picture quality—there's just no comparison to what we were getting before," continues Mr. Fleming. "Also, from an engineers standpoint, I appreciate the ease of maintenance and the easy interchangeability of lenses and parts. I like the full complement of automatics, too—they are a real help to our video operator."

Dan Roan, WCIA-TV Sports Director, gives area football scores, as Studio Technician Joan Halleran operates one of the two TC-80 cameras used for the station's newscasts.

Silver Anniversary

In November, WCIA-TV completed its twenty-fifth year on the air, and celebrated the occasion with special anniversary programs covering the history of the station. Segments of these programs were devoted to former on-air personalities, which created a lot of interest with viewers whose memories stretched all the way back to the station's beginnings in 1953.

From those early days on up to the present, WCIA-TV has been building and maintaining a fine reputation for service to the entire central portion of Illinois. In addition to the remarkably thorough news coverage provided for viewers, the station produces such public service programs as the yearly Coronary/Pulmonary Resuscitation Telethon. This telethon, produced in cooperation with the Lions Club, raises money to provide training for laymen in emergency lifesaving techniques. TV stars such as Tom Kennedy have come to Champaign in the past to participate in this annual event, which runs nineteen straight hours, and moves back and forth from the WCIA-TV studios to various remote locations.

Covering an area that includes such a wide diversity of interests and activities—from the state government in Springfield, to the University of Illinois in Champaign/Urbana—from heavily industrialized areas to numerous rural communities—is not an easy task. However, WCIA-TV is managing to provide excellent service to all of its viewers with well-balanced "local" programming, and with the best broadcast cameras available—Harris' TC-80's.

AM STEREO-- SOON TO BE PLAYING IN CITIES EVERYWHERE

Joe De Angelo

AM broadcast stations may soon undergo a major technical change. During 1979 many of the AM stations throughout the country could possibly start broadcasting in stereo. Yes, AM stereo is almost here. There is no question in the minds of broadcasters, advertisers and equipment manufacturers as to whether AM stereo's time has come. It has. In fact, it's long overdue.

Overcoming the Major Problems

During the last twenty years, a multitude of AM stereo systems have been developed—some by receiver manufacturers, others by broadcast consultants. Until the advent of the Harris CPM system, all systems proposed exhibited common problems as a result of the **non-linear** or multiplicative method of generating the coded stereo information. The problem . . . broad, difficult to reproduce sidebands that extend beyond the normal sidebands experienced in AM broadcasting.

Harris has exhibited its CPM AM stereo system at the 1977 and 1978 NAB and NRBA Conventions. Dave Hershberger (1) and Cliff Leitch, design engineers for CPM, are shown in front of a Harris MW-1A, one-kilowatt AM transmitter, operating in stereo.

Recognizing that practical AM broadcasting experiences bandwidth limitations in the transmitter, antenna system and home receiver, Harris began pursuing an alternate AM stereo system that would provide a service undegraded by these normal bandwidth restrictions.

The Compatible Phase Multiplex (CPM) system was developed by Harris as an answer to the problem. CPM employs **linear** stereo coding methods which result in sidebands **no wider than in conventional AM broadcasting.** Harris' long years of experience in all facets of the broadcasting system convinces us that only such a system will provide the quality of service to which the AM broadcaster is accustomed.

The advantages that the controlled sidebands of CPM offer the broadcaster are:

1. Compatibility—both with mono and with typical broadcast systems.
2. Ability to maintain full modulation—no need to limit modulation to avoid break-up in stereo.
3. No increase in bandwidth—no signal degradation with typical broadcast systems.
4. Good stereo coverage—no ambiguous claims regarding coverage.

Coverage

Recently there has been a lot of discussion in the industry about AM stereo's coverage area. Harris has been the **only** proponent of the five to submit calculated coverage area data. Why have the other proponents been reluctant to submit coverage data? The answer lies in the non-linear nature of the other four systems.

Let's pursue this subject further. For the Harris CPM system at a typical AM station, the calculated coverage areas show only a 2% reduction in daytime, and a 3% reduction in nighttime mono service area when transmitting in stereo. The other four systems have reduced mono coverage

HARRIS COMMUNICATION AND INFORMATION PROCESSING

Dear Broadcaster:

On April 9, 1980, the Federal Communications Commission conducted an open meeting in which it directed the Commission staff to submit rules allowing AM Stereo broadcasting. The system recommended by the Commission staff was the Magnavox system. The Commission tentatively adopted that recommendation. It is expected that within a month, the Commission will formally adopt the staff's recommendations.

During the 1980 NAB Convention, broadcasters had the opportunity to evaluate and to discuss the Commission's action. In both public sessions and individual discussions, broadcasters repeatedly expressed dissatisfaction with the system selected. Harris Corporation favors the rapid implementation of AM Stereo and is pleased that the FCC is going to adopt the use of one system. We intend to supply products for the system ultimately chosen; however, we are becoming increasingly aware of broadcaster complaints that the Magnavox system will impair AM broadcasting. Many broadcasters have urged us to inform the broadcasting industry of the serious limitations of the Magnavox system.

According to these broadcasters, the Magnavox system has several substantial limitations. The Magnavox system transmits the stereo (L-R) information by simple phase modulation of the carrier. Consequently, the Magnavox system requires that a certain amount of carrier must always be present. Thus, 100 percent downward modulation must never occur. For stereo receivers to function properly, a reduction of downward modulation will be required, reducing monophonic coverage and loudness. In addition, other Magnavox system shortcomings adversely affect the fidelity potential of AM radio: (1) The Magnavox system's increased RF bandwidth may necessitate the use of 5 kilohertz lowpass filters and (2) the Magnavox system forecloses the future use of synchronous detector receivers, which are superior to diode detector receivers. If you require additional information concerning the Commission's decision, please write Harris or call Bob Weirather or Dave Hershberger at (217) 222-8200.

Under FCC procedures, parties are entitled to petition the Commission requesting that it reconsider its system selection decision. During NAB-80 several Commissioners indicated that they would reconsider their April 9 decision if large numbers of broadcasters protested the decision. There is still an opportunity to make your views known. If you are among the broadcasters that are dissatisfied with the Commission's decision, it is important that you act immediately. To keep the docket open, telegram or mailgram your request for reconsideration of the Commission's decision on AM Stereo. Your correspondence should specifically reference Docket 21313. Correspondence should be addressed to The Secretary, Federal Communications Commission, 1919 M Street N.W., Washington, D.C. 20554.

HARRIS CORPORATION

MAGNAVOX
CONSUMER ELECTRONICS COMPANY
A NORTH AMERICAN PHILIPS COMPANY
1700 MAGNAVOX WAY
FORT WAYNE, INDIANA 46804

KENNETH C. MEINKEN, JR.
PRESIDENT

(219) 432-6511

May 27, 1980

Dear General Manager:

On Wednesday, April 9, 1980, the Federal Communications Commission made two decisions which directly affect you, an AM broadcaster.

The first decision was the recommendation to adopt a single AM stereo system. Not only does Magnavox support the "single system" concept, all except one of the five system proponents strongly advocated the adoption of a single system. Any other decision would create uncertainty and speculation, increase cost and further delay the implementation of AM stereo broadcasting.

The second decision was that the recommended system should be the one developed by Magnavox. We believe both decisions were the right ones. It is unfortunate that some proponents of other systems have elected to attack the Magnavox system on certain technical parameters. I would like to take this opportunity to set the record straight.

Directly addressing the question as to why the FCC recommended the Magnavox system as the industry standard: the Commission's office of Science and Technology said that the Magnavox System was the best -- based on exhaustive evaluation of all systems submitted. I invite you to look at the facts, not listen to the rumors:

* Range -- your stations' broadcast range will remain the same. Although Magnavox has proposed rules to the FCC that will restrict negative peak envelope modulation to 95%, the positive peak modulation limit will remain 125%. The peak power difference amounts to less than one-tenth of a decibel. The decibel, you may recall, is the smallest loudness difference that can be perceived by the human ear. And remember, that's peak -- not average. Your average modulation level will depend on your program material, your audio processing equipment, and how you choose to use it.

Other proponents have been claiming "full modulation" capabilities. However, an examination of the FCC records shows this to be a monophonic (center channel) claim. The record shows the proposed rules for Motorola limit modulation to 90% (and for Kahn, 50%) with left or right channel sources. Harris has given a limitation of 80%. Thus, in making use of the full capabilities inherent in the new AM stereo service Magnavox offers modulation capabilities greater than those of Kahn, Harris and Motorola.

* Cost of Conversion - As pointed out in the AM stereo sessions at the recent NAB convention in Las Vegas, the main costs of conversion from AM mono to AM stereo are in the studio equipment and program sources. An additional STL may be needed. The stereo exciter for the Magnavox system is simpler than exciters for other proposed systems. The additional equipment required at your transmitter to broadcast the Magnavox system signal will cost no more, and probably less, than that for any of the other proposed systems.

* Compatibility - The Magnavox system signal is fully compatible with existing AM monophonic receivers and with most existing broadcast equipment. Some older transmitters will require modification to reduce incidental phase modulation or control negative peaks. The Magnavox system is fully compatible with directional arrays. Our actual on-the-air experience at Station KRMC, Tulsa, Oklahoma, with their six-tower array and negative peak control of their RCA BT50F transmitter at full power has been excellent.

* Receiver Performance - The name Magnavox always has stood for quality sound. We have long advocated improvement in AM receiver performance. We believe that the advent of AM stereo will provide an impetus to receiver manufacturers to produce receivers having improved sensitivity, selectivity, and bandwidth; and not merely to add the stereo feature to receivers having present day average performance levels.

Some critics of our system claim that "disastrous noise pops" occur when the received signal hits -100% envelope modulation peaks. We have never experienced this with a properly operating receiver. Under severe -100% envelope modulation conditions we have experienced noise similar to "dust" noise on a phonograph record. All this was reported to the FCC in our filings. We also reported that we could design and build receivers that would be noise-immune to -100% envelope modulation conditions. Our critics said it couldn't be done - but we did it. What's more, this feature is being incorporated into the integrated circuit decoder chip for our system designed by National Semiconductor Corporation. Because this feature can be built into an IC decoder chip, it now looks as though all AM stereo receivers will have it. If, in fact, this turns out to be the case, then the -95% modulation limit we have proposed can be dropped and a return to -100% permitted.

* Maintenance of Monaural Signal - The Magnavox System maintains monaural loudness by audio processing very similar to that used in FM stereo. However, instead of controlling on the L and R signals, we use the matrixed signals (L+R) and (L-R). The monaural listener will not be able to detect any difference between your present AM signal and the Magnavox AM stereo signal. Our proposed rules submitted to the FCC do not reduce the 15Khz audio bandwidth now permitted.

We could go on for several pages, restating the items that appear throughout the thirteen volumes of record in the AM stereo docket at the FCC. The Commission staff had the benefit of that record -- what was said by the system proponents, the broadcasters, the equipment manufacturers, and all other interested parties. The record clearly supports the adoption of the Magnavox system.

The AM stereo system will be demonstrated at the Consumer Electronics Show June 15-18; we will be advising you of other demonstration cites later this summer. If you, or members of your staff have any questions regarding the Magnavox AM Stereo System, I urge you to contact Mr. Charles Dolk, Vice President, Product Management at this address. I assure you he will respond to your needs.

Sincerely,

K.C Meinken Jr

K.C. Meinken, Jr.

MOTOROLA INC.

May 2, 1980

Re: AM Stereo

Dear AM Broadcaster:

As the enclosed Editorial from Broadcasting states, many believe the FCC made a mistake on April 9 when it instructed its staff to prepare a decision authorizing the Magnavox system for AM stereo.

Broadcasters should expect the Commission to select an AM stereo system that serves well both stations and listeners under a variety of transmission and reception conditions. We agree with the numerous concerns voiced by broadcasters and station engineers at the NAB Convention. These doubts relate to the performance of the Magnavox system as well as the means by which the Commission, working under great pressure to approve AM stereo, reached its decision. The main areas of concern are set forth in the one page attachment to this letter.

Since the FCC may indeed take a further look and in view of the serious misgivings that have been voiced, we urge you to write without delay to request that the Commission review the proposed AM stereo systems and to allow broadcasters, system proponents, and other parties to make oral presentations before the choice is finalized. Even if you are not considering conversion to stereo in the near future, it is in your best interest to write the Commission now. Since a decision will fix the standards, it is important that AM broadcasting provides an excellent stereo service if and when you do choose to convert.

We appreciate your concern in this area. Please refer all inquiries to: Mr. Frank H. Hilbert (312) 576-4889 or Mr. Norman W. Parker (312) 576-5221.

Sincerely,

Very truly yours,

Martin Cooper
Vice President,
Director of Research
and Development

MOTOROLA INC.

EDITORIALS, BROADCASTING MAGAZINE, APRIL 21, 1980

TWO-TRACK TUMULT

If the FCC thought it was doing AM broadcasters a favor by approving an AM stereo system two weeks ago, it got a rude surprise at the National Association of Broadcasters convention last week. At every session where AM stereo was a subject, and at some sessions where it was dragged in as an uninvited guest, the FCC was berated for picking the wrong system. No other topic at the convention attracted more heated debate.

If any conclusion may be distilled from all the criticism, it is that the FCC's selection of Magnavox among five systems in contention was the most unpopular choice it could have made. Few broadcasters, however, are pleased by the probability that FCC reconsideration or court appeals would delay the adoption of a preferred system. Fewer still want the FCC to step aside and let the marketplace decide which of the systems survive. Among AM broadcasters, there is an evident desire to get on with the inauguration of stereo broadcasting.

Underlying the AM broadcasters' eagerness to introduce stereo is their keen awareness of FM stereo's ascension in radio ratings. AM musical formats face prospects of more erosion in the ratings as long as differences in AM and FM fidelity, especially at the receiving end, remain as sharp as they are. The hope of AM broadcasters is that stereo will not only enhance their output at the transmitter but also encourage manufacturers to improve the quality of AM receiving sets.

Members of the FCC gave informal assurances last week that they would take another look at their stereo decision if a significant volume of requests for reconsideration was received. Broadcasters ought to accept the invitation, but with the added request that the FCC's second look be expedited. If there is genuine reason for the broadcasters' disapproval of the FCC's first choice the case against it can be made from the evidence already at hand.

MOTOROLA INC.

AM STEREO AREAS OF CONCERN

1. The lack of a genuine dialogue among the Commission's engineers who rated the various systems, knowledgeable station engineers who tested the systems, and engineers of the system proponents.
2. The extent to which the FCC's method of scoring the various systems may have weighed inadequately transmitter and directional antenna considerations.
3. The problem of restricting negative peak modulation to no more than 95% in transmitters using the system approved by the FCC.
4. The difficulty of modifying existing transmitters to produce high quality signals using phase modulation (as in the Magnavox system) in addition to amplitude modulation.
5. The practical (not just the theoretical) fidelity potential of the various AM stereo systems.
6. The difficulty of combating in receivers the effects caused by exceeding 95% negative peak modulation and problems caused by directional transmitting antennas.

MOTOROLA INC.

The letter, referencing to Docket No. 21313: AM Stereo, should be addressed to the Chairman of the Commission, and copies forwarded to each of the Commissioners as follows:

Original to: The Honorable
Charles D. Ferris, Chairman
Federal Communications Commission
Washington, D.C. 20554

Copies to: The Honorable
Robert E. Lee, Commissioner
Federal Communications Commission
Washington, D.C. 20554

The Honorable
Abbott Washburn, Commissioner
Federal Communications Commission
Washington, D.C. 20554

The Honorable
Tyrone Brown, Commissioner
Federal Communications Commission
Washington, D.C. 20554

The Honorable
Joseph R. Fogarty, Commissioner
Federal Communications Commission
Washington, D.C. 20554

The Honorable
Anne Jones, Commissioner
Federal Communications Commission
Washington, D.C. 20554

Mr. William J. Tricarico, Secretary
Federal Communications Commission
Washington, D.C. 20554

DEANE PARKHURST

Hot for the convention:

AM STEREO MAY BE UPON US

Exactly 10 years ago I was the program director for WHEN Radio in Syracuse, New York. At the time there was little in the way of FM penetration in that market, yet the obvious fact that FM was with us to stay led the station manager to suggest that I look into AM stereo to see if it was something we might consider for the future.

I looked, but there was not much to see.

The technology was there, and had been since the fifties. The FCC had denied a petition for AM stereo in 1959, feeling that FM deserved the change to go stereo as a way to help it gain some recognition and listeners. There the matter stood, somewhere behind the back burner, in the minds of all but a few die-hard advocates who knew that someday their day would come.

It has.

It now appears that the FCC will issue a favorable decision on AM stereo before, or possibly at, the NAB convention in Las Vegas this April. In a telephone interview with Chris Payne, assistant to the vice president for engineering of the NAB, BROADCAST COMMUNICATIONS learned that the way has at last been cleared for the final OK.

Following a letter-writing campaign and activity by the NAB through the offices of the House Oversight Committee, the matter has been brought forward for action before the end of the first quarter of 1980. Gregg DePriest, an electrical engineer for the FCC assigned to the project, agrees: "That's what the chairman has said. That's our target date, and we're going to do everything we can to meet it."

Payne told BROADCAST COMMUNICATIONS that he, personally, spoke with six of the seven commissioners, and their general reaction was why not? Says Payne, ". . . one commissioner, I think it was Anne Jones, said, 'Well, if there's no problem with it, why are we holding things up?' I think that's an excellent question."

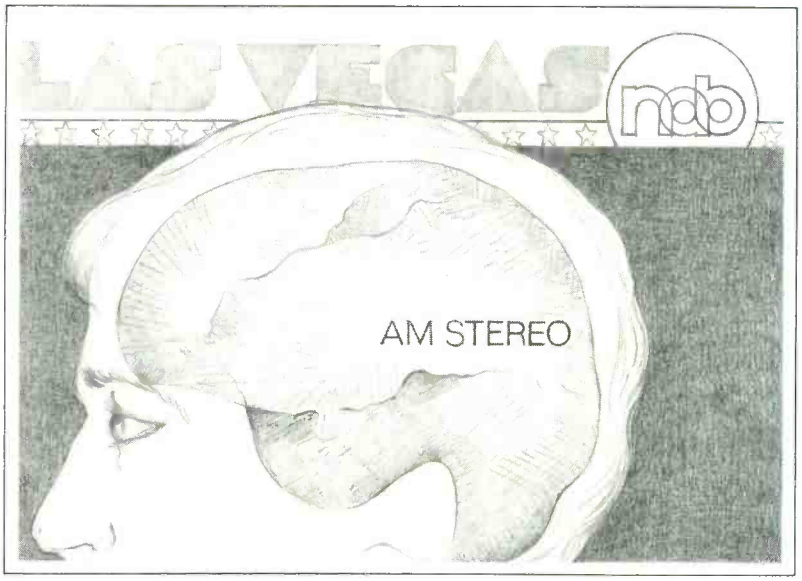
The answer to the delay was more pressing business before the FCC, including action on 9 kHz AM spacing and preparation for the Region 2 meeting in March.

On the matter of problems with AM stereo, there seem to be none. Some questions have been raised that it would not be compatible with the new 9 kHz spacing, but according to Payne, there is nothing to worry about. DePriest indicated that the FCC had requested the manufacturers to include studies of the 9 kHz question. From what he has seen, there will, indeed, be no problem.

Other adverse comments centered on the thought that more stations would fit into the band without AM stereo; and that, too, is not the case. "There was only one objection that I saw from an FM broadcaster," noted Payne, "and in that case the individual was concerned that the quality of the AM stereo signal would not be up to the standards established by FM, thus harming the image of stereo broadcasting."

The big question, of course, lies in which of the five possible systems the FCC will select as the standard. The five are not compatible with one another, and one must emerge as a winner. There is no second place. All systems have been tested in "real life" situations, with experiments conducted in a variety of markets, including Nashville, Cleveland, Chicago, Quincy, Detroit, and New

Continued on page 32



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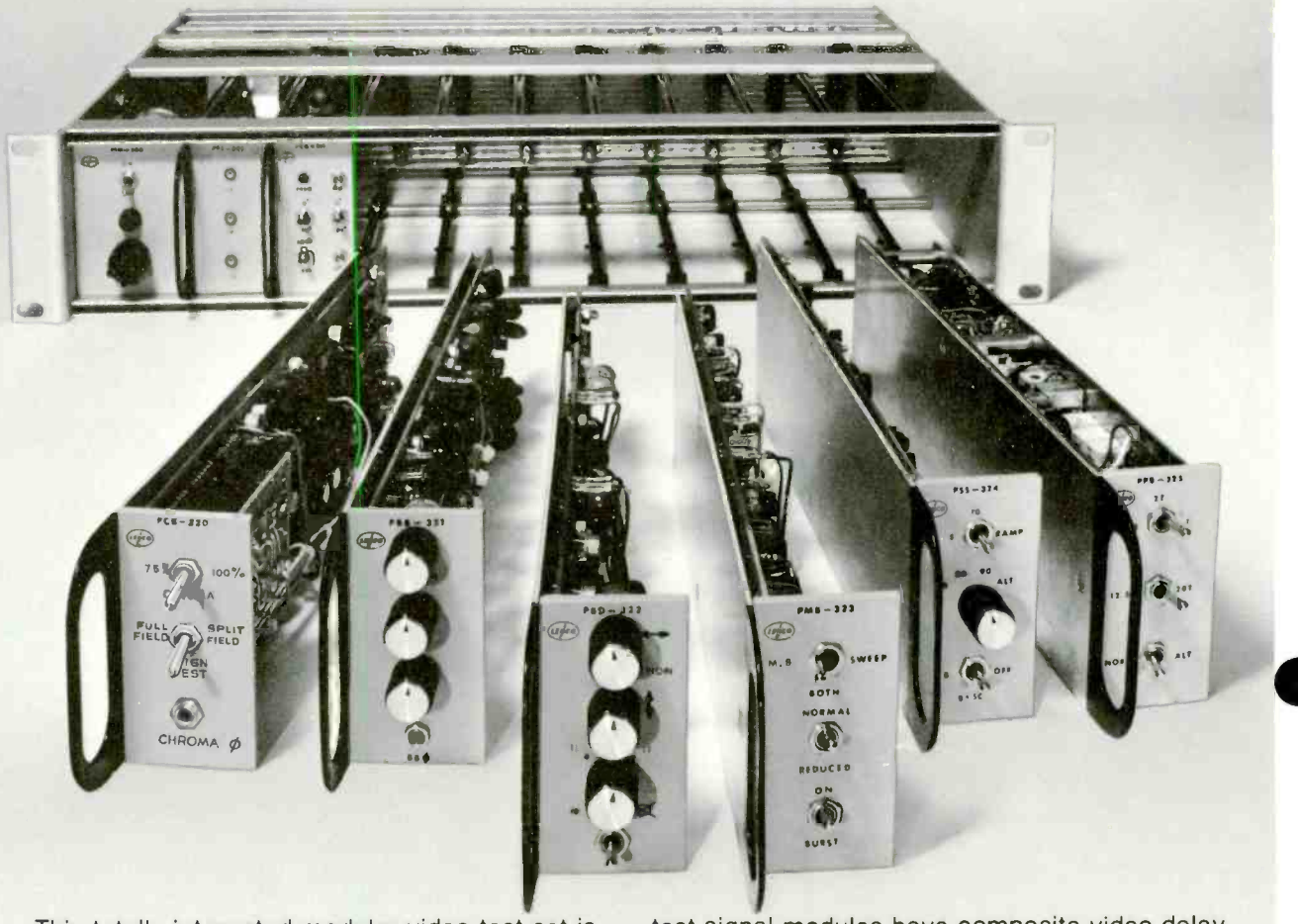

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GORDON PETERS Southwest
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Phone 817/467-0051

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Phone 804/384-7001

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Circle (21) on Action Card

AM Stereo

York. All test data has been turned over to the FCC for their consideration. The NAB remains neutral on the subject of which is best, preferring to avoid any real or implied endorsement of any manufacturing technology.

As far as the receiver manufacturers are concerned, they're ready. In fact, most have tooled up for all five possibilities, and have asked their sub-contractors to do the same. At least one has gone to the extent of designing and building full lines of prototypes of each system, ready to scrap four to get to the market place as soon as possible with the selected one.

One concern expressed by Payne was that the receiver manufacturers maintain the same frequency response and fidelity capability for AM stereo as they do for FM. He cited the example of the state-of-the-art combination receiver, where the FM side was excellent, but the AM side "terrible." Ideally, the NAB would like to see a full range of receivers on the market, with varying degrees of quality for both AM and FM. The feeling being that this would open the door for a wide range of prospective buyers and listeners to both broadcast bands.

The reasons for the interest in AM stereo have been recounted many times, but they're worth capsulizing here. AM listeners have been defecting to FM at the annual rate of three percent a year. Enough history for the analysts to compute that by 1993 there will be no one listening to AM at all.

That, of course, will not be the case, but it's safe to assume that without something to at least bend that curve to a straight line, AM is in trouble. That "something" is AM stereo. One must attract the younger generation to AM. Not *back* to AM, but *to* AM.

As Chris Payne noted, "These days, most kids prefer FM. We hope AM stereo will help re-equalize the radio listening audience. We also hope radio programmers will develop a broad range of formats for both bands, further enhancing the equalization process."

So, at long last the wait is over. AM stereo will undoubtedly be a prime topic of conversation at the NAB convention. And all that's needed is a nod from the FCC to change the conversation to reality. The nod, hopefully, comes next month. BC

EST.

STEREO CONVERSION

AS of 3-80

HARRIS

STEREO GEN	5,000
" MOD MON	5,000
8 CH CONSOLE	4,685
MONITOR AMP	600
MONITOR SPKRS	300
	15,785
A	
AUDIO PROCESSOR	4500.
	$ 20,285

1 Q. Why AM stereo?
A. Consumer preference for stereo vs. mono music is overwhelming. Virtually all commercial disk and tape recordings are now stereo; most FM broadcasts are stereo, and today even the movies have stereo sound. AM radio is the only major music medium lacking stereo, and now the technology is available to add this important new dimension to AM broadcasting.

2 Q. What's new in AM stereo?
A. Harris has improved its Compatible Phase Multiplex (CPM) AM stereo system. While retaining all the advantages of the original CPM system, the improved system provides increased stereo coverage area, typically 90% of the mono coverage area. As with the original Harris system, the mono coverage area is not diminished when broadcasting in stereo.

3 Q. How will stereo benefit the AM broadcaster?
A. The Harris system is compatible with all mono radios now in use; therefore, no listeners will be lost in the transition from mono to stereo. As stereo AM receivers come into use, the many listeners already accustomed to stereo through recordings and FM may be added to the AM broadcaster's audience. In strong signal areas the quality of AM stereo broadcasts can be fully comparable to FM stereo broadcasts.

4 Q. Are present AM transmitters adaptable to stereo?
A. Nearly 90% of existing transmitters can be adapted for CPM by adding a stereo exciter and making minor modifications to the transmitter.

5 Q. What other changes must be made to the AM broadcast plant to convert to stereo?
A. As with FM stereo, studio equipment must be changed to stereo, stereo source material must be added to the library, and a stereo audio link must be provided between studio and transmitter if remote controlled. Directional and non-directional antenna systems which work well in mono will work well in stereo with the Harris system. This, however, is not necessarily true with the other proposed systems. If the antenna system has experienced problems in mono

broadcasting,these problems will be magnified in stereo. Retuning or redesign may be necessary in order to correct antenna deficiencies.

As with FM stereo, the FCC will likely require installation of a type-approved modulation monitor.

6 Q. What will all of these changes cost?
A. Harris estimates the AM stereo exciter and modulation monitor could cost up to $5000 each. Cost for studio equipment, source material, and antenna system work would, of course, vary greatly from station to station.

7 Q. Will it be necessary to reduce modulation or loudness to broadcast AM stereo?
A. No, not with the Harris system. Negative 100% and positive 125% modulation can be maintained. Any type of audio processing can be used without fear of increasing interference to other stations.

8 Q. Why is Harris proposing an AM stereo system when several others have already been proposed?
A. Harris is concerned that the four systems which were proposed in early 1977 are based upon outdated technology. Any of these other AM stereo proposals, if adopted, would stall future advances in the AM state-of-the-art, and might work so poorly that consumer acceptance would be unlikely. This concern has led Harris to search for a better way to broadcast stereo in the AM band. The improved Harris Compatible Phase Multiplex system is the latest development in the AM stereo field and takes advantage of the most recent advances in synchronous receiver technology. In addition, CPM deals realistically with the over-crowding problems of the present-day AM band, recognizes the broadcaster's need to maintain high modulation levels, and satisfies the consumer's demand for high-fidelity stereo sound now and in the future.

9 Q. How does the new Harris system work?
A. The improved Harris CPM system is similar to the original system, in that it is a modified quadrature system. The original system, however, had a fixed angle of 30 degrees between left and right channel sideband vectors to ensure compatibility

with mono receivers. A technological improvement in the new system varies this angle at a syllabic rate to optimize signal-to-noise ratio while still maintaining the same high degree of compatibility with mono receivers. A frequency-modulated, low-frequency pilot tone communicates to the receiver the instantaneous angle so the receiver can always properly track the transmitted signal. This improvement gives a 9 to 12 dB increase in signal-to-noise ratio without sacrificing any of the other advantages of the CPM system.

10 Q. Is the improved Harris system superior to the four competing systems?

A. Yes. It has seven major advantages over the other proposed systems:

- Compatible mono can be received on all mono AM radios including narrow-band radios and the new synchronous receivers.
- No reduction in modulation or loudness is required.
- There is no increase in interference in the crowded AM band.
- The AM broadcaster will experience no reduction in mono coverage area when transmitting stereo.
- The stereo coverage area, normally 90% of mono coverage area, will exceed that of any of the competing systems.
- Performance requirements for antenna and phasing networks are less severe than for the other four proposals, and require only minimal, if any, changes to existing equipment.
- Adverse transmission conditions (skywave, selective fading, nulls of directional array, etc.) do not result in distortion in stereo receivers.

11 Q. What disadvantages does the Harris system have in comparison to the other proposals?

A. Only one. Stereo channel separation is low or non-existent at frequencies below 200 Hz. This is necessary to accommodate the pilot tone which varies between 55 and 100 Hz. Many experiments, however, have shown that channel separation is not necessary at the low frequencies to maintain the full stereo effect; therefore, there is really no disadvantage at all.

12 Q. Is the Harris system capable of good channel separation at mid and high frequencies where it is really important?

A. Yes. It is unique to the Harris system that there is no theoretical limit to the channel separation possible, even in narrow-band receivers. Figures of 50 dB have been achieved in the laboratory, although the first generation of modified AM transmitters will exhibit somewhat less separation.

13 Q. Are there any side benefits from AM stereo?

A. AM stereo broadcasting is likely to create a new market for AM stereo receivers which are more sophisticated and high-fidelity oriented than their mono counterparts. Such an increase in receiver performance will make the AM medium more competitive. Furthermore, synchronous stereo receivers will provide better fringe area reception, both in stereo and mono. The Harris system is the only one of the five stereo proposals which will allow these improvements. The others must limit frequency response to control interference; will have high distortion in practical receiver designs; and can not use synchronous receivers for either mono or stereo reception.

14 Q. What is a synchronous receiver and why is it better?

A. Most AM radios use an envelope detector which simply rectifies the radio frequency signal to recover the audio impressed on the carrier wave. This usually works relatively well, but Harris is commited to a better way. The synchronous receiver regenerates the carrier wave and uses it as a reference signal to help the receiver discriminate against noise and distortion. With synchronous receivers, reception is less plagued with noise and interference, and the rasping distortion heard on skywave signals and in directional antenna nulls is completely eliminated.

15 Q. Why aren't synchronous receivers used universally?

A. The advantages of synchronous receivers have been known for many years, but until recent advances in integrated circuit technology, the cost was prohibitive for consumer-oriented radios. Now, however, some of the major receiver manufacturers are building synchronous receivers for

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

HARRIS CORPORATION Broadcast Products Division
P. O. Box 4290, Quincy, Illinois 62301 U.S.A.

Proposal Number: 01310NAB

Date of Proposal: March 7, 1980

Date:

PROPOSAL

FOR

PRE-NAB '80 AM STEREO EQUIPMENT OFFER

We are pleased to present this Proposal to supply the apparatus as itemized and priced in the attached schedule. All orders subject to final confirmation and acceptance by Seller at its home office.

HARRIS CORPORATION Broadcast Products Division

Prepared by:

W. J. Kabrick
Audio Products Marketing Manager
Harris Corporation
P. O. Box 4290
Quincy, Illinois 62301
(217) 222-8200 Ext. 3538

HARRIS CORPORATION Broadcast Products Division
P.O. BOX 4290, Quincy, Illinois 62301

EQUIPMENT

ITEM NO.	QTY.	STOCK NO.	DESCRIPTION	UNIT PRICE	TOTAL
			A. Audio Console Selection		
1	___	740-xxxx-000	Harris M90 Modular Audio Console with 12 of 18 Input Channels Operational, Plug-In Expansion to full 18 Input Channels, Stereo Output Channel.	13,523.00	
1A	___	994-6158-001	Harris Executive Audio Console with 10 Input Channels, Stereo Output	6,665.00	
1B	___	994-6867-001	Harris Stereo 80 Audio Console with 8 Input Channels, Stereo Output	4,885.00	
1C	___	994-7691-001	Harris Stereo 5 Audio Console with 5 Input Channels, Stereo Output	1,950.00	
			B. Cartridge Machines		
2	___	994-7994-001	Harris C90-1 Stereo 2-Tone Playback, Desk Mount for A & B Size Carts	955.00	
2A	___	994-7996-001	Harris C90-2 Stereo 2-Tone Playback, Desk Mount for A, B & C Size Carts	985.00	
2B	___	994-8001-001	Harris C90-3 Stereo 1-Tone Playback, Three Decks, Desk Mount for A & B Size Carts	2,235.00	
3	___	994-7998-001	Harris C90-2 Stereo 2-Tone Record/Playback, Desk Mount for A, B & C Size Carts	1,745.00	
4	___	994-8161-001	C90-1 Playback Rack Mount, One Unit	25.00	
4A	___	994-8162-001	C90-1 Playback Rack Mount, Two Units	25.00	
5	___	994-8160-001	C90-2 Playback Rack Mount, One Unit	25.00	
6	___	994-8045-001	C90-3 Playback Rack Mount, Two Units	48.00	
7	___	994-8162-001	C90-2 Rec/Play Rack Mount, One Unit	25.00	
8	___	992-4882-001	C90-3 Secondary Cue Card, 2nd Tone	170.00	
			C. Turntables & Accessories		
9	___	994-7866-001	Harris CB-1201 Turntable, Undrilled	295.00	
9A	___	994-xxxx-001	CB-1201 Drilled for Popular Arms	314.00	
10	___	723-0386-000	Technics SP-25 Direct Drive Turntable*	350.00	
11	___	723-0385-000	Technics SP-15 Direct Drive Turntable*	600.00	
12	___	723-0367-000	Technics SP-10MKII Direct Drive Turntable*	900.00	
			*Technics Turntables Require One of the following Bases:		
13	___	723-0387-000	Technics SH-15B2 Base for SP-15 or SP-25 Turntable, Rosewood Finish	250.00	
14	___	723-0388-000	Technics SH-15B3 Base for SP-15 or SP-25 Turntable, Black Finish	250.00	

EQUIPMENT

ITEM NO.	QTY.	STOCK NO.	DESCRIPTION	UNIT PRICE	TOTAL
15	___	723-0368-000	Technics SH10B3 Base for SP-10MKII Turntable	350.00	
16	___	994-6977-002	Harris Stereo IC Equalized TT Preamp	325.00	
17	___	723-0268-000	Micro-Trak Model 303 12" TT Arm	99.50	
18	___	723-0358-000	Stanton 600A Stereo TT Cartridge	24.20	
			D. Reel-Reel Machines		
19	___	730-2059-000	Otari Mark II-2 Half-Track Stereo Record/Play, 7.5/15 ips	2,445.00	
20	___	730-2062-000	Rack Mount Adaptor for Mark II-2	36.00	
21	___	448-0712-000	Ruslang RL500 Wood Floor Tape Console With Electronic Overbridge and Casters for Mark II-2	390.00	
22	___	730-2058-000	Otari MX-5050-B Half-Track Stereo Record/Play, 3.75/7.5/15 ips	2,050.00	
23	___	730-2061-000	Rack Mount Adaptor for MX-5050-B	35.00	
24	___	448-0711-000	Otari CSL-B Wood Floor Tape Console with Casters, for Horizontal Operation of MX-5050-B	330.00	
25	___	730-2029-000	Otari ARS-1000-DC Half-Track Stereo Playback Only, 3.75/7.5 ips, Rack Mount	1,365.00	
26	___	730-1705-000	Ampex AG-440C-2 Half-Track Stereo Record/Play, 7.5/15 ips, Rack Mount	4,700.00	
27	___	730-1706-000	Ampex AG-440C-2 Half-Track Stereo Record/Play, 7.5/15 ips, In Console	5,500.00	
28	___	730-1489-000	Revox A77 Mark III Half-Track Stereo Record/Play, 3.75/7.5 ips, Wood Cabinet	1,399.00	
			E. Audio Processor		
29	___	994-8358-001	Harris MSP-90 Stereo Tri-Band AGC Amplifier	3,990.00	
30	___	994-8204-001	Harris MSP-90 Stereo Wide-Band AGC Amplifier	1,845.00	
			F. Miscellaneous Studio Equipment		
31	___	740-0303-000	Crown D75 Dual Channel Amplifier, 35W per Channel, Required for Item 1 (M90 Console), Typical for Control Room Speakers with Other Consoles	399.00	
32	___	722-0085-000	AR-10 PI 3-Way Speaker System, Oiled Walnut Finish	450.00	
33	___	722-0092-000	JBL Model 4311WX 3-Way Speaker System, Oiled Walnut Finish	336.00	

HARRIS COMMUNICATION AND INFORMATION PROCESSING

HARRIS CORPORATION Broadcast Products Division
P.O. BOX 4290, Quincy, Illinois 62301

Contract No. 01310NAB

EQUIPMENT

ITEM NO.	QTY.	STOCK NO.	DESCRIPTION	UNIT PRICE	TOTAL
34	___	722-0090-000	JBL Model 4301WX 2-Way Speaker System, Oiled Walnut Finish	168.00	
35	___	721-0074-000	Sennheiser HD-414-13 2,000 Ohm Stereo Headphones, Open-Aire Lightweight	74.80	
36	___	721-0102-000	Sennheiser HD-400 600 Ohm Stereo Headphones, Featherweight	43.80	
37	___	721-0108-000	Koss PRO/4AA 3.2-600 Ohm Stereo Headphones, Volume Balance Controls	70.00	
38	___	721-0107-000	Koss K/6 3.2-600 Ohm Stereo Headphones	29.95	
39	___	478-0291-000	Speaker Matching Transformers for Executive, Stereo 80 and Stereo 5 Audio Console Monitor Amplifiers	8.35	
			Note: Please add the extended total prices in each category, and carry back to the Summary Page. Add together for Total Equipment, deduct 10% for all items listed in this pre-NAB AM Stereo Equipment Offer.		

1. PURCHASERS LEGAL NAME & ADDRESS:

Name_____

Address_____

City_____

State_____ Zip_____

CALL LETTERS ☐

2. FORM OF BUSINESS:

☐ Proprietorship ☐ Corporation

☐ Partnership ☐_____

3. RESIDENCE ADDRESS OF PRINCIPLES:

a. Name_____

Address_____

City/State_____ Zip_____

Title_____ % Ownership_____

b. Name_____

Address_____

City/State_____ Zip_____

Title_____ % Ownership_____

c. Name_____

Address_____

City/State_____ Zip_____

Title_____ % Ownership_____

4. CREDIT INFORMATION:

Bank Reference(s)

a. Name_____

City/State_____

Contact:_____ Phone_____

b. Name_____

City/State_____

Contact:_____ Phone_____

Major Trade Reference(s)

a. Name_____

City/State_____

Contact:_____ Phone_____

b. Name_____

City/State_____

Contact:_____ Phone_____

5. EQUIPMENT ON THIS ORDER IS FOR:

☐ New Station ☐ Power Increase ☐ Replacement

☐ AM ☐ FM ☐ TV ☐ Other_____

6. ORDER IS CONTINGENT UPON:

☐ Issuance of construction permit by FCC.

☐ Transfer of ownership approval by FCC.

☐ Other - Explain_____

_____

7. ORDER IS FIRM AND EQUIPMENT CAN BE SHIPPED WHEN AVAILABLE. ☐ Yes ☐ No If NO - When??

_____

_____

IF EQUIPMENT IS FOR NEW STATION, WHAT IS ANTICIPATED "ON AIR" DATE?_____

8. LOCATION OF EQUIPMENT COVERED BY THIS CONTRACT:

TRANSMITTER:

Street_____

City_____ County_____

State_____ Zip_____

STUDIO:

Street_____

City_____ County_____

State_____ Zip_____

9. ADDRESS ALL CORRESPONDENCE TO:

Name_____

Address_____

City/State_____ Zip_____

Phone_____ Title_____

10. STATIONS CONSULTING ENGINEER:

Name_____

Address_____

City/State_____

Phone_____ Title_____

11. PREFERRED SHIPPING METHOD:

☐ NON-EXCLUSIVE ELECTRONICS VAN ☐ BEST WAY

☐ MOTOR FREIGHT ☐ AIR FREIGHT ☐ UPS

☐ OTHER_____

12. SHIP TRANSMITTING EQUIPMENT TO:

Street_____

City/State_____ Zip_____

Notify:_____ Phone_____

13. SHIP STUDIO EQUIPMENT TO:

Street_____

City/State_____ Zip_____

Notify:_____ Phone_____

HARRIS COMMUNICATION AND INFORMATION PROCESSING

HARRIS CORPORATION Broadcast Products Division
P. O. Box 4290, Quincy, Illinois 62301 U.S.A.

SUMMARY

Contract No. 01310NAB

1. SUMMARY OF ITEMS:

A. Audio Consoles, Item 1 - 1C	$
B. Cartridge Machines, Item 2 - 8	$
C. Turntables & Accessories, Item 9 - 18	$
D. Reel-Reel Machines, Item 19 - 28	$
E. Audio Processor, Item 29 - 30	$
F. Misc. Studio Equipment, Item 31 - 39	$
	$
	$
PRICES SUBJECT TO CHANGE WITHOUT NOTICE	$
	$
	$
Total Equipment (All Items Listed Above)	$
EQUIPMENT PRICE (Total Equipment, Less 10%)	$
Tax (description) (If Applicable)	$
Total, including tax (Equipment Price With Tax)	$
Trade in allowance per TRADE-IN AGREEMENT attached	$
Total Price, less trade in	$

(PRICES QUOTED ARE VALID FOR 30 DAYS UNLESS OTHERWISE NOTED.)

2. ESTIMATED SHIPMENT SCHEDULE:

ITEM	ESTIMATED SHIPMENT DATE
Please contact Wally Kabrick at 217-222-8200 Extension 3538 on items 1, 10 - 15, 19 - 28. The other items are typically -	30 Days A.R.O.

3. PAYMENT ARRANGEMENTS:

Cash with order Down Payment of 25% $

Additional payment before shipment $

Balance due Net-30 Days $

Payable as follows:

Contact Jerry Gervais (217) 222-8200 Extension 3492 for financing or leasing arrangements.

If the above provides for payment in deferred installments, purchaser authorizes seller, in acknowledging this order, to calculate and state in its acknowledgement, the balance remaining unpaid to seller under this contract, the total amount of the finance charge payable on said balance, computed at____% per annum, the time balance inclusive of finance charge payable by purchaser, and the amount of each of the____substantially equal and consecutive monthly installments, the first of which installments will be due____days after the anticipated date of shipment of the major item of equipment described herein, as determined by seller. All instruments on deferred transactions shall be executed prior to shipment.

ALL PRICES ARE NET, ARE F.O.B. MANUFACTURER'S SHIPPING POINT(S), AND ARE SUBJECT TO ADJUSTMENT AS HEREIN PROVIDED.

THE PROVISIONS OF THE REVERSE SIDE HEREOF ARE A PART OF THIS ORDER, AND UPON ACCEPTANCE OF THIS ORDER SHALL BE BINDING UPON SELLER AND PURCHASER.

This proposal consisting of pages numbered 1 to ___, inclusive, is hereby accepted this____day of_____, 19____.

(Purchaser's name, corporation or partnership)

(Signature of owner, partner or officer — state which)

TERMS AND CONDITIONS

Acceptance:

This proposal, when signed by Purchaser, shall constitute an order by Purchaser which shall be deemed to be accepted by Seller when Seller mails to Purchaser its standard form of acknowledgment. Seller reserves the right, in its acknowledgment, to change prices and specifications herein to Seller's prices and specifications in effect on the date of the acknowledgment. If the prices or specifications in the acknowledgment differ from those herein, Purchaser may cancel this order by a written notice by certified mail to Seller within ten (10) days after receipt of the acknowledgment. In case of such cancellation, Seller shall refund to Purchaser all payments previously made on account of the purchase price, without interest. If a written notice is not received from Purchaser, as above provided, then such changes shall be deemed to be accepted. The order, together with the acknowledgment above mentioned, shall constitute the entire contract between the parties, and shall be changed only by written agreement of the parties. The banking by Seller, or other disposition of funds paid by Purchaser to Seller, shall not constitute acceptance of this order by Seller. The contract shall be governed by the laws of the State of Illinois.

Purchaser acknowledges receipt of a copy of this order as signed by it.

Price:

Seller may adjust the price of any of the equipment covered by this order to Seller's list price in effect immediately prior to shipment, except that in the case of equipment manufactured by Seller, Seller agrees to make no price adjustment if the equipment is shipped within the normal delivery time for the respective items (90 days or six months after Seller's acceptance of a firm order, whichever is applicable), and (a) this order is accompanied by a down payment of at least 25 percent of the total price of the equipment described herein, or (b) this order is designated herein as contingent upon issuance of a construction permit by the Federal Communication Commission and is accompanied by a down payment of at least 5 percent of the total price of the equipment described herein, provided the order is made firm and accompanied by a down payment amount of at least 20 percent within six (6) months after Seller's acceptance of the contingent order. Delays in delivery caused solely by Seller's own actions are excepted. Delays for the convenience or at the request of Purchaser shall not effect Seller's right to adjust prices hereunder. If this order provides for deferred payment terms, Seller may increase the rate of finance charge provided herein to its rate of finance charge in effect immediately prior to shipment, provided, however, that in no event shall such increases exceed one percentage point. No adjustment in price or rate of finance charge shall be made other than as provided herein.

Contingent Orders:

If this order is herein designated as being contingent, Purchaser represents it as pending, or will file with the F.C.C. an application for a construction permit. If such application, as originally filed or as amended, is denied, revoked, or abandoned, Purchaser, upon giving prompt written notice to that effect to Seller, may cancel this order with respect to any or all items unshipped at the date of Seller's receipt of said notice, whereupon Seller shall refund to Purchaser the payments theretofore made for such cancelled items after deducting charges for special or custom-built equipment. If a balance remains payable to Seller after deducting the price of such equipment, Purchaser shall pay said balance upon receipt of invoice from Seller.

Taxes:

Purchaser shall pay, or upon receipt of invoice from Seller shall reimburse Seller for, all sales, use, occupation, gross income, excise, and other taxes or charges levied or imposed on Purchaser or required to be collected by Seller or imposed on the Equipment or on Seller resulting from this transaction or any part thereof, irrespective of whether included on the face hereof at the time of entry of this order.

Insurance:

Purchaser shall furnish to Seller an insurance policy in such company as Seller shall approve, on the Equipment, against fire and extended coverage perils in an amount equal to the full value of the Equipment, with loss first payable to Seller as its interests may appear. Purchaser will maintain such insurance until full payment shall have been made to Seller, in default of which Seller may obtain the same at Purchaser's expense, for which Purchaser shall promptly reimburse Seller.

Purchaser agrees to indemnify Seller against all claims arising out of or resulting from the erection, operation or use of the equipment, whether on account of negligence or otherwise, except those asserted by Seller's employees.

Delivery:

If Purchaser delays shipment, payments are to be made as though shipment had been made as specified and the Equipment shall be at Purchaser's risk and shall be stored by Seller at Purchaser's expense.

Seller's obligations hereunder are subject to delays incident to labor difficulties, fires, casualties and accidents, acts of the elements, acts of the public enemy, component failures on test; transportation difficulties; inability to obtain equipment, materials or qualified labor sufficient to timely fill its order, in which latter case Seller may apply or prorate shipments of its products to or among its customers as in its judgment is reasonable in the circumstances; governmental interference or regulations and causes beyond Seller's control.

If shipment of any item is delayed more than one year beyond the shipping date specified herein, by reason of any one of the foregoing, either party may terminate this contract as to any such items by written notice to the other, whereupon Seller shall either (a) issue a credit to Purchaser's account hereunder in an amount equal to an equitable portion of the total contract price, without interest, or (b) if the total contract price has been paid, Seller shall refund to Purchaser an equitable portion thereof without interest. If other equipment has been accepted by Seller as part payment and is not available for return to Purchaser, then Seller shall pay to Purchaser the net proceeds received by Seller from its disposition of such equipment.

Installation and Maintenance:

Except as set forth on the face hereof, Purchaser is responsible for the prompt installation, and proper maintenance, of the Equipment to Seller's specifications, and accepted engineering practice, providing an adequate foundation, employment of sufficient technically qualified personnel and shall furnish any necessary equipment, materials, services, necessary facilities and utilities, and adequate access to the Equipment and installation site, if this contract so provides. Seller will furnish the service of an erection supervisor, whose sole responsibility shall be to supervise or check out the installation of Seller's equipment furnished hereunder for the number of days required therefor, at Seller's published field service charge then in effect.

Title and Remedies:

Until full payment of all obligations of Purchaser hereunder (whether represented by notes, open account, judgment, or otherwise), Seller reserves title to all of the Equipment furnished hereunder, or hereafter in connection therewith, whether or not the same is attached to the realty, and the same shall be considered as personal property and subject to the Purchase Money Security Interest of Seller hereby granted by Purchaser.

If Purchaser defaults in paying or performing any of its obligations hereunder, Seller, with or without notice, may treat all amounts owing hereunder by Purchaser to be immediately due and payable and may repossess the equipment, and exercise such other or different remedies as are provided by applicable laws.

No remedy herein provided for shall be applicable where not permitted by law.

When requested by Seller, Purchaser shall duly acknowledge this contract, and execute, acknowledge, and deliver to Seller in Seller's usual form, a supplement hereto, chattel mortgage, supplemental security agreement, financing statement, or other additional appropriate instrument which Seller may require to constitute the Equipment as the unencumbered security for the obligations of Purchaser hereunder, or to enable Seller to comply with all applicable filing or recording laws.

Purchaser hereby authorizes Seller, or its assignee, where permitted by applicable law, to sign and file financing statements in order to perfect the security interest of Seller hereunder.

If, in the judgment of Seller, either before or after manufacture or shipment of the Equipment, the financial responsibility of Purchaser is such as to indicate inability to pay its obligations, including those hereunder, as they mature, Seller, upon giving written notice to Purchaser, may require payment in full or of a specified part of the balance of the purchase price within ten (10) days after the giving of such notice, irrespective of the terms of payment stated herein.

Warranty:

In the event that this order includes service parts, the following Warranty period shall apply: Replacement parts, with the exception of tubes, are warranted by Seller for a period of 90 days from date of shipment.

Seller warrants Equipment of Seller's manufacture against defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one year (6 months on moving parts) from the date of shipment, of which Purchaser gives Seller prompt written notice. Other manufacturers' and Suppliers' Equipment and services, if any, including electron tubes, solid state devices, transmission line, antennas, towers, related equipment and installation and erection services, shall carry only such manufacturers' or Suppliers' standard warranty as to which Purchaser hereby agrees to deal with such manufacturer or installation contractor.

Seller's sole responsibility for any breach of the foregoing provision of this contract, with respect to any Equipment or parts not conforming to the warranty or the description herein contained, is at its option, (a) to repair or replace such Equipment or parts, f.o.b. Seller's shipping point, upon the return thereof, freight prepaid, within the period aforesaid, or (b) to accept the return thereof f.o.b. Purchaser's point of installation, whereupon Seller shall either (1) issue a credit to Purchaser's account hereunder in an amount equal to an equitable portion of the total contract price, without interest, or (2) if the total contract price has been paid, refund to Purchaser an equitable portion thereof without interest. If other equipment has been accepted by Seller as part payment and is not available for return to Purchaser, then Seller shall pay to Purchaser the net proceeds received by Seller from its disposition of such equipment.

If the Equipment is described as used, it is sold as is and where is. If the contract covers equipment not owned by Seller at this date, it is sold subject to Seller's acquisition of possession and title.

Seller assumes no responsibility for design characteristics of special equipment manufactured to specifications supplied by or on behalf of Purchaser and shall not be liable for any expenses, whether for repairs, replacements, material, service, labor or otherwise, incurred by Purchaser, or for modifications made by Purchaser to the Equipment without prior written consent to Seller.

EXCEPT AS SET FORTH HEREIN AND EXCEPT AS TO TITLE, THERE ARE NO WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY SELLER, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INFRINGEMENT, OR OTHERWISE WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

Damages and Risk of Loss:

Purchaser assumes all responsibility for, and risk of loss of, or damage to, the Equipment upon delivery at Seller's shipping point, notwithstanding the fact that Seller may have selected the carrier.

Purchaser is expressly notified, and hereby agrees, that Seller's liability hereunder shall not include losses of anticipated profits or special incidental or consequential damages.

Tower, Antenna and Related Services:

Tower and antenna erection work, ground system installation, installation of concrete foundations and anchors, and services related thereto and provided for herein, will be performed by an independent contractor.

Seller shall let the contract for erection of any towers and antennas provided for herein to an independent contractor, who shall not be deemed to be an agent of Seller, upon the installer's Terms and Conditions hereto attached, as accepted by Purchaser. Purchaser agrees to supervise and direct such independent contractor in the performance of the work to assure compliance with all applicable specifications, restrictions, ordinances, laws and governmental regulations.

With respect to the erection of the tower, antenna and related services, Purchaser agrees that, (a) prior to shipment of such equipment, Purchaser will have obtained from the Federal Communications Commission, the Federal Aviation Agency, and any other governing bodies having jurisdiction thereof all necessary permits; (b) the site will be level, clear and free from obstructions and debris, and staked off prior to arrival of the tower erection crew; (c) the site shall not consist of marshy land, swamps, dumps, rocky soil, peat or frozen soil, and the soil conditions shall be normal and suitable; (d) suitable electrical power will be available for construction work and for testing; and (e) there shall be suitable access to the site by truck and other vehicles for the hauling of all necessary materials and equipment.

If, either before or after the erection crew has begun the work of erection, it is discovered that any of the conditions specified in (a) through (e) do not obtain, then the erection crew foreman, in his discretion, may have the crew, at the expense of the Purchaser, perform such work as may be necessary or appropriate in order that the specified conditions may be brought about, or may delay the beginning of the work, or if already begun may discontinue the work, and, if he considers it impracticable to keep the erection crew on the site, may have the crew depart from the site.

Purchaser agrees to pay to Seller, or its order, upon invoice, all costs of extra material or services required for the performance of work related to the installation of towers, antennas or related equipment, including any extra costs incurred by the contractor by reason of failure of compliance by Purchaser with any of the conditions (a) through (e) above or occasioned by inclement weather, labor difficulties, or excess labor costs resulting from requirements of local unions for extra work or stand-by labor.

Upon certification of the completion of the erection work hereunder by the erection crew foreman, Purchaser shall inspect the work, and if it is in conformity with the terms and provisions of this contract, shall certify its acceptance by immediately delivering to the erection crew foreman a signed statement to that effect. If Purchaser declines to sign such statement, then Purchaser, before departure of the crew, shall inform Seller in detail by telephone of the reasons for such declination and promptly confirm such reasons in writing. If, before departure of the crew, Purchaser fails so to notify Seller, or if Purchaser fails to make such inspection, the work shall be conclusively deemed to have been accepted by Purchaser.

In the event that this order covers an antenna to be installed on an existing tower, Purchaser alone shall be responsible for determining, to his complete satisfaction, the adequacy of such tower to support the weight and wind loading associated with such antenna and related hardware and the installation thereof. Seller's sole responsibility shall be to provide to Purchaser the specifications relative to such antenna and related hardware.

Miscellaneous:

This order is subject to acceptance by Seller at its home office written herein and thereupon shall constitute the entire contract between the parties which replaces, supersedes and merges all prior discussions, agreements or understandings between the parties and which shall be changed only by written agreement of the parties.

Any or all of Seller's rights or obligations hereunder may be assigned by Seller without notice to Purchaser and may be exercised by an assignee thereof. Purchaser shall not assert against any transferee, either of this contract or of promissory notes, any defense (other than actual payment), setoff, equity, or counterclaim which Purchaser may have or claim against Seller. Purchaser acknowledges that Seller uses varying trade styles and names in those jurisdictions in which it does business.

Model, nomenclature and the mechanical and electrical design of equipment described herein are subject to change without notice.

The remedies of Purchaser, for any breach of any obligations arising hereunder as herein set forth, shall be the sole and exclusive remedies thereto, irrespective of any other remedies otherwise available pursuant to UCC2-719 or otherwise in law or equity.

Each provision of this contract is severable, and in the event that any one or more provisions hereof may be declared invalid, the remainder of this agreement shall nevertheless remain in full force and effect.

HARRIS COMMUNICATIONS AND INFORMATION HANDLING

HARRIS CORPORATION Broadcast Products Division
P. O. Box 4290, Quincy, Illinois 62301 U.S.A.

Proposal Number: 01010NAB

Date of Proposal: March 7, 1980

Date:

PROPOSAL

FOR

AM STEREO GENERATOR, AM STEREO MODULATION MONITOR

We are pleased to present this Proposal to supply the apparatus as itemized and priced in the attached schedule. All orders subject to final confirmation and acceptance by Seller at its home office.

HARRIS CORPORATION Broadcast Products Division

Prepared by:

W. J. Kabrick
Audio Products Marketing Manager
Harris Corporation
P. O. Box 4290
Quincy, Illinois 62301
(217) 222-8200 Ext. 3538

HARRIS COMMUNICATION AND INFORMATION PROCESSING
HARRIS CORPORATION Broadcast Products Division
P.O. BOX 4290, Quincy, Illinois 62301

Contract No. 01010NAB

EQUIPMENT

ITEM NO.	QTY.	STOCK NO.	DESCRIPTION		UNIT PRICE	TOTAL
1	1	Special	Harris AM Stereo Generator	Est.	5,000.00	5,000.00
2	1	Special	Harris AM Stereo Modulation Monitor	Est.	5,000.00	5,000.00
			Estimated Total			10,000.00

SUPPLEMENTAL TERMS AND CONDITIONS

1. This order is recognized by Purchaser and Seller as being a contingent order and the fulfillment of such order is dependent upon Federal Communications Commission (FCC) authorization and approval of AM Stereo radio broadcasting as well as upon Sellers decision to manufacture this equipment.

2. The price of equipment contained in this proposal has yet to be determined and, as such, prices listed for equipment are estimates only. Purchaser may, if the actual price exceeds the estimated price, cancel this order within ten days of a written notification from the Seller that the final price exceeds the estimated price.

3. Upon announcement of an approved AM Stereo System and FCC authorization and Sellers decision to manufacture, this order must be made firm within ten days by Purchaser by forwarding to Seller an additional down payment in the amount of 20% ($2,000) of the estimated price. Purchaser acknowledges that any delay in forwarding said down payment will cause a similar delay in processing the firm order and such delay will impact shipment to Purchaser.

4. In consideration of the foregoing rights and privileges afforded to the Purchaser by the Seller, Purchaser agrees to secure the placement of this contingent order by payment of the nominal sum of $500 to Seller upon signing this order. Said nominal sum will be applied to the final purchase price of the equipment contained in this proposal or it will be returned to Purchaser in accordance with the cancellation privilege contained in paragraph 2. Furthermore, if the contingencies contained in paragraph 1 are not removed, then Seller will likewise return to Purchaser any payments received for this order.

5. The Supplemental Terms and Conditions apply to this order and are in addition to the terms and Conditions that normally apply to the sale of Harris Corporation Broadcast Products Division goods and services.

HARRIS COMMUNICATION AND INFORMATION PROCESSING

HARRIS CORPORATION Broadcast Products Division
P. O. Box 4290, Quincy, Illinois 62301 U.S.A.

SUMMARY

Contract No. 01010NAB

1. SUMMARY OF ITEMS:

AM Stereo Generator	Est.	$	5,000.00
		$	
AM Stereo Modulation Monitor	Est.	$	5,000.00
		$	
		$	
		$	
		$	
		$	
		$	
		$	
		$	
		$	
Total Equipment		$	10,000.00
EQUIPMENT PRICE		$	10,000.00
Tax (description) To be billed separately		$	
Total, including tax		$	
Trade in allowance per TRADE-IN AGREEMENT attached		$	
Total Price, less trade in		$	

(PRICES QUOTED ARE VALID FOR 30 DAYS UNLESS OTHERWISE NOTED.)

2. ESTIMATED SHIPMENT SCHEDULE:

ITEM	ESTIMATED SHIPMENT DATE
See paragraphs 1 - 5.	

3. PAYMENT ARRANGEMENTS:

Cash with order	$	500.00
Cash due per paragraph 3		2,000.00
Additional payment before shipment	$	
Balance due	$	
Payable as follows: Net invoice		

If the above provides for payment in deferred installments, purchaser authorizes seller, in acknowledging this order, to calculate and state in its acknowledgement, the balance remaining unpaid to seller under this contract, the total amount of the finance charge payable on said balance, computed at____% per annum, the time balance inclusive of finance charge payable by purchaser, and the amount of each of the____substantially equal and consecutive monthly installments, the first of which installments will be due____days after the anticipated date of shipment of the major item of equipment described herein, as determined by seller. All instruments on deferred transactions shall be executed prior to shipment.

ALL PRICES ARE NET, ARE F.O.B. MANUFACTURER'S SHIPPING POINT(S), AND ARE SUBJECT TO ADJUSTMENT AS HEREIN PROVIDED.

The provisions of the reverse side hereof and paragraphs 1 thru 5 on page 2, are a part of this order, and upon acceptance of this order shall be binding upon seller and purchaser.

This proposal consisting of pages numbered 1 to 3, inclusive, is hereby accepted this____day of_____, 19____.

(Purchaser's name, corporation or partnership)

(Signature of owner, partner or officer — state which)

TERMS AND CONDITIONS

Acceptance.

This proposal, when signed by Purchaser, shall constitute an order by Purchaser which shall be deemed to be accepted by Seller when Seller mails to Purchaser its standard form of acknowledgment. Seller reserves the right, in its acknowledgment, to change prices and specifications herein to Seller's prices and specifications in effect on the date of the acknowledgment. If the prices or specifications in the acknowledgment differ from those herein, Purchaser may cancel this order by a written notice by certified mail to Seller within ten (10) days after receipt of the acknowledgment. In case of such cancellation, Seller shall refund to Purchaser all payments previously made on account of the purchase price, without interest. If a written notice is not received from Purchaser, as above provided, then such changes shall be deemed to be accepted. The order, together with the acknowledgment above mentioned, shall constitute the entire contract between the parties, and shall be changed only by written agreement of the parties. The banking by Seller, or other disposition of funds paid by Purchaser to Seller, shall not constitute acceptance of this order by Seller. The contract shall be governed by the laws of the State of Illinois.

Purchaser acknowledges receipt of a copy of this order as signed by it.

Price:

Seller may adjust the price of any of the equipment covered by this order to Seller's list price in effect immediately prior to shipment, except that in the case of equipment manufactured by Seller, Seller agrees to make no price adjustment if the equipment is shipped within the normal delivery time for the respective items (90 days or six months after Seller's acceptance of a firm order, whichever is applicable), and (a) this order is accompanied by a down payment of at least 25 percent of the total price of the equipment described herein, or (b) this order is designated herein as contingent upon issuance of a construction permit by the Federal Communication Commission and is accompanied by a down payment of at least 5 percent of the total price of the equipment described herein, provided the order is made firm and accompanied by a down payment amount of at least 20 percent within six (6) months after Seller's acceptance of the contingent order. Delays in delivery caused solely by Seller's own actions are excepted. Delays for the convenience or at the request of Purchaser shall not effect Seller's right to adjust prices hereunder. If this order provides for deferred payment terms, Seller may increase the rate of finance charge provided herein to its rate of finance charge in effect immediately prior to shipment, provided, however, that in no event shall such increases exceed one percentage point. No adjustment in price or rate of finance charge shall be made other than as provided herein.

Contingent Orders:

If this order is herein designated as being contingent, Purchaser represents it as pending, or will file with the F.C.C. an application for a construction permit. If such application, as originally filed, or as amended, is denied, revoked, or abandoned, Purchaser, upon giving prompt written notice to that effect to Seller, may cancel this order with respect to any or all items unshipped at the date of Seller's receipt of said notice, whereupon Seller shall refund to Purchaser the payments theretofore made for such cancelled items after deducting charges for special or custom-built equipment. If a balance remains payable to Seller after deducting the price of such equipment, Purchaser shall pay said balance upon receipt of invoice from Seller.

Taxes:

Purchaser shall pay, or upon receipt of invoice from Seller shall reimburse Seller for, all sales, use, occupation, gross income, excise, and other taxes or charges levied or imposed on Purchaser, or required to be collected by Seller, or imposed on the Equipment or on Seller resulting from this transaction or any part thereof, irrespective of whether included on the face hereof at the time of entry of this order.

Insurance:

Purchaser shall furnish to Seller an insurance policy in such company as Seller shall approve, on the Equipment, against fire and extended coverage perils in an amount equal to the full value of the Equipment, with loss first payable to Seller as its interests may appear. Purchaser will maintain such insurance until full payment shall have been made to Seller. In default of which Seller may obtain the same at Purchaser's expense, for which Purchaser shall promptly reimburse Seller.

Purchaser agrees to indemnify Seller against all claims arising out of or resulting from the erection, operation or use of the equipment, whether on account of negligence or otherwise, except those asserted by Seller's employees.

Delivery:

If Purchaser delays shipment, payments are to be made as though shipment had been made as specified and the Equipment shall be at Purchaser's risk and shall be stored by Seller at Purchaser's expense.

Seller's obligations hereunder are subject to delays incident to labor difficulties; fires, casualties and accidents, acts of the elements; acts of the public enemy, component failures on test; transportation difficulties; inability to obtain equipment, materials or qualified labor sufficient to timely fill its order, in which latter case Seller may apply or prorate shipments of its products to or among its customers as in its judgment is reasonable in the circumstances; governmental interference or regulations and causes beyond Seller's control.

If shipment of any item is delayed more than one year beyond the shipping date specified herein, by reason of any one of the foregoing, either party may terminate this contract as to any such items by written notice to the other, whereupon Seller shall either (a) issue a credit to Purchaser's account hereunder in an amount equal to an equitable portion of the total contract price, without interest, or (b) if the total contract price has been paid, Seller shall refund to Purchaser an equitable portion thereof without interest. If other equipment has been accepted by Seller as part payment and is not available for return to Purchaser, then Seller shall pay to Purchaser the net proceeds received by Seller from its disposition of such equipment.

Installation and Maintenance:

Except as set forth on the face hereof, Purchaser is responsible for the prompt installation, and proper maintenance, of the Equipment to Seller's specifications, and accepted engineering practice, providing an adequate foundation, employment of sufficient technically qualified personnel and shall furnish any necessary equipment, materials, services, necessary facilities and utilities, and adequate access to the Equipment and installation site. If this contract so provides, Seller will furnish the service of an erection supervisor whose sole responsibility shall be to supervise or check out the installation of Seller's equipment furnished hereunder for the number of days required therefor, at Seller's published field service charge then in effect.

Title and Remedies:

Until full payment of all obligations of Purchaser hereunder (whether represented by notes, open account, judgment, or otherwise), Seller reserves title to all of the Equipment furnished hereunder, or hereafter in connection therewith, whether or not the same is attached to the realty, and the same shall be considered as personal property and subject to the Purchase Money Security Interest of Seller hereby granted by Purchaser.

If Purchaser defaults in paying or performing any of its obligations hereunder, Seller, with or without notice, may treat all amounts owing hereunder by Purchaser to be immediately due and payable and may repossess the equipment, and exercise such other or different remedies as are provided by applicable laws.

No remedy herein provided for shall be applicable where not permitted by law.

When requested by Seller, Purchaser shall duly acknowledge this contract, and execute, acknowledge, and deliver to Seller in Seller's usual form, a supplement hereto, chattel mortgage, supplemental security agreement, financing statement, or other additional appropriate instrument which Seller may require to constitute the Equipment as the unencumbered security for the obligations of Purchaser hereunder, or to enable Seller to comply with all applicable filing or recording laws.

Purchaser hereby authorizes Seller, or its assignee, where permitted by applicable law, to sign and file financing statements in order to perfect the security interest of Seller hereunder.

If, in the judgment of Seller, either before or after manufacture or shipment of the Equipment, the financial responsibility of Purchaser is such as to indicate inability to pay its obligations, including those hereunder, as they mature, Seller, upon giving written notice to Purchaser, may require payment in full or of a specified part of the balance of the purchase price within ten (10) days after the giving of such notice, irrespective of the terms of payment stated herein.

Warranty:

In the event that this order includes service parts, the following Warranty period shall apply: Replacement parts, with the exception of tubes, are warranted by Seller for a period of 90 days from date of shipment.

Seller warrants Equipment of Seller's manufacture against defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one year (6 months on moving parts) from the date of shipment, of which Purchaser gives Seller prompt written notice. Other manufacturers' and Suppliers' Equipment and services, if any, including electron tubes, solid state devices, transmission line, antennas, towers, related equipment and installation and erection services, shall carry only such manufacturers' or Suppliers' standard warranty as to which Purchaser hereby agrees to deal with such manufacturer or installation contractor.

Seller's sole responsibility for any breach of the foregoing provision of this contract, with respect to any Equipment or parts not conforming to the warranty or the description herein contained, is at its option, (a) to repair or replace such Equipment or parts, f.o.b. Seller's shipping point, upon the return thereof, freight prepaid, within the period aforesaid, or (b) to accept the return thereof f.o.b. Purchaser's point of installation, whereupon Seller shall either (1) issue a credit to Purchaser's account hereunder in an amount equal to an equitable portion of the total contract price, without interest, or (2) if the total contract price has been paid, refund to Purchaser an equitable portion thereof without interest. If other equipment has been accepted by Seller as part payment and is not available for return to Purchaser, then Seller shall pay to Purchaser the net proceeds received by Seller from its disposition of such equipment.

If the Equipment is described as used, it is sold as is and where is. If the contract covers equipment not owned by Seller at this date, it is sold subject to Seller's acquisition of possession and title.

Seller assumes no responsibility for design characteristics of special equipment manufactured to specifications supplied by or on behalf of Purchaser and shall not be liable for any expenses, whether for repairs, replacements, material, service, labor or otherwise, incurred by Purchaser, or for modifications made by Purchaser to the Equipment without prior written consent to Seller.

EXCEPT AS SET FORTH HEREIN AND EXCEPT AS TO TITLE, THERE ARE NO WARRANTIES, OR ANY AFFIRMATIONS OF FACT OR PROMISES BY SELLER, WITH REFERENCE TO THE EQUIPMENT, OR TO MERCHANTABILITY, FITNESS FOR A PARTICULAR APPLICATION, SIGNAL COVERAGE, INFRINGEMENT, OR OTHERWISE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE EQUIPMENT ON THE FACE HEREOF.

Damages and Risk of Loss:

Purchaser assumes all responsibility for, and risk of loss of, or damage to, the Equipment upon delivery at Seller's shipping point, notwithstanding the fact that Seller may have selected the carrier.

Purchaser is expressly notified, and hereby agrees, that Seller's liability hereunder shall not include losses of anticipated profits or special incidental or consequential damages.

Tower, Antenna and Related Services:

Tower and antenna erection work, ground system installation, installation of concrete foundations and anchors, and services related thereto and provided for herein, will be performed by an independent contractor.

Seller shall let the contract for erection of any towers and antennas provided for herein to an independent contractor, who shall not be deemed to be an agent of Seller, upon the installer's Terms and Conditions hereto attached, as accepted by Purchaser. Purchaser agrees to supervise and direct such independent contractor in the performance of the work to assure compliance with all applicable specifications, restrictions, ordinances, laws and governmental regulations.

With respect to the erection of the tower, antenna and related services, Purchaser agrees that, (a) prior to shipment of such equipment, Purchaser will have obtained from the Federal Communications Commission, the Federal Aviation Agency, and any other governing bodies having jurisdiction thereof all necessary permits, (b) the site will be level, clear and free from obstructions and debris, and staked off prior to arrival of the tower erection crew; (c) the site shall not consist of marshy land, swamps, dumps, rocky soil, peat or frozen soil, and the soil conditions shall be normal and suitable, (d) suitable electrical power will be available for construction work and for testing; and (e) there shall be suitable access to the site by truck and other vehicles for the hauling of all necessary materials and equipment.

If either before or after the erection crew has begun the work of erection, it is discovered that any of the conditions specified in (a) through (e) do not obtain, then the erection crew foreman, in his discretion, may have the crew, at the expense of the Purchaser, perform such work as may be necessary or appropriate in order that the specified conditions may be brought about, or may delay the beginning of the work, or if already begun may discontinue the work, and, if he considers it impracticable to keep the erection crew on the site, may have the crew depart from the site.

Purchaser agrees to pay to Seller, or its order, upon invoice, all costs of extra material or services required for the performance of work related to the installation of towers, antennas or related equipment, including any extra costs incurred by the contractor by reason of failure of compliance by Purchaser with any of the conditions (a) through (e) above or occasioned by inclement weather, labor difficulties, or excess labor costs resulting from requirements of local unions for extra work or stand-by labor.

Upon certification of the completion of the erection work hereunder by the erection crew foreman, Purchaser shall inspect the work, and, if it is in conformity with the terms and provisions of this contract, shall certify its acceptance by immediately delivering to the erection crew foreman a signed statement to that effect. If Purchaser declines to sign such statement, then Purchaser, before departure of the crew, shall inform Seller in detail by telephone of the reasons for such declination and promptly confirm such reasons in writing. If, before departure of the crew, Purchaser fails so to notify Seller, or if Purchaser fails to make such inspection, the work shall be conclusively deemed to have been accepted by Purchaser.

In the event that this order covers an antenna to be installed on an existing tower, Purchaser alone shall be responsible for determining, to his complete satisfaction, the adequacy of such tower to support the weight and wind loading associated with such antenna and related hardware and the installation thereof. Seller's sole responsibility shall be to provide to Purchaser the specifications relative to such antenna and related hardware.

Miscellaneous:

This order is subject to acceptance by Seller at its home office written herein and thereupon shall constitute the entire contract between the parties which replaces, supersedes and merges all prior discussions, agreements or understandings between the parties and which shall be changed only by written agreement of the parties.

Any or all of Seller's rights or obligations hereunder may be assigned by Seller without notice to Purchaser and may be exercised by an assignee thereof. Purchaser shall not assert against any transferee, either of this contract or of promissory notes, any defense (other than actual payment), setoff, equity, or counterclaim which Purchaser may have or claim against Seller. Purchaser acknowledges that Seller uses varying trade styles and names in those jurisdictions in which it does business.

Model, nomenclature and the mechanical and electrical design of equipment described herein are subject to change without notice.

The remedies Purchaser, for any breach of any obligations arising hereunder as herein set forth, shall be the sole and exclusive remedies thereto, irrespective of any other remedies otherwise available pursuant to UCC2-719 or otherwise in law or equity.

Each provision of this contract is severable, and in the event that any one or more provisions hereof may be declared invalid, the remainder of this agreement shall nevertheless remain in full force and effect.

OBW 12-14

X2YNR

BROADCAST ROW AND REGULAR

B-FCC

(WASHINGTON)-- THE FEDERAL COMMUNICATIONS COMMISSION HAS VOTED TO REDUCE CHANNEL SPACING ON THE A-M BAND. THE ACTION COULD LEAD TO AUTHORIZATION OF 14-HUNDRED NEW, FULLTIME A-M STATIONS.

AN F-C-C SPOKESMAN SAYS THE ACTION WILL PROMOTE AN INCREASE IN STATION OWNERSHIP AND A GREATER DIVERSITY OF PROGRAMING. THE VOTE WAS UNANIMOUS. IT STILL HAS TO BE APPROVED BY THE STATE DEPARTMENT AND SUBMITTED TO A REGIONAL ADMINISTRATIVE RADIO CONFERENCE OF THE WESTERN HEMISPHERE IN BUENOS AIRES IN MARCH, 1980.

IF THE PROPOSAL IS APPROVED... CHANNEL SPACING WILL BE REDUCED FROM 10 TO NINE KILOHERTZ ON THE A-M BROADAST BAND. A KILOHERTZ IS ONE-THOUSAND CYCLES PER SECOND.

THERE ARE NOW ABOUT 22-HUNDRED AND 50 STATIONS ASSIGNED TO THE A-M BAND, WITH 107 CHANNELS IN ANY ONE AREA.

IF THE BAND WAS REDUCED TO NINE KILOHERTZ, THE TIGHTER SPACING WOULD PERMIT AN INCREASE IN THE TOTAL NUMBER OF CHANNELS FROM 107 TO 119. THIS EXPANSION WOULD MEAN AN ADDITIONAL 200 TO 14-HUNDRED FULLTIME STATIONS COULD BE AUTHORIZED.

MANY OF THE CURRENTLY AUTHORIZED STATIONS OPERATE DURING THE DAYTIME ONLY AND THE F-C-C DECISION COULD PERMIT THEM TO EXPAND INTO FULLTIME OPERATIONS.

UPI 12-13 11:10 PES

THE FCC HAS RECOMMENDED THAT THE U-S SUPPORT A REDUCTION IN AM BANDWIDTH FROM 10 KHZ TO 9 KHZ IN THE WESTERN HEMISPHERE, AS EXPECTED (VOL. 19:50 P6). STATE DEPARTMENT MUST APPROVE THE RECOMMENDATION TO MAKE IT THE U-S POSITION AT THE RARC MEETING IN BUENOS AIRES NEXT MARCH. EUROPE AND ASIA ALREADY USE 9 KHZ SPACING; CANADA AND OTHER WESTERN HEMISPHERE COUNTRIES ARE OPPOSED. BENEFITS SEEN BY COMMISSION: MORE DAYTIME STATIONS, DIVERSITY IN PROGRAMMING AND OWNERSHIP, INCREASED MINORITY OWNERSHIP, OPPORTUNITY FOR MORE NON-COMMERCIAL STATIONS. IF REDUCTION IS APPROVED, IT WILL CAUSE PROBLEMS FOR SET MANUFACTURERS SWITCHING TO ELECTRONIC TUNING.

DEMOCRATIC PRESIDENTIAL CANDIDATE SENATOR EDWARD KENNEDY HAS TOLD TELEVISION DIGEST THAT HE AGREES WITH THE FCC'S 4-3 DECISION THAT THE TV NETWORKS WERE "UNREASONABLE" IN REFUSING TO SELL PRESIDENT CARTER 30 MINUTES OF TIME THE FIRST WEEK IN DECEMBER. KENNEDY ALSO SAID HE'LL START BUYING TV TIME EARLY IN JANUARY.

065YNR

MANAGEMENT-MORE MANAGEMENT MEMO

INSIDE INDUSTRY

(A SUMMARY OF BROADCAST INDUSTRY NEWS PREPARED FOR UPI BY THE EDITORS OF TELEVISION DIGEST AND PUBLIC BROADCASTING REPORT, 1836 JEFFERSON PLACE NW, WASHINGTON, D.C., 20036. PHONE: 202-872-9200.)

BELIEVING THE SUBJECT TO BE TOO CONTROVERSIAL AND ONE THAT WOULD SPLIT THE BROADCAST INDUSTRY, THE NAB BOARD OF DIRECTORS HAS BACKED AWAY FROM ADVOCATING MINIMUM PROGRAM STANDARDS OR PERCENTAGES IN RETURN FOR DEREGULATION BY THE FCC. INSTEAD, THE BOARD ADOPTED A RESOLUTION STATING THAT THE RADIO INDUSTRY HAS "FAR EXCEEDED PERFORMANCE REQUIREMENTS IN PROGRAMMING AND OPERATED WELL BELOW COMMERCIAL LIMITATIONS" USED BY THE FCC AS GUIDELINES. NAB ASKED THE COMMISSION TO ABOLISH ASCERTAINMENT, MINIMUM PROGRAM PERCENTAGE GUIDELINES, COMMERCIAL TIME STANDARDS AND PROGRAM LOGGING REQUIREMENTS.

REJECTING PROPOSALS OF SENATORS HOWARD CANNON (D-NEV.) AND ERNEST HOLLINGS (D-S.C.), FCC WILL GO AHEAD WITH PLANS TO ISSUE RULEMAKING ON CHILDREN'S TV WHICH WOULD REQUIRE STATIONS TO PROGRAM A MINIMUM OF 7-1/2 HOURS WEEKLY FOR CHILDREN. BOTH SENATORS WROTE FCC CHAIRMAN CHARLES FERRIS SUGGESTING THAT COMMISSION SHOULD KEEP THE INQUIRY PERIOD OPEN FOR AT LEAST ANOTHER 45 DAYS TO CONSIDER MORE VIABLE ALTERNATIVES. FCC MEETS ON RULEMAKING DECEMBER 19.

number of areas; AT&T says the new system would allow virtually all television stations to offer simulcasts.

Essentially, the system is a further improvement of the diplexing technique that was developed by a joint Bell System and television industry committee and that AT&T began making available last January. That system, which opened the door to presenting programs in high fidelity sound, involves the simultaneous transmission of audio and video signal along the same path. The conventional method is to transmit them along separate transmission facilities.

Under the system AT&T wants to introduce, a second audio channel is added to the video channel.

AT&T is promoting the technique as a means of providing stereophonic sound in television sets. But AT&T officials note that the system could be used to transmit, say, coverage of a baseball game in two languages—English version being taken by one station, a French version by another. Or a radio station could be served by one of the two audio channels that accompany a video channel being used to service a television station.

Schmitt keeps up criticisms of WARC preparations

Third-world nations will inject politics into conference, he says, and U.S. is not ready for that

Despite evidence of some progress, U.S. preparations for the World Administrative Radio Conference 1979 are fast becoming a case of too little too late, Senator Harrison Schmitt (R-N.M.) said last week.

Speaking to a conference about WARC in Washington Oct. 4, the senator proposed that the President's Domestic Council intervene in WARC policy preparations. The lack of cabinet-level participation to date, he said, "is indicative of the low priority that this administration so far places on telecommunications."

Senator Schmitt said he is particularly troubled with the state of the preparations because he expects the negotiations at WARC to be politically charged. Third-world countries are beginning to focus on communications and are likely to try at WARC to reserve more radio frequencies than they need, he said. The United States should go in ready to "play political hardball."

Senator Schmitt said he is also concerned that there are disagreements on technical points among the State Department, the National Telecommunications and Information Administration and the FCC. Valuable time for gaining international support for U.S. WARC views "is slipping by without our coming to grips with our own national interests," he said. As a way of resolving the problems quickly, he suggested that a tripartite panel be formed composed of Glen Robinson, WARC delegation chairman; Henry Geller, head of NTIA; and Charles Ferris FCC chairman.

Hearings on WARC had been proposed before the Senate Communications Subcommittee by Chairman Ernest Hollings (D-S.C.), but they won't take place this year, Senator Schmitt said last week. It would be "useful," he said, if they were scheduled early next year.

Canadian objects to AM stereo inquiry

Toronto FM operator claims U.S. service would violate NARBA provision, would disrupt FM pattern in his country

A Canadian FM radio station has asked the dominion's minister of communications to "advise the FCC" that the introduction of AM stereo in the United States would involve a breach of the North American Regional Broadcasting Agreement that has existed, since the early days of radio, between countries of the northern portion of this hemisphere.

The FCC has begun a rulemaking proceeding, including all five proposed AM stereo systems, hoping to resolve the matter (BROADCASTING, Sept. 25).

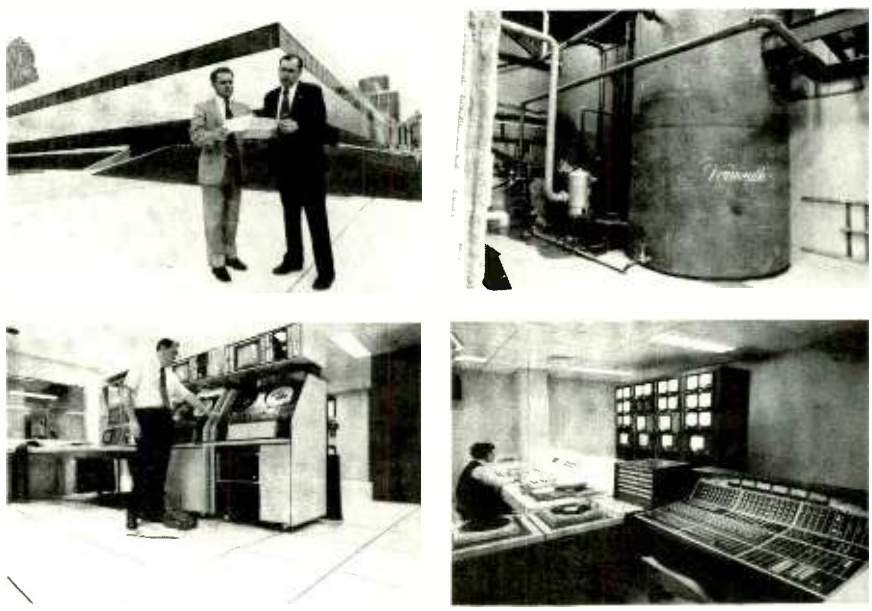
A letter, signed by I. Switzer, vice president of engineering of Canada's CKO-FM-2 Toronto, claims AM stereo service in the U.S. would create "an intolerable pressure on Canada" for a similar service. "It is our view," he said, "that an AM stereo service in Canada would be seriously detrimental to our interests as the operator of a national network of FM radio stations."

In a public statement, Mr. Switzer quoted NARBA as saying: "The form of modulation for broadcasting stations is amplitude modulation of an unsuppressed carrier of constant amplitude yielding two symmetrical sidebands."

He said CKO-FM-2 and Canada All-News Radio Ltd., its parent company, do not understand how the FCC could institute "a rulemaking proceeding that would probably result in a form of modulation inconsistent with NARBA broadcasting regulations without prior consultation with NARBA signatories."

The minister of communications and the Canadian Radio-Television and Telecommunications Commission are being asked to reject a change in NARBA regulations allowing AM stereo until "all the effects and ramifications in Canada have been studied and considered by affected broadcasters here and by Canadian agencies concerned with the public interest in Canada."

An FCC spokesman said four of the five competing AM stereo systems would probably require a change in the NARBA agreement. He said the FCC has held informal talks with Canada, but would not talk officially until it has chosen a system.



Energy saver. WKBW-TV Buffalo, N.Y., owned by Capital Cities Communications, is scheduled to move into its new $3 million complex today (Oct. 9). The operation is what Cap-cities calls "the first energy-oriented TV facility in the country." Shown in front of the reflective stainless steel building are Phil Beuth, vice president and general manager (top, l) and Don Holland (r), chief engineer. The building has no furnace; instead, two 10,000-gallon water storage tanks (labeled "gin" and "vermouth") hold water warmed by heat from the studios, master control and production facilities. A heat pump is then used to convert the water back to hot air and distribute it to needed areas. The system also works as air conditioning by passing warm air through the tanks of cool water. The heating and cooling system is not the only thing that is state of the art. Mr. Holland (bottom, l) examines one of three Ampex one-inch video-tape recorders and (bottom, r) one of the production units incorporating a Grass Valley switcher and a custom designed McCurdy audio console.

VPR-1 models and that ABC, the American network, had agreed to purchase 83 VPR-2 units. ABC will use the new equipment at its owned stations and at its production centers in New York and Los Angeles. The units will also be used by the network during its coverage of the 1980 winter Olympics in Lake Placid, N.Y.

Sony introduced its BVP-300P three-tube ENG camera to the European market. The camera, which weighs about 13 pounds without lens, has a power consumption of 22 watts and can be powered for up to two hours by batteries.

And Marconi Communications Systems Ltd. showed the conferees its new Mark IX camera family—which includes an extra-light ENG camera that operates "for a number of hours using two standard car batteries." The Marconi line was first seen at last spring's NAB in Las Vegas.

Thomson-CSF was also in the ENG picture with its eight-pound Microcam TTV 1600, which operates for up to five hours. The camera consumes 24 watts of power. Pye TVT Ltd., a division of Philips, also showed its LDK 14 ENG camera and accessories.

Digital switching systems were also much in evidence, and most of the larger manufacturers present displayed their versions. One of them was Vital Industries' Squeezoom and its companion Production Switcher Automation System (PSAS). The Squeezoom is designed to give the director in the control room a virtually unlimited number of special effects and sequences and, when tied to the programable PSAS system, allow him to recall them at will. The units are designed to work with Vital's VIX-114-4A production switcher.

In spite of the overwhelming attendance at the IBC and the considerable interest in the products shown on the floor, the convention was not a major order-taking session. Richard Sirinsky, managing director of Ampex's British operations, explained that many of the broadcasters outside of North America are government agencies or dependent on government funds, and those who attend the IBC are not likely to be empowered to make purchasing decisions. "You don't take orders as you do at NAB," Mr. Sirinsky said. As a consequence, the equipment booths are at the IBC primarily to introduce new products to the engineers who must make recommendations to the purchasing arms of their agencies.

If the degree of interest at IBC is any indication then, it appears likely that ENG is about to begin its long awaited drive into the European market. This is due primarily to the enhanced quality of today's ENG equipment. Europe, Mr. Sirinsky explained, tends to "have no real sense of urgency regarding news," and there has been little need for the time advantages offered by ENG. But with the improved performance of the newer equipment, it seems likely that the European broadcasters may start turning to ENG in the production of regular entertainment and public affairs programing.

RCA Americom is flying high at two years old

Carrier says its two birds now transmit 4,000 hours of TV a month, more than any other, announces NBC plan to feed shows from West Coast to New York and deal with cable program supplier

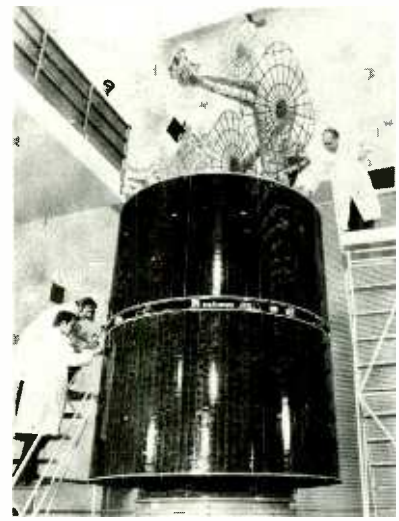
In marking its second anniversary last month, RCA Americom Communications Inc. announced that its two Satcom satellites now carry more hours of nationwide television programing than any other carrier's system. It was also announced that NBC has committed itself to use the RCA system for some of its West Coast program feeds and that Modern Cable Programs, a distributor of motion picture cassettes, will break into satellite distribution next year.

Americom's announcement said that its system now carries more than 4,000 hours of television each month—1,500 hours more than are carried by its principal competitor, Western Union. The monthly schedules of all three television networks total 1,200 hours a month, RCA Americom noted by comparison.

The two crosspolarized Satcoms have twice the capacity of Western Union's Westar satellites and are used in large part to relay programs to cable television systems. (Some of Satcom's users include Home Box Office, Showtime Entertainment Inc., WTCG[TV] Atlanta and the Christian Broadcasting Network.) Westar has proved more popular with broadcasters, who have been slower turning to satellites than the cable operators. Robert Wold Co., Spanish International and the Public Broadcasting Service are among Westar's principal television users. (The new National Public Radio and Mutual Broadcasting System satellite distribution services also will use Westar.)

An Americom spokesman said that NBC is expected to join the others on its bird with five hours per day of transmissions of programs from Los Angeles production headquarters to New York where AT&T lines are used to place programs on the air. NBC has also exhibited interest in opening parts of both its radio and television networks to satellites and has solicited proposals from carriers (BROADCASTING, March 27).

Beginning Jan. 1, 1979, Satcom will add yet another customer when Modern Cable Programs, a Modern Talking Picture Service division, will forsake its cassette distribution system and begin relaying its packages of "informational motion pictures" via the satellite. Modern signed a $182,500 contract for five hours a day of off-peak time. It also took an option for use of RCA's videotape playback facilities at Vernon Valley, N.J., a satellite uplink site. Modern's service is currently used by 100 cable systems.



New bird on the block. Satellite communications earth stations in the Indian Ocean area, bounded approximately by Britain and Europe in the west and Japan and Australia in the east, are switching over to a new, larger-capacity Intelsat IV-A communications satellite. The satellite, with 6,000 two-way telephone circuits, will have 25% more capacity for everyday communications and will eventually provide increased capacity for international satellite television. The complex transition, involving 47 earth stations and expected to be substantially completed by next year, will mean some shutdown of television services but will result in two Indian Ocean channels instead of one.

AT&T wants to send its little piggyback to market

FCC asked to approve system that would permit stereo sound for TV as well as allow two-language aural transmission; however, immediate drawback is need to convert present sets

If AT&T has its way, networks and others transmitting television programs will soon be able to present stereophonic sound. Not only that, but the same system could be used to transmit programs in two languages or to piggyback a signal destined for a radio audience on a television channel.

AT&T is seeking FCC authorization to construct the system, which it says could be in operation by the end of the year. However, how much of an audience there would be is another matter: Television sets would have to be converted to receive the new system.

And until television stations themselves are equipped to broadcast stereo, "simulcasting" would have to be employed—a system whereby viewers receive the stereo sound portion of the program from a local radio station. At present, such programs can be offered in a limited

080YNR

BROADCAST ROW

STEREO

(WASHINGTON)-- THE FEDERAL COMMUNICATIONS COMMISSION HAS ISSUED SPECIAL PERMISSION FOR FIVE A-M RADIO STATIONS TO CONDUCT OVER-THE-AIR TESTING OF A-M STEREOPHONIC EQUIPMENT.

UNDER TERMS OF THE AUTHORIZATION... THE STATIONS ARE NOT ALLOWED TO USE THE TEST AUTHORITY FOR PROMOTIONAL PURPOSES, THOUGH THE TESTS MAY BE ANNOUNCED. THE FIVE STATIONS ARE EXPECTED TO SUBMIT RESULTS TO THE F-C-C AFTER THE TESTS ARE COMPLETED.

THE STATIONS PARTICIPATING ARE W-J-R IN DETROIT, WHICH WILL BE TESTING A SYSTEM PROPOSED BY BELAR... W-A-B-C IN NEW YORK AND W-F-I-L IN PHILADELPHIA, TESTING KAHN-HAZELTINE EQUIPMENT... AND W-G-N IN CHICAGO AND W-T-A-Q IN LAGRANGE, ILLINOIS, TESTING MOTOROLA EQUIPMENT. W-G-N ALSO WILL TEST A HARRIS SYSTEM.

THE TESTING PERIODS VARY FROM ONE TO THREE MONTHS.

UPI 03-22 07:58 AES

AM Stereo System By Motorola Scores

SAN FRANCISCO—Extensive field tests of the Motorola AM stereo system have just been completed here at KIOI-AM, reports owner Jim Gabbert.

"These tests included more than 100 pictures of spectrum analysis which show that AM stereo easily fits within the existing allocation of AM radio. The frequency response of the system can be readily extended to 12,000 cycles (the maximum on most 8-track cartridge systems is 8,000 to 10,000 cycles) and the measured stereo separation averaged 20 dB.

"Most stereo records are below this figure," says Gabbert.

There were many mobile tests made to determine what distortion, if any, would be introduced in cars. "The conclusion of the tests were that AM stereo can be broadcast with better fidelity than an 8-track stereo cartridge. All of this within the currently allocated AM radio spectrum space."

An interesting aspect, he says, is that the KIQI-AM transmitter was easily converted to AM stereo in approximately 15 minutes.

"It is our conclusion that most transmitters, regardless of age, will be easily convertible to any of the proposed AM stereo systems. Therefore, the major expense of any AM broadcaster to convert his AM signal to stereo will be in the studio equipment he'll have to buy.

The Motorola AM stereo system was unveiled at the recent San Francisco convention of the National Radio Broadcasters Assn. Gabbert operates KIOI, an FM station, and KIQI, an AM station, in San Francisco and is president of the NRBA.

Interested: Listening to the Motorola AM Stereo System in San Francisco are Djalma Ferreira, chief engineer of Sistema Globo de Radio, Rio de Janeiro, and Luiz Brunini, director superintendent, Sistema Globo de Radio, one of the largest radio operations in the world.

Frisco Buys

• *Continued from page 20*

have put KSJO on top. "But we want to have the satisfaction of beating KOME fairly. Our staff met and unanimously voted to give back the diaries. I would have done that anyway, they should be off the street."

Rosetta notes that ARB ratings are "critical in so many areas and the responsibilities are so incredibly

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FEB. AIR TEST?

AM Stereo: No Timetable Effect From RCA Exit

WASHINGTON—The recent withdrawal by RCA of its AM stereo system from consideration by the National AM Stereophonic Radio Committee will not affect the timetable for over-the-air testing of the other systems submitted—which could start Feb. 1, 1977.

Harold Kassens of the A.D. Ring engineering consultants firm here, and chairman of the committee, says they still have four systems from three firms going on with the tests (Communication Associates, Motorola and Sansui), and two more companies "are considering" entering AM stereo systems.

One of the two Sansui systems submitted bears some resemblance to the withdrawn RCA-type, although it is not really close, says Kassens.

The testing stations are expected to be in the Washington area, for the convenience of the FCC during the experimental transmission period. The Feb. 1, 1977, target date is not absolute at this point, and "could slip a little, as these things have a way of doing," says Kassens.

The committee was formed at the request of the FCC in September 1975. It is sponsored by the EIA, NAB, and the Institute of Electrical & Electronic Engineers. Chairman Kassens, formerly with the FCC, was a prime mover in the authorization of FM stereo in 1961.

The Kahn Communications AM stereo system has not been submitted to the committee for testing. Instead, its president, Leonard Kahn, has appealed directly to the FCC for early authorization of his AM stereo system, in the belief that delays are "built into" committees like the NASRC."

According to RCA, its decision to withdraw its AM stereo system is based on the company's studies "indicating that RCA's potential return from the sale of AM signal generators would not justify the research and development required for hardware design." RCA also notes that it feels all other systems proposed to the stereo committee will be "compatible with present RCA transmitters."

MILDRED HALL

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Johnson, Dan (Mike Daniels) Bettian and **Greg (Gary Scott) Glover.** The station features a contemporary MOR format and simulcasts it on FM. Teh music list is done Tuesdays; record promotion executives may call Harvey 1-3 p.m. CST.

★ ★ ★

Wouldn't you know? In an advertisement promoting the ninth annual International Radio Programming Forum and the fantastic **Bee Gees** who'll be performing the night of the Awards Banquet, the act was listed as being on RSO Records, distributed by Atlantic. RSO is, however, distributed by Polydor.

★ ★ ★

After three years with KOB in Albuquerque, N.M., as program director, music director and afternoon drive personality, **Larry Sherman** has left the adult contemporary station and is looking. He's looking for either a disk jockey and/or programming position and you can call him at 505-292-0631. Good to hear from you, Larry, and I'm going to miss not seeing you at the International Radio Programming Forum this year in New Orleans. ... **Dale Z. Dawson,** who worked as a rock jock, a program director and a general manager in his years in radio, is now with the New Life Evangelistic Assn. Inc., P.O. Box 1846, Gary, Ind. 46409, and has launched a radio show called "Lifeline" on WLNR in Lansing, Ill. The show features both gospel and current hit material and he needs records desperately. The show excludes superhard rock, profanity or lyrics which glorify a vice. However, the **Bee Gees** with "Don't Wanna Live Inside Myself" or **Peggy Lee** with "Is That All There Is?" would do well.

★ ★ ★

Billboard will feature in the issue dated Dec. 25 (it arrives at many radio stations on Dec. 20 or 21) a countdown of the top 100 singles of the year. So, you men who're preparing to feature a countdown of the top records of 1976 on New Year's Day should have the information in plenty of time to prepare your programming.

★ ★ ★

Ted Bair has been appointed operations director for WHN, the New York country music station; he'd been director of public affairs there

(Continued on page 34)

KAHN COMMUNICATIONS, INC.
74 NORTH MAIN STREET
FREEPORT, NEW YORK 11520

(516) 379-8800

Memo

Enclosed is a reprint of an independent status report on AM Stereo.

Besides the reasons mentioned in the report, our system is far ahead of competition because of its unique 100% negative modulation capability with no noise burst breakup. Also, note that we have 20,000 hours of commercial on-the-air experience as against less than 100 hours for our competitors.

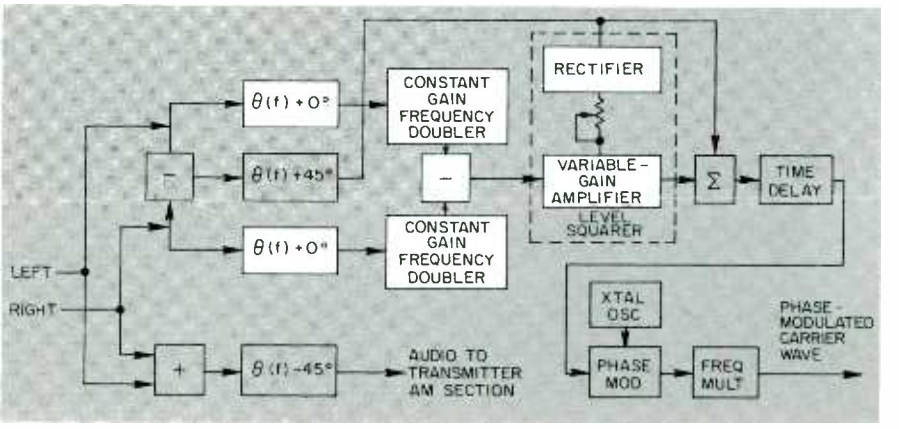
If you require details, please write or call.

Broadcast Department
KAHN COMMUNICATIONS, INC.

FCC to select a standard for stereo broadcasting on AM

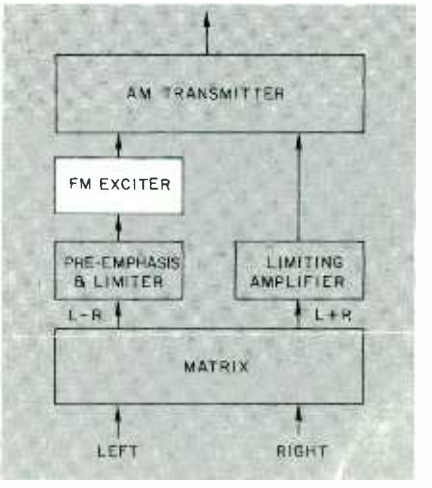
New circuits for AM radios and transmission equipment will have to be designed next year after the Federal Communications Commission gives the go-ahead to stereophonic broadcasts on the AM band. Precisely how those circuits will have to operate depends on which of five AM stereo-transmission techniques proposed to the FCC emerges as a standard.

Once AM stereo is on the air—perhaps by the end of this year and likely by the middle of 1978—the demand for high sound quality at the transmitting and receiving ends is likely to grow. Circuits will have to be designed to increase the bandwidth and cut the distortion, as well as to encode and decode the stereo information, in AM transmitters and receivers.



1. To increase stereo separation to more than 30 dB, Kahn-system transmitters shift the left and right signals by −45° from the L−R signal, then double the frequencies, subtract, and square. The result is a second-order component.

"Cousin Bruce" Morrow could be on AM in stereo by next year.



2. Adding FM to AM is an alternate approach to stereo AM. In RCA-system transmitters, an L−R signal frequency-modulates and L+R amplitude-modulates the carrier.

AM can be better

Usually considered a low-fidelity medium, AM is capable of acceptable high fidelity and even has some advantages over FM. Although the FCC requires that the frequency response of an AM transmitter be checked only from 100 to 7500 Hz, many AM stations transmit with flat response to 10 kHz, and some even to 15 kHz. With proper equipment, and without interference from nearby stations, an AM station can offer flat frequency response from 50 Hz to 10 kHz, which is more than sufficient to satisfy most listeners' needs for high fidelity.

While a response beyond 10 kHz would satisfy an audio buff, it would be wasted in the location that is most important to broadcasters—automobiles. Especially valuable—and profitable—are morning and evening rush hours.

High-frequency response and extreme stereo separation in a car is unnecessary because wind and road noise mask high-frequency sound, and stereo speakers are generally close to each other. The systems proposed for AM stereo can provide more than adequate performance in frequency response and separation.

In fact, AM can provide better performance than FM in a car. As a car moves past buildings and other obstructions, FM multipath patterns change, and the stereo image shifts. This "picket fence" problem doesn't exist in AM.

The range of AM broadcast is also substantially larger than that of FM, whose broadcast frequency limits re-

Andy Santoni
Associate Editor

ception to line of sight from the transmitter, or no better than 60 to 80 miles. Because of ionospheric refraction, AM broadcasts can travel hundreds of miles, especially at night, and some stations can be heard anywhere in the country.

Another advantage of AM stereo is its relatively easy demodulation. Simple, inexpensive ICs can effectively demodulate the stereo signals that would be generated with any of the AM stereo systems under consideration.

But before anything more permanent than an experimental AM stereo broadcast gets on the air, the FCC will have to choose which system to employ. While all the techniques have great similarities they also have distinct differences.

Choosing a system

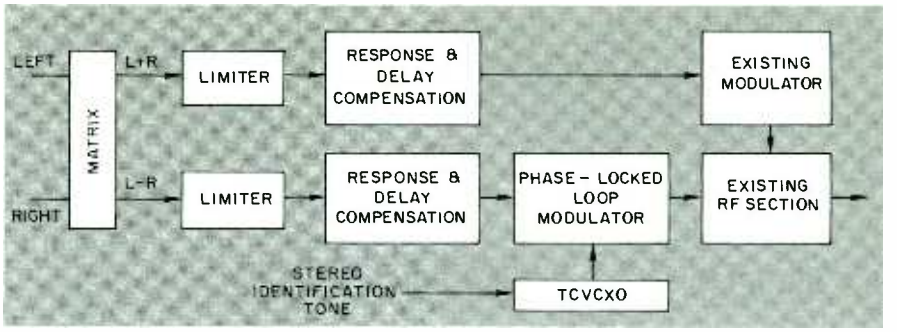
Four systems have already been proposed to the FCC and are now being investigated. A fifth system is still being developed, and should be proposed later this year.

The system that has undergone the most extensive on-the-air testing to date was developed more than 15 years ago by Kahn Communications Inc. of Freeport, NY. In the Kahn system (Fig. 1), the L+R wave is produced by adding left and right channel signals and feeding the sum signal through a constant phase-difference, constant amplitude-response network. This wave, which is identical to the wave that would be produced in a monophonic broadcast, is connected to the audio input of the associated transmitter and modulates the carrier. In addition, the envelope modulation in the Kahn system, as in all proposed systems, is compatible with current monophonic receivers.

The left and right channel signals also feed a difference circuit, and the output of the difference circuit feeds a second constant phase-shift network that displaces the phase of the audio wave by 90° from the phase of the L+R component. The signal passes through a summation circuit, then a variable time delay that compensates for the difference in timing between the L+R and L−R signals.

The output of the time delay feeds a phase modulator. Since the modulator produces relatively small amounts of phase modulation, a frequency multiplier is added to the chain.

The phase-modulated output wave shifts to the carrier frequency of the station, then feeds the transmitter. The exciter has an output power level



3. The listener knows it's in stereo when the indicator responds to a 5-Hz identification tone, a feature of this Magnavox system.

of about 2 W, and feeds the transmitter at a low power stage. The rest of the transmitter operates as it would in transmitting monophonically, which simplifies the installation of the stereo exciter.

The stereo signal produced by this simplified version of the Kahn system has limited stereo separation. "By adding a second-order phase-modulation component, the sideband separation has been improved so that separation slightly better than 30 dB can be achieved," explains Leonard R. Kahn, president of Kahn Communications.

The second-order component is generated by shifting the L and R signals by −45° relative to the L−R component. The waves are first fed to frequency doublers, then to a circuit that

Looking back

Thoughts about transmitting stereo information on an AM broadcast band may be a live issue, but the subject is far from new. In fact, the first AM stereo transmissions date back more than 50 years, to 1925, when WPAJ in New Haven, CT, experimented with stereo broadcasting via two transmitters.

Many patents on AM stereo-transmission techniques have been issued over the years, and many broadcast demonstrations of AM stereo conducted. But interest shifted to FM stereo in the 1950s, largely because the Federal Communications Commission wanted to foster the development of the economically weaker medium. When the FCC was petitioned with AM-stereo proposals in the late 1950s and early 1960s from Philco Corp., RCA, and Kahn Research, it denied them. Lack of "public need" and "industry desire" for such service was the prime reason given.

Nonetheless, AM-stereo experiments continued. In 1970, XETRA, a 50-kW station broadcasting on 690 kHz from Tijuana, Mexico, put Kahn stereo equipment to work. The station uses a directional antenna to aim its English-language transmissions at the Los Angeles/San Diego area, where KMPC operates at 710 kHz. The proximity of KMPC provides a good test of the spectral cleanliness of the AM stereo signal, says Kahn, adding that the tests "confirm the lack of increased interference of XETRA during the three-year period of experimental stereo operation." This despite reports that XETRA has a powerful enough beam to be received clearly as far north as Alaska.

More recent tests, again with Kahn equipment, have taken place in Baltimore over WFBR. "No complaints of interference or air product deterioration were received by the station from any source," says a January, 1976, report from WFBR to the FCC. "Stereophonic separation was excellent as transmitted," according to the report.

The most recent on-air AM stereo tests took place with experimental Motorola gear, in December, 1976, over WKDC. There was no increased interference or degradation in signal quality, says Frank Blotter, president of the station.

Today, the inroads made by FM stations into markets formerly dominated by AM stations has changed the broadcasters' attitudes toward stereo broadcasting, and the FCC has again been called upon to study the matter.

takes the difference, and finally to a level-squaring network.

Two-set reception

A major advantage of this system, says Kahn, is that "many listeners will be able to use radio sets now in their homes, at no additional expense, for stereo reception on the first day their local AM station initiates stereocasting." Because the lower sideband carries left-channel information and the upper sideband carries right-channel information, one receiver tuned slightly below and one receiver tuned slightly above the AM carrier frequency can pick up separate left and right-channel signals. "The sets do not have to be matched, and even tiny portable sets can be used to provide creditable stereo performance," Kahn adds.

According to a report of on-the-air performance submitted to the FCC by station WFBR in Baltimore, the Kahn system will provide more than the minimum 8 dB required to produce a stereo effect: "Receiver bandpass, care in tuning, and adjacent channel interference will influence the stereo separation, but in most cases 9 dB to 12 dB is achieved."

The low-cost, immediate transition to AM stereo that the Kahn system would provide "avoids the chicken-and-egg problem for broadcasters and set manufacturers that plagued the color-television industry for many years," says Kahn. "The broadcaster is assured of a sizable stereo audience, [and] set manufacturers will be certain of an immediate market for AM stereo receivers."

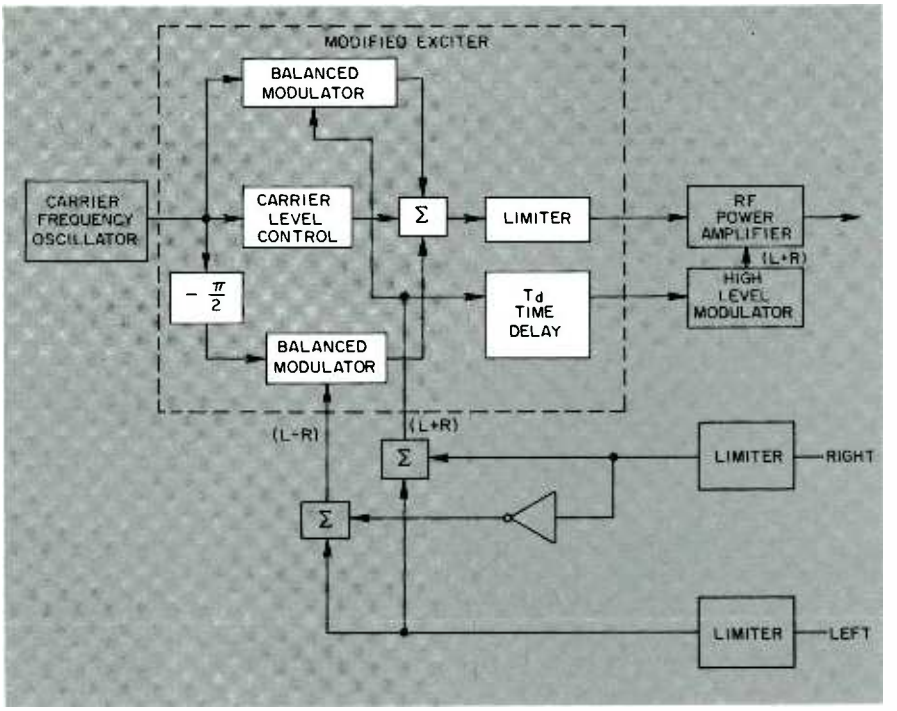
Another feature of the Kahn system is a stereo-indicator lamp on the receiver, which tells the listener when a station is broadcasting in stereo.

Combining AM and FM

An alternative to the Kahn system comes from RCA Corp., which dropped its support of the technique when it ceased producing radios last year. However, the system is being supported by Belar Electronics Laboratory Inc. of Devon, PA, a studio-equipment manufacturer that had manufactured much of the RCA stereo-transmission gear.

Like the Kahn system, RCA's approach to AM stereo is compatible with present monophonic receivers, can make use of existing transmission equipment, and dates back to the 1950s

(see box, next page)



4. A modified exciter adds a second channel to AM broadcasts with a variation of quadrature transmission developed by Motorola.

The carrier in the RCA/Belar system (Fig. 2) is frequency-modulated with an L−R signal and amplitude-modulated with an L+R signal. The receiver has a conventional mixer and a single i-f amplifier. The amplifier drives an AM detector and a balanced-discriminator FM detector. Matrix circuits encode and decode between the left and right-channel signals and the L+R and L−R signals that are transmitted over the air.

Changing phase

A system similar to RCA's has been proposed by Magnavox Consumer Electronics Group, Fort Wayne, IN. The Magnavox system (Fig. 3) combines amplitude modulation for the L+R signal with phase modulation for the L−R signal. The phase deviation is 1 radian, peak.

In addition, the Magnavox system has a 5-Hz subaudible tone that is frequency-modulated onto the carrier with a deviation of about 20 Hz. This tone can be decoded to light a stereo indicator—like the Kahn system's—and modulated to transmit slow-speed digital data such as station call letters, time, or temperature.

The transmitter in the Magnavox system employs virtually all the existing parts of a standard AM transmitter, without modification. And because the station carrier, which is modulated with the 5-Hz tone, is generated at broadcast frequency, neither multiplying nor mixing is needed. This carrier signal is a reference for a wideband phase-locked loop, which delivers an on-frequency signal phase-modulated with an L−R signal. The resulting signal is amplitude-modulated with the L+R audio signal.

The receiver configuration is one of the main advantages of the AM/PM system, says Magnavox. The receiver has a single i-f and a standard envelope detector for the AM channel. Phase-modulation information is recovered by sampling the i-f signal, limiting it, and detecting it with a phase-locked loop circuit.

A stereo-identification tone is regenerated by recovering the audio tone between the main voltage-controlled oscillator and the loop filter, then passing the audio tone through a tone detector to drive an indicator.

A tested technique

The latest AM stereo-broadcast technique to undergo on-the-air testing is developed by Motorola Inc., Franklin Park, IL. The C-QUAM (compatible quadrature AM) system was tested late last year over WKDC in Elmhurst, IL.

Left and right signals in the stereo transmitter are first passed through program limiters (Fig. 4). The left signal is supplied to two summing devices. The right signal is supplied to one of these circuits to form L+R signals. To

provide L−R signals, the phase of the right signal is reversed and combined with a left signal in the second summing device.

To provide L+R sidebands, the carrier frequency is supplied to a balanced modulator with the L+R signals. An adjustable level carrier in phase with L+R is added to the L+R sidebands to provide an AM signal with the appropriate degree of modulation.

A second balanced modulator is fed by the L−R signal and the phase-shifted carrier-frequency oscillator signal to provide the quadrature signal at the output of the carrier-frequency summing device.

In the Motorola receiver (Fig. 5), the output of the i-f amplifier is applied to the carrier-level modulator and the limiter. The voltage-controlled oscillator (VCO), which is locked in phase quadrature with the i-f carrier, is used with the limiter output to provide input signals to a phase-detector circuit. The phase detector and low-pass filter provide the control signal that keeps the VCO locked in phase-quadrature with the i-f carrier. To provide a signal that is in phase with the i-f carrier, the VCO output is shifted 90°.

When the phase-shifted VCO signal and the signal from the limiter are fed to the phase detector, a signal is derived that can supply the carrier-level modulator. The left and right signals can be demodulated by a pair of synchronous detectors.

Overseas interest in AM stereo

Other proposals for AM stereo systems will be submitted to the FCC from other manufacturers, including Sansui Corp. of Japan. Sansui had submitted a proposal already, but withdrew it because the company felt it was not up to the technical standards of some of the other methods being proposed. A different technique, now being developed, should be submitted later this year, after testing in Japan.

The Sansui tests will be performed in accordance with procedures developed by the National AM Stereophonic Radio Committee, which is advising the FCC. The committee plans to begin testing the RCA/Belar, Magnavox, and Motorola systems over radio stations WBZ in Boston and WGMS and WTOP in Washington, DC, this month. These tests should be completed in about two months, and a report submitted to the FCC before Labor Day, according to Harold Kassens, a consultant with A. D. Ring & Associates in DC and NAMSRC chairman. Sansui test data might be included in that report.

Kahn Communications, however, has bypassed the group testing and submitted its system directly to the FCC. Kahn calls the cost of joining the committee and its subcommittees "prohibitive for a small company," and questions the advisability of a group "composed of cooperating, putative commercial competitors who represent neither the public nor the broadcasters."

According to Kahn, whose petition to the FCC to adopt the Kahn system was filed last June, "Small organizations have not been well represented on such committees because of the high cost of participation and their lack of bargaining muscle." In addition, he says, joint decisions by competitors raise antitrust questions.

In opposing the Kahn petition, the NAMSRC states, "We believe that comprehensive, carefully controlled tests of possible systems should be performed in a uniform manner to complement analytical information developed on a common basis. This work should represent the cooperative effort of suitable numbers of technical people so that diverse points of view are considered.

"Only by this method of true field testing can the FCC be sure that the information it eventually uses to choose an AM stereophonic broadcasting system is suitable and sufficient," adds the NAMSRC.

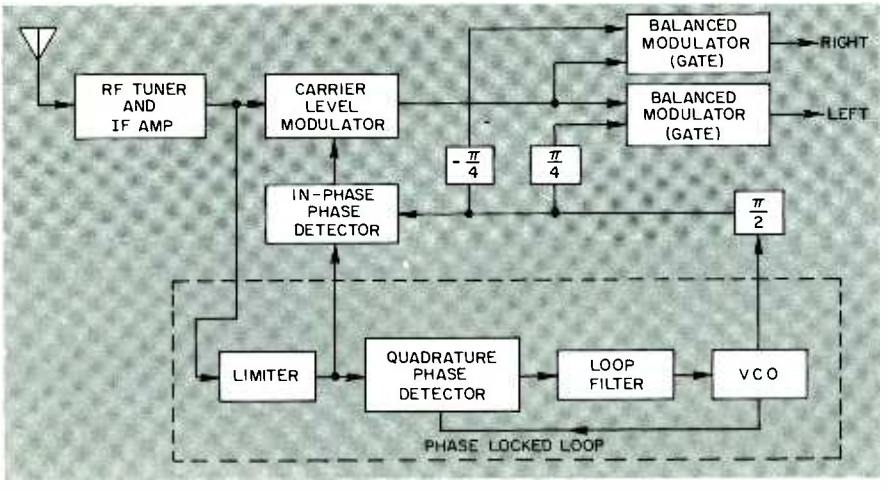
The public interest would be better served, the committee suggests, if the Kahn system were submitted to the committee for analysis and testing, and NAMSRC's Kassens says, "We wish Leonard would come in." But Kahn maintains his system has undergone sufficient scrutiny, adding, "Why should I do it over again?"

An economic boon

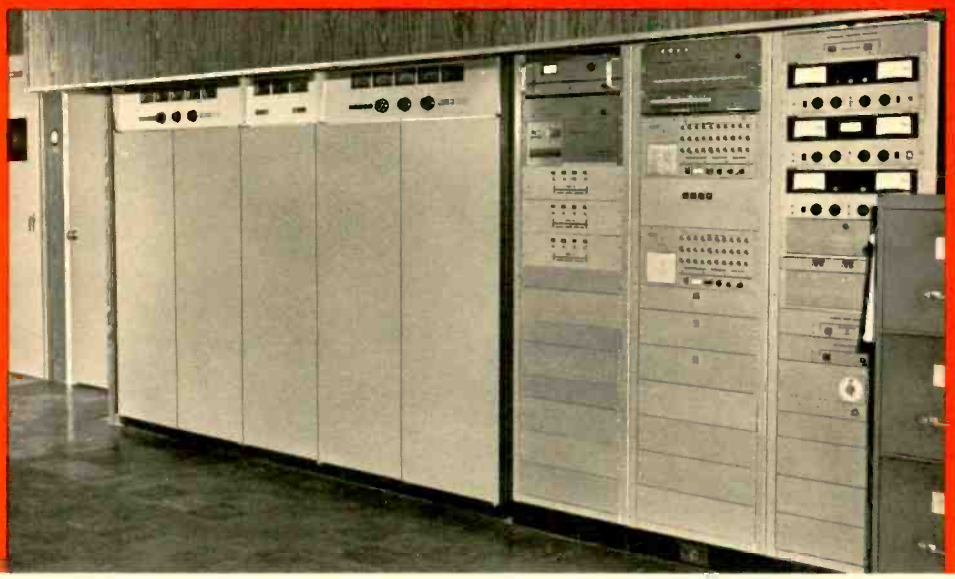
Whatever the FCC eventually decides, the result will be "a boon to the economy," says Frank Blotter, president of WKDC in Elmhurst, IL, a Chicago suburb. In the automotive market alone, he points out, a $50 additional charge for adding stereo to optional AM radios would mean a market of $300-million. The cost of new station equipment and new AM radios for the home will generate additional millions in sales. In fact AM-radio sales may just boom as FM-set sales did 15 years ago, when a second channel was added.

Operators of AM radio stations, too, are looking forward to being able to broadcast in stereo. The AM band has suffered a loss in market share and advertising revenue over the past few years as consumers switched to FM listening, first at home and then in their cars. Despite critics who call stereo broadcasting a gimmick, AM broadcasters are convinced that two-channel transmissions, along with improved sound quality, will bring back much of the audience that was won over to FM in the last decade. The talk and sports-show formats that fill most of the AM band are likely to be replaced with music of all types.

If only 20% of the existing AM stations went stereo, muses WKDC's Blotter, there would be more stereo stations on the AM band than on the FM band. A 20% crossover could happen by next year.■■



5. Balanced modulators convert quadrature signals into separate left and right channels in Motorola-system receivers.



Shown here is one of the two BTF-40E1 40 kW parallel FM transmitters installed at WBEN, Buffalo, operating as Alternate-Main systems. "Rock 102" operates automated 24 hours a day. The transmitters are also fully automated, including custom logic and automatic power level control. Everything at the transmitter site can be operated remotely from the studio. The installation also includes a BFG-8 circularly polarized antenna with deicers.

A Brief Review of AM Stereo Broadcasting

In evaluating possible AM stereo broadcast systems, it is necessary to consider:

1. **Stereo Performance:** distortion (intermodulation and harmonic); crosstalk, and signal-to-noise ratio.
2. **Compatibility:** performance of a monophonic receiver during a stereo transmission; distortion, and signal-to-noise ratio, and the effects of misalignment and mistuning.
3. **Out-of-Band-Radiation:** radiation in adjacent channels and the effect on receivers tuned to these channels.
4. **Transmitter Design:** conversion of transmitters for stereo transmission.

Compatibility is a prime requisite for AM stereo broadcasts. Any monophonic AM receiver should be able to pick up AM stereo broadcasts as well as if it were a mono transmission. No degrading of monophonic performance should be allowed with stereo AM broadcasts.

Several operating systems using two full bandwidth audio channels have been proposed for accomplishing compatible AM stereo broadcasting. An RCA research study of the various possible systems indicated that the "AM-FM" system represented the best approach to compatible AM stereo broadcasting.

To achieve the desired stereo effect, the basic AM signal must remain intact with both channels of audio present.

In the proposed RCA system, the alternate channel (Left minus Right) signal is achieved by phase modulating the carrier in such a manner as to produce a Left-minus Right (L-R) channel by "FM-ing" the carrier.

Figure 1 illustrates the monophonic and stereophonic modulation of a carrier, showing that there is no interaction between the two forms of modulation, provided the transmission channel has sufficient bandwidth to accommodate all the significant sidebands arising from the composite modulation. Channel bandwidth should be in the order of 12 to 15 kHz.

Since the signal for any system can be generated by suitable frequency and amplitude modulation of the carrier, a general method applicable to all systems may be used to convert an existing monophonic transmitter for stereophonic operation. The RF source in a transmitter can be replaced by a frequency (or phase) modulator, as shown in Figure 2.

You will be able to check out an operating AM Stereo broadcasting system at NAB, in the Radio area of the RCA exhibit. The unit to be shown is the engineering model which will be used in the National AM Stereo Radio Committee (NAMSRC) field tests later this year.

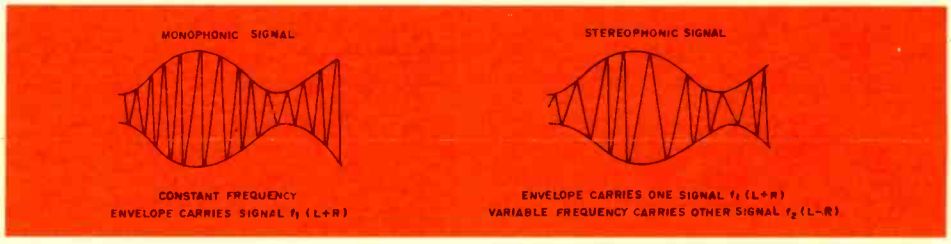


Fig. 1 Monophonic and Stereophonic modulation of a carrier.

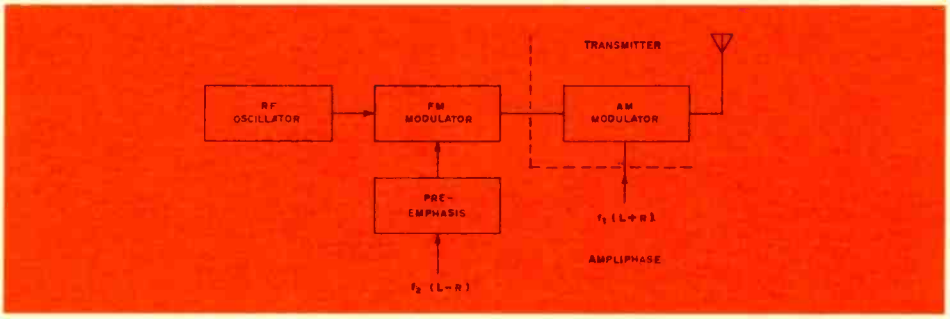


Fig. 2 Stereo Transmitter. The r-f exciter of a conventional transmitter is replaced by an FM modulator.

NAB Aural Broadcast Showcase

(Continued from page 2)

Audio Processing Systems

All three of these compact, state-of-art audio processors will be at NAB. BA-145 (Mono) and BA-145S (Stereo) are AGC signal processing amplifiers that provide maximum average modulation over extreme variations of program levels. These unique systems are useful in AM, FM, TV and Recording facilities.

BA-146 is a Limiter Amplifier for AM. The BA-147 includes a pre-emphasis time constant and peak clipper for FM and TV applications. Both units feature a high compression ratio and fast attack time to allow high peak modulation levels for maximum broadcast coverage.

Compact BA-145, BA-146 and BA-147 signal processing amplifiers each require only 1¾ inches of height in a standard rack.

Cartridge Tape Players and Recorders

The versatile RT-125, RT-126 and RT-127 systems have been significantly improved. These new units feature ruggedized controls, lower power consumption and high reliability electronics. Some features that were previously optional are now standard. And—wonder of wonders—prices have been reduced. See these mono and stereo cartirdge systems at work in our NAB exhibit.

Radio Answer Men Are on the Spot

Aside from the generous equipment array, the RCA Aural Broadcast exhibit area is a good place for you to meet our engineering and product specialists. They're ready, able and more than willing to answer your questions; to share their experiences with you—and of course they're prepared to discuss the equipment in exquisite detail.

We put our Answer Men on the spot—and so can you.

Rx for Tired Microphones

Hundreds of 77-D's, 44-BX's, BK-6's and a long list of other quality RCA microphones are being refurbished now rather than being discarded.

Broadcast Systems' CRAE (Custom, Repair and Engineering) Shop in Camden performs this reconditioning service on RCA broadcast microphones. Incoming mikes are checked, repaired, tested and returned to customers with performance certified to equal original specifications.

With CRAE Shop service, many users are finding that "good as new" is a lot cheaper than "new". For information on microphone refurbishing, contact Ed Miller, RCA, Building 2-8, Camden, N. J. 08102.

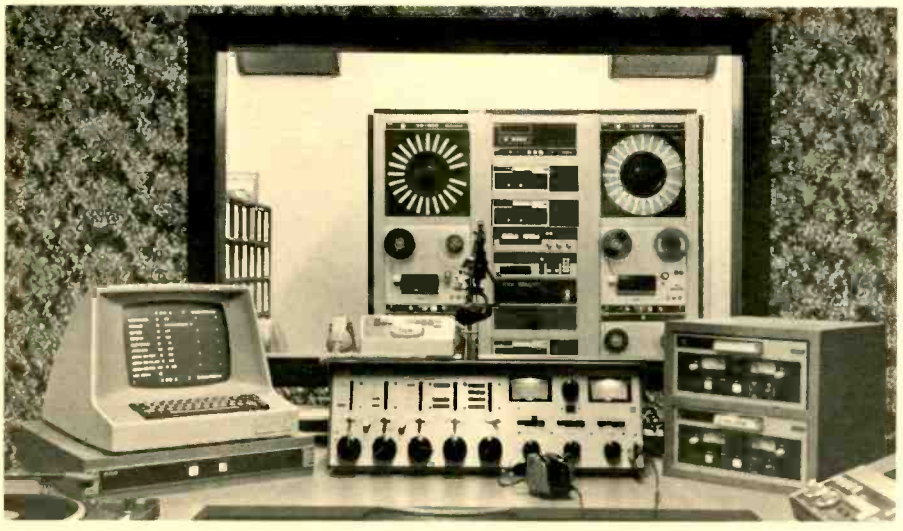


Photo Courtesy Patrick C. McBride, President & General Manager, KMBS-FM

Audio Automation System DAP-5000A installed at KMBS-FM, Harlingen, Texas. The complete system with logging and print-out facilities is installed in the production studio of this highly successful FM station which is fully automated, with an M-O-R program format.

Come to NAB

We're looking forward to seeing many of you there and sincerely hope you will take time to visit with us.

RCA Broadcast Systems

Form 3J5961

Printed in U.S.A.

mation. An expansion of that system, to begin in 1979, is "Viewdata," which will enable subscribers to dial through their sets for information or messages they would like to receive. The messages would be returned by the telephone company for TV display.

■ Quadraphonic radio. A quadraphonic system has been tested nationally by the BBC for more than a year, Sir James said. Some improvements have been made during that time, "and we think it unlikely that anyone can find a better formula since we've exploited all the options ... The main lesson that we have learned is that the results depend less upon the system than on the skill with which the system is used in production. We have built a very good vehicle and in our second year we hope to learn to drive it."

■ A special radio information service for motorists. Proposed by the BBC to the English government, it would use low-power medium frequency radio stations, all operating on the same fixed frequency, but using time division multiplex to prevent stations from interfering with one another. An FM keying system would insure that drivers heard only stations appropriate to the area in which they were driving. A special receiver in the car radio might also interrupt regular broadcasts if there was a specific message for the area the driver was in. The BBC's proposal for that system is expected to be approved soon for testing in a limited area, according to Sir James.

All for two. At the engineer's version of the NAB session, "Getting Ready for AM Stereo," these experts briefed technical people on what changes the new technique will require in the way of equipment (l to r): Chris Payne, NAB engineering department; W. D. Mitchell, Continental Electronics; Ed Edison, Hammett & Edison; David G. Harry, Potomac Instruments, and Jim Loupas, James Loupas Associates.

Getting down to the nitty-gritty on AM stereo

The question is no longer 'if' but 'when' as station managers and engineers discuss how much the switch will cost and the technical problems involved

There were two NAB convention sessions titled "Getting Ready for AM Stereo." One was for engineers, one for managers. The NAB engineering department's Chris Payne, moderator of the sessions, summed them both up in opening the manager's version when he noted an enthusiastic element of the preceding sales workshop that wouldn't clear the room. "I guess that last session had to do with making money," said Mr. Payne. "This one has to do with spending money." Indeed, that is where AM stereo stands now; it's no longer a whether, it's now only a when—and it may be very soon.

Mr. Payne told the sessions he is hopeful the FCC will issue a rulemaking proposal for AM stereo late this summer and possibly make a decision on an AM stereo system by late this year or early next. "When we talk about getting ready for AM stereo," he said, "there's good reason to get ready." His opinion is that AM stereo will come on much faster than FM stereo; receiver manufacturers, he said, are gearing up now to meet expected consumer demand. By their numbers alone at the sessions, engineers and managers seemed to be in agreement with Mr. Payne's assessments.

At the engineer's session, several technical experts presented their thoughts on what a station will have to do to convert to stereo. They all emphasized that it is possible to change over in a relatively inexpensive fashion. But they all also urged the engineers to go for high-grade set-ups, and the engineers, on a show of hands, overwhelmingly agreed.

Some of the particulars the panelists noted:

W.D. Mitchell of Continental Electronics, Dallas, said that "transmitters, no matter how old, can probably be made to work for AM stereo" at a cost of about $10,000.

Ed Edison of Hammet & Edison, San Francisco, said that as for antennas, the "worst case" in terms of converting to AM stereo is a directional antenna for a station at the low end of the band; the "best case" a nondirectional antenna at the high end.

David G. Harry of Potomac Instruments, Silver Spring, Md., said that monitors for AM stereo can be as simple or as complex as a station desires or the FCC requires. He would prefer to let the marketplace decide, but, noting the increasing audio sophistication of the radio audience, he urged that monitoring be done at levels consistent with superior sound.

Jim Loupas of James Loupas Associates, Chesterton, Ind., spoke of the studio conversion necessary for AM stereo. A stereo console and a stereo processor, he said, are the necessary additions. Other adds, he said, "depend on the commitment of the station." Turntables, preamps, cartridges and tone arms also must be replaced, he said.

Moseley the most. John A. Moseley (l), president of Moseley Associates, Goleta, Calif., accepts the NAB's annual Engineering Achievement Award from George Bartlett, NAB vice president for engineering. Mr. Moseley was honored particularly for his work in developing a control system for studio-transmitter links. He has been head of his own firm since 1959 (also see "Profile," April 3).

Indifference to automatic FM gear

FCC disappointed that few avail themselves of such transmitters; it could affect commission's thoughts about like concessions

For years, broadcasters had pressed the FCC to authorize the use of automatic transmitters. Finally, two years ago, at the time of the National Association of Broadcasters convention in Chicago, the commission adopted rules permitting the use of automatic transmitters with FM and nondirectional AM stations. What has been the broadcasters' response? According to commission staff members, only three applications have been granted. The automatic transmitter, Dennis Williams, assistant chief of the FCC's Broadcast Facilities Division said, is "not a big seller."

The issue of the automatic transmitters game up at two panels last week—a technical one, on which FCC staff members and industry personnel sat and one on which commission staff members answered broadcasters' questions.

Some broadcasters at both sessions had theories for the failure of the automatic transmitters to take hold. "The control is complicated, and the expense is high," said one broadcaster. "And if something goes wrong, it takes you off the air—some-

HOW TO REDUCE RUST

YOU MAY BE WASHING THE WRONG SIDE OF YOUR CAR.

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Rusting is a year-round problem, and corrosive conditions have become a lot worse in the last five years.

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We're doing something to help prevent rust on the new cars we're building. Meanwhile, you can do something about reducing rust on your car.

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If your car gets dented, scratched, or chipped, try to get it repaired as soon as possible. Even a "small" scratch is bad. Because once a car starts to rust, the damage spreads fast. The paint around a dent or scratch can look okay, but rust is spreading underneath. In the long run, it's cheaper to fix the car right away.

A lot of people think that parking a car in a heated garage during the winter will help prevent rust. But it's just the opposite. Cold slows down the rusting process, as it does most chemical reactions.

We're doing more now to protect GM cars from rust. For one thing, we're using more rust-resistant materials, including different types of zinc-coated steel, in places where rust usually occurs. Also, our new paint primers and the way we apply them are designed to provide a thorough finish, even on some parts of the car you can't see.

Our goal is to protect your car so that it lasts longer and gives you the most value. And fighting rust helps.

This advertisement is part of our continuing effort to give customers useful information about their cars and trucks and the company that builds them.

General Motors

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Sound thinking: Engineers debate radio audio quality

Some suggest AM has ironically decreased its audience in trying to expand it with louder signal

Have AM stations, by pushing their transmission equipment to the limit in trying to obtain the widest possible reach, driven listeners to FM?

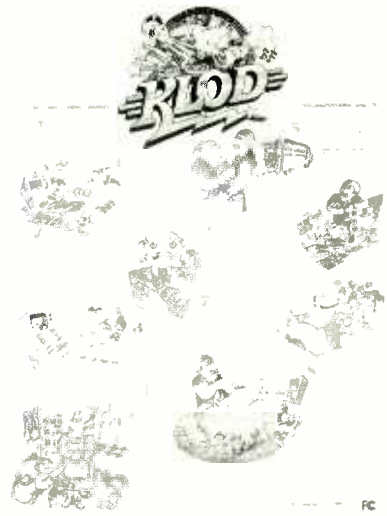
The participants on an April 12 NAB engineering panel called "AM-FM: Quality vs. Coverage" think so. And they think the problem may have been exacerbated by an over-all deterioration in the quality of AM receivers over the years, especially those incorporated into systems with FM receivers, record players and stereo tape decks. To make matters worse, they said, AM stereo may drive up the demand for AM quality, thus allowing listeners, as one participant put it, to hear "all the junk we've been putting out."

One example of the degradation problem in AM came from a member of the audience who said that a recent survey of the listenership of his AM and FM simulcast station found that 80% of his audience listened on FM, and that 70% of that audience were tuned in a monaural mode.

Asked if any hard research exists connecting viewer tuneout to sound quality, panel member James Loupas of James Loupas Associates said the best indication was the Arbitron ratings book, which he said, often show relatively new FM stations stealing the audience from well established AM's. Harvey Rees of Carl T. Jones Associates said that he has been an engineer for several stations in large markets where he complied with management requests for a louder sound only to be "embarrassed" by its quality. "If the dynamic range is there and is pleasing, people will not tune away, and I think that's what we're all looking for," he said. "Some loudness and some distortion is going to have to be sacrificed."

The panel members also agreed that the choices are bound to get more difficult for stations as the medium advances to AM stereo. Dick Schumeyer of Capital Cities Communications envisioned a sort of double-bind situation developing: On the one hand, listeners with stereo receivers will demand a higher quality sound, while on the other, listeners sticking with their existing equipment may be lost as loudness and over-all coverage decrease. "It's going to be a very hard decision for some operators to make," he said. Jack Williams of Pacific Recorder and Engineering Corp. agreed "it's going to be a very interesting transition in the next two or three years," he said, "it's going to be fun for all of us to live through."

Eric Small of Eric Small Associates, noted that an FCC notice of inquiry is expected to be issued soon concerning the general status of audio quality, measurements and processing. The results, he believes, "may have as much if not more effect on us in the next five years as AM stereo." Speaking to the problems of FM, Mr. Small suggested that the presumed relationship between modulation rates and occupied bandwidth may in fact be attributable to "a set of very arbitrary and capricious modulation rules." If research was devoted to the subject, Mr. Small said, stations may find they can kick up their transmission peaks—and tone down processing—without threatening bandwidth integrity.



A clod by any other name. The FCC's Field Operations Bureau introduced a new broadcasting operation to the industry last week at the National Association of Broadcasters' convention in Las Vegas. The operation is KLOD-AM-FM-TV New York, which is managed by Hy Watt, and is served by the DJ, Brad Caster; the chief operator, Gene Yuss, and the third-class operator, Ida Knowe. The illustrated story of the ill-starred KLOD was published and distributed at the convention as a means of pointing up the most common rule violations uncovered by the FOB at stations around the country—violations, the poster says, that lead to degradated service which in turn can cost a station audience. The fable recounts eight violations, which involve excessive modulation, under-power operation, blanking intervals, remote control point, equipment performance measurement, remote antenna ammeter, falsification of logs, and failure to make log entries.

NAB wants the FCC to get moving on TV tuners

The National Association of Broadcasters is urging the FCC to resolve promptly a proceeding initiated in March 1977 focusing on the problem of providing for UHF and VHF tuning comparability in television sets. In a letter signed by its general counsel, Erwin Krasnow, NAB said a continuing UHF/VHF "comparability gap" 15 years after the enactment of the all-channel TV receiver law is largely attributable to the "snail-like" pace of the commission proceedings dealing with the issue. Presently pending is a notice of inquiry. Mr. Krasnow said that if the commission feels a rulemaking is needed, it should promptly issue one providing for a 30-day period for comments and another 10 for replies. He said the record in the proceeding is already "exhaustive."

Justice Dept. says added tax on imported TV's would be unfair

Zenith, backed by U.S. groups, is seeking reversal of lower court

The Department of Justice has asked the Supreme Court to uphold a U.S. Court of Customs and Patent Appeals decision that a Japanese remittance of its commodity tax on exported television sets is not an unfair international trade practice. Justice's brief was filed in the eight-year court battle waged by Zenith Radio Corp. to impose countervailing duties on Japanese sets sold here.

Justice said that if the U.S. imposed the duties, intended to counteract price differenced caused by a foreign country's granting of a bounty or grant on exported products, it "would lead to double taxation" on the goods sold in this country. "That would put foreign goods at a disadvantage in addition to the disadvantage already imposed by tariffs and transportation costs. That is not the purpose of the countervailing duty statute."

"The countervailing duty statute is intended to offset the advantage conferred by a subsidy, not to require the U.S. to collect the same sort of tax that Japan desires to impose on goods consumed there."

Justice's opinion said, in effect, that Japan's decision not to impose its domestic taxes on exported television sets was not the same as subsidizing them. "There is a fundamental difference," the court ruled, "between the failure to tax a good and the provision of a subsidy."

"The failure of any state or nation to collect an indirect tax on exported goods is not a bounty or grant," the brief said.

Zenith's position in the case—that Japan was, indeed, subsidizing television set exporters—was backed by friend of the court briefs filed by a number of industry groups and manufacturers: the Committee to Preserve Color Television, United States Steel Corp., Ford Motor Co. and Bethlehem Steel Corp.

The Treasury department opposed Zenith and said that a ruling in the manufacturer's favor "would risk a significant breakdown in international trading agreements."

Zenith had asked the Supreme Court to overturn a 3-to-2 July 1977 appeals court decision that, itself, reversed an earlier district court ruling favoring the countervailing duties.

thing that does not happen with a live operator." Another broadcaster said the automatic transmitter "doesn't provide financial relief for the station."

The automatic transmitter's lack of acceptance by FM and nondirectional AM broadcasters is a disappointment to the commission staff, as it prepares drafts of orders authorizing the use of automatic transmitters for television and directional AM stations, John Taff, assistant chief of the Rules and Policy Division, said the order authorizing the use of the transmitters with directional AM stations is due to be acted on in July, and the one authorizing the use of the transmitter with television stations, in September. But before reaching that stage, staff members had hoped to have gained some solid experience in the operation of the transmitters with FM and nondirectional AM stations.

Is there a commercial future for shortwave?

BIB's Jacobs sees great possibilities if medium can overcome propaganda image

The determination of most of the world's nations to limit satellite transmissions to the country of their origin leaves shortwave radio the only viable international broadcasting medium, in the opinion of George Jacobs, engineering director of the U.S. Board for International Broadcasting.

Speaking to a luncheon gathering of the NAB's engineering conference last Monday (April 10), Mr. Jacobs said that if "broadcasting's stepchild" is ever to achieve its potential as a communications and even a commercial force, it must overcome its current limitations of spectrum space and the general perception of its function as that of a "propaganda machine."

There are 1,500 shortwave transmitters in more than 100 countries, Mr. Jacobs said, and attempts to "squeeze" that many signals into the eight international bands allocated has left them "virtually bursting at the seams," with interference due to competing transmitters "often intolerable." The World Administrative Radio Conference in 1979 will deal with the problem, Mr. Jacobs said.

He defined propaganda as basically information or entertainment "you don't want to hear," or that certain countries don't want their citizens to hear. One alternative to the latter problem, he suggested, would be to offer air time for reply from countries whose objections to portions of, say, a Voice of America broadcast, were deemed "to have merit."

Governments remain the principal users of shortwave, despite "stirrings" of interest in its use as a commercial medium, Mr. Jacobs said. He cited a recent Gallup poll finding that 18 million Americans said they listened to a shortwave broadcast every week. "That's a very juicy market," in Mr. Jacob's view, both for advertising and for "promoting our free enterprise system."

Look, up in the sky. Mutual Broadcasting's announcement earlier this year that it will shift its network service from land lines to satellite prompted this workshop, "Satellite Distribution of Radio Programing." It was a primer on satellite technology, with Mutual representatives and hardware suppliers describing the workings of uplinks, downlinks, low-noise amplifiers, downconverters, demodulators, transponders, small dishes and large dishes. Mutual Executive Vice President Gary Worth noted the benefits that satellite networking will allow—multiple program feeds and improved sound quality. He didn't note the costs involved, but CBS Radio's Ralph Green did. For CBS to install receivers at each of its radio affiliates, as Mutual intends to do, he estimated a $4.5 million-$6 million capital outlay and $1.5 million annually for maintenance. But he added, "when the day comes, we will probably go" with satellites. He also contended Mutual may not easily get the blanket approval it is seeking for 500 earth stations. Since Mutual is not indicating the location of most of these terminals now, said Mr. Green, they will need an FCC waiver for approval. That, he said, may not be as automatic as might be expected because of potential interference problems in locating earth stations. L to r at the session are Mr. Worth, S.N. Verma of Western Union, Andrew Inglis of RCA Americom, Guy Beakley of Scientific-Atlanta, Mr. Green and J. Walter Johnson of California Microwave.

FCC Opens Door To Stereo On AM

from Batavia paper 4/10/80

WASHINGTON (AP) — Stereophonic radio broadcasts, limited in the past to the FM band, will soon become a reality on AM as well, because of action by the Federal Communications Commission.

For many of the nation's AM broadcasters, whose audiences in recent years have switched increasingly to FM because of its stereo signal, the move could spark a resurgence of listener interest.

John B. Summers of the National Association of Broadcasters hailed the FCC's decision Wednesday as a "milestone."

And the company whose method of stereo AM broadcasting was given a monopoly by the FCC, Magnavox Consumer Electronics Corp., was "delighted."

Magnavox, picked from five firms that submitted proposals, will have to share its system with other manufacturers — but will receive a royalty in return.

A company representative said Magnavox was surprised at the speed with which the FCC made its decision and could not immediately speculate on how much money might come from the royalties.

Commission officials said they expected the real market for AM stereo receivers to be in the automobile industry, since many people might be slow to trade in their home receivers.

Radios capable of receiving stereo signals on both the AM and FM bands could be produced for only $2 to $8 more than radios now on the market that receive monophonic AM and stereo FM signals, those officials said.

Neither FCC nor Magnavox officials would speculate on how soon the first stereo AM units would appear on the market or how soon broadcasters will begin to alter transmitting equipment.

Dr. Robert Powers of the FCC said stereo AM signals will have slightly less fidelity than stereo FM.

→ some stations are all set to go, in reality . . .

received for the appropriation was

Orleans services in 1979 tinued at the $24,000 shows the housing of figure used in 1979. The nale prisoners in the Al- only bill on hand, at the bion facility increased time, was the $12,184 dramatically late in the charge for the first five ear. The bill covering months. That combined he seven month period with the last bill for 1978 rom Jan. 1 to July 31 that was actually paid howed 287 incarcera- ion days, while the se- ond bill covering two nonths less contained harges for 653 prisoner lays.

At the contract price f $25 a day, the cost for he first seven months vas $7,175. It rose to 16,325 for the balance

Continued on Page 4

Legisla For Exp

By Al McWilliams

Federal and state funds will be sought for construction of an aircraft parking area at the County Airport.

The County Legislature Wednesday authorized application for a $212,444 project that would involve the construction of a 65,000 square foot parking apron and installation of drainage and lighting.

Cost sharing will be similar to the other airport projects. The Federal Aviation Administration will provide $191,200, the state, $15,933, and the county, $5,311.

Not all solons are enthusiastic about spending more money for airport expansion. Micheal T. Welsh of Le Roy said he was voting

Inside The News

their costs, he said.

.ow we see another emerging down e, but I believe the industry is in .er shape this time. Rates are still lequate, but they're closer to ade- ıte than they were then," he said.

The next several months should be ›ecially shaky, with inflation around percent making our rates inadequate, —th political unrest, fluctuations in the ternational money markets, uncertain- in our stock market," he said.

Independent agents and the compan- :s they write for need to develop special ıarketing programs and keep to con- tant price levels, he said. In addition. he next few years will see companies leaning toward the agents who produce the most business for them, and agencies having to specialize with two or three companies in order to be efficient enough to keep costs down, he said.

FCC favors Magnavox AM stereo system

United Press International

WASHINGTON — The Federal Communications Commission yesterday proposed approving plans by Magnavox Consumer Electronics Co. to produce a system for stereo transmission of AM broadcasting.

The commission, on a 5-2 vote, instructed its broadcast bureau to work up a paper favoring Magnavox's system over those proposed by four other companies, including Harris Corp.

The commission said its decision to select a single system was prompted by concern that the new service be made available to the public as quickly as possible.

by the close of the first quarter, an industry trade journal said yesterday.

The 118,116 cars planned for production would push the 1980 total to 2,012,285, *Automotive News* said. That represents a 24 percent drop from the 2,666,653 produced through April 14, 1979.

Weekly production was scheduled to drop 8.9 percent from 129,690 built a week ago and decline 3.5 percent from 122,497 built the same week a year ago, the journal said.

Truck production for this week by U.S. automakers was slated to reach 20,416, representing a big 39 percent decrease from 33,486 built last week but a 43 percent plunge from the 35,622 in the 1979 week.

Canadian car output this week was scheduled to total 14,052, a 21 percent dip from the 17,785 built a week ago but a 13 percent increase from the 12,163 assembled the same week in 1979.

›s reported **metals** **coffee futures** **dividends**

attorney general in charge of the department's antitrust division, withdraws what the spokesman termed a "public precondition." The spokesman cited Litvack's statement to a reporter that "We aren't going to settle for anything less than divestiture."

Litvack said on March 11 that the department and IBM were "very close" to agreeing on procedural points to guide negotiations on a settlement. He said IBM's attorneys hadn't told him they wouldn't continue negotiating.

The department's goal of divestiture has hampered the talks since they began last October. When told of the department's hopes before the first meeting, IBM senior vice president and general counsel Nicholas Katzenbach said, "If that is the department's notion of settlement, then it has zero chance of success."

Lancia buys back cars

LONDON — Lancia, the Italian automaker, said yesterday it is buying several hundred of its popular Beta models back from their British owners for scrapping because of rust proble

has a population of about 6,000.

On an annual basis Kirkpatrick probably never sold more than 250 new cars or grossed more than $3 million to $4 million in sales, according to auto sources here.

Suddenly, on Friday, March 14, the dealership got a phone call from Kirkpatrick. He had been out of the office that day trying to obtain financing to save the business. He had been unsuccessful. The dealership would be closed the next day.

"Everybody knew he was having financial problems, but nobody knew how serious. Everybody was in a state of shock," remembers Ray O. West, a former salesman for Kirkpatrick.

"I'm sure he was in as much of a state of shock as we were. I think he felt very confident he was going to get the money. In the morning I had talked to him about a Cadillac I had sold and he felt it would be all right to order it for the customer, but wanted me to wait until he got back."

West continued: "I think the greatest problem he had was his large

predecessor, Shays Oldsmobile dillac.

Kirkpatrick was reported to l of the state and could nc reached.

Referring to the Kirkpa Motors' closing, another Dai auto dealer, who asked not t identified, said, "You're going to lot of this happening. This is just tip of the iceberg. I know of fou five dealers within a 100 miles of h who are on the verge of going unc There's no financing available. just a vicious circle."

Within the past week, another ar auto dealer — Messner Buick-Po tiac Inc. — also has closed.

The dealership, at 4243 Lakevil Road in Geneseo, had been owned b Raymond Hardy. Hardy had lease the property from Gwen Messner whose deceased husband, Richard was the original owner.

Messner Buick-Pontiac was ever smaller than Kirkpatrick Motors. I had been in business about 15 ye and at one time employed about