

Regulatory News

NAB/NPR Oppose Moody Stance

by Alex Zavistovich

Washington DC ... In recently filed comments, the NAB and National Public Radio (NPR) have urged the FCC not to allow noncommercial FM translators to be program fed by satellite or land-based microwave.

The proposed modifications to the FCC translator rules are "contrary to legitimate Commission concerns over its administration of its limited resources, long-established radio allocations policy and the public interest," the NAB said.

The association also cited FM interference to TV Channel 6 and the possible impeded growth of full-service noncommercial radio stations as objections to the proposed expansion.

The Moody Bible Institute (MBI) of Chicago petitioned the FCC in October 1985 to program feed its noncommercial translators by satellite, rather than using the direct broadcast over-the-air signal.

On 13 April 1986, the FCC adopted a Notice of Proposed Rule Making, to adopt the MBI modifications. The proposal would limit authorization to translators assigned to noncommercial educational stations in channels 200-220 owned and operated by the parent station.

MBI said it believes public interest "mandates the expansion of the uses of noncommercial FM translators by noncommercial FM licensees" to "increase the diversity of aural programming services."

NAB pointed out that the FCC has long been concerned with the protection of TV Channel 6 from noncommercial educational FM broadcast interference.

Although the FCC's concerns applied specifically to full-service, noncommercial educational FM stations with an ERP greater than or equal to 100 W, NAB claimed that significant interference is also produced by "every translator at or within the Channel 6 Grade B service area."

Using the example of an FM translator in the 88-92 MHz band operating within the Grade B contour of a Channel 6 station, the NAB held that a 10 W translator could produce an interference area of some 50 square miles. A 1 W translator's interference area would be approximately 20 square miles.

These interference areas are "particularly objectionable," NAB maintained, because the predicted service areas of a

10 W and a 1 W translator "would be only 21 square miles and 7 square miles, respectively."

National Public Radio (NPR) added that translators removed from their primary station, as under the MBI petition, might not be monitored adequately to assure the FCC of noninterference.

Broadcasters are also concerned about

the growth of full-service FM stations.

NPR stressed that FM translator service should be auxiliary—it should "supplement, not supplant" full-service radio.

NPR pointed out that, unlike applicants for full-service licenses, applicants for translator licenses do not have to demonstrate their financial and personal

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NARTE Claim Examined

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ently. FCC Engineering Policy Branch Assistant Chief John Reiser said NARTE's use of the word was inaccurate.

FCC objection explained

He pointed to a January 1986 letter he sent to RW, in reference to a November 1985 story concerning NARTE, in which he said: "The FCC does not issue authorizations to organizations to conduct commercial radio operator or service technician examinations or to issue operator certificates."

"An authorization," Reiser added, "implies the holding of some legal instrument permitting the holder to engage in certain activities under specified conditions."

The FCC "endorses" the concept of industry-backed engineer certification programs, but does not "endorse" specific programs, or "authorize" any of them, he said.

The Commission's decision to turn over the certification program to the industry was contained in a May 1984 order, which was part of FCC docket GEN 83-322.

Reiser added that FCC has not informed NARTE of the wording in the announcement because the Commission had not received any formal complaints about the practice.

Grandfather deadline

In a related matter, Thrower said that despite the 31 July deadline for engineers to obtain NARTE certification without taking an examination, engineers can still be certified without a test via NARTE-affiliated corporate certification programs through the end of 1986.

While NARTE itself can no longer offer the test-free certifications after the ex-

tended deadline, Thrower indicated that program is "still open" to engineers who apply through a corporation that offers a certification program under NARTE's guidance.

"I know that there will be some engineers, who (may) have been in the industry 30 years, who won't hear about the (exam-free) certification until it's too late," he said.

While the FCC has issued public notices on the certification policy, Thrower said the notification efforts do not always reach all the engineers, particularly in small towns and rural areas.

While he reported a "nice tidal wave" of certification applications just before the 31 July deadline, Thrower maintained that NARTE has "to close the door sometime, and this is it. We're not trying to be punitive."

For more information, contact NARTE at 503-581-3336.

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FCC Clips

Editions Discontinued

Due to budgetary constraints, the FCC said it has been unable to produce current editions of the loose-leaf version of its rules and regulations. The previously available volumes were current as of October 1982, except for Volume I, which was updated through September 1985.

While the 1982 editions have been discontinued, the FCC said that the "current status of any of the Commission's rules may be determined by obtaining a copy of the appropriate book in Title 47 of the October 1985 edition of the Code of Federal Regulations," which is available from the Government Printing Office.

Broadcasters can keep up to date on the rules by using the annual federal regulations code book in conjunction with the current edition of the monthly rules index, which is called "LSA—List of Sections Affected," the Commission said.

The FCC added that it plans to continue printing a loose-leaf version of its rules "when possible."

For more information, contact Ronald Jackson at 202-632-4178.

McNaughten Retires

The FCC announced that Neal McNaughten, a radio industry veteran for almost 60 years, has "officially" retired.

McNaughten's career dates back to the 1930s, when he was CE at several Colorado stations. In 1939, he joined the FCC's Office of Engineering.

Since then he has worked with the Radio Intelligence Division, been an aide to a commissioner, and participated in many CCIR activities.

In the 1940s and 50s, he held positions in the engineering department of the National Association of Radio and Television Broadcasters (now NAB).

McNaughten returned to the FCC in the 1960s. In the 1980s, he moved to the Office of Science and Technology, now the Office of Engineering and Technology.

McNaughten plans to work part-time to represent the US in international communications forums.

For more information, contact the FCC's news media information office at 202-254-7674.

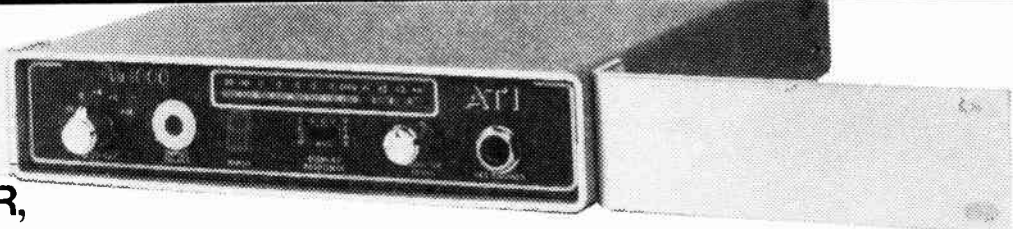
Broadcast Station Totals

For the first time there are more than 10,000 radio stations in the US, according to the FCC's latest broadcast station total figures as of 30 June.

The Commission said there are 5,170 FM stations, 1,247 of those noncommercial, and 4,839 AM stations. The figures also indicated that there were 1,672 TV stations.

For more information, contact the FCC news media information office at 202-254-7674.

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Regulatory News

Southwest Allowed 110% Mod

by David Hughes

Washington DC ... The FCC has deleted its rule prohibiting FM stations within 200 miles of the Mexican border to operate with modulation levels up to 110% when utilizing subcarriers (SCAs).

The Commission deleted its note to Rule Section 73.1580 (b)(2)(ii) that, according to the NAB, "limited (the) technical flexibility" of FM stations in the Southwest.

The 15 July ruling was contained in an FCC order containing a wide variety of "oversight" rule changes.

The change was made "so that SCA operations in the Mexican border area can be conducted on the same basis as elsewhere in the US," the Commission said.

FCC Engineering Policy Branch Assistant Chief John Reiser said the Commission had been getting "lots of calls" from stations in cities within the zone, such as

San Diego, Los Angeles and Tucson, that wanted to add subcarrier operations, but would not because of the modulation restrictions.

The restrictions had been instituted to comply with international broadcasting agreements with Mexico, according to FCC Attorney Jonathan David.

However, the FCC said that, after "ongoing negotiations with Mexico, it became clear that it was no longer necessary to retain the modulation restriction"

for SCA operations.

Mike Callaghan, KIIS-AM/FM CE, Los Angeles, said the rule change will allow FMs operating with subcarriers in the southwest US to sound as loud as FMs operating without subcarriers.

According to NAB Engineer Ralph Justus, all FMs operating without subcarriers are limited to a 100% modulation level. Several years ago NAB petitioned the FCC to allow FMs using subcarriers to modulate as high as 110% to compensate for the subcarrier modulation.

However, because of an agreement with Mexico, stations within 200 miles of the border had been exempted from the rule change, Justus said.

The new order was scheduled to take effect upon its publication in the federal register, which was to take place in late July, FCC officials said.

For more information, contact John Reiser at the FCC, 202-632-9660, or the NAB Science and Technology Office: 202-429-5346.

Final Mexican Accord Pending

Washington DC ... FCC officials are hopeful that the final AM broadcasting agreement with Mexico can be signed by the end of August. Once signed, daytimers on the seven Mexican clear channels will be able to add nighttime operations, while many other daytimers can expand their postsunset (PSS) levels.

"We're looking at the latter part of August," said FCC Attorney Jonathan David. "There are no obstacles, and we've been in contact with Mexican officials."

"I'm optimistic, but I've been optimistic before," he added.

The FCC and broadcasters have anxiously been awaiting the signing of the final accord since the preliminary document was signed in August 1985. Officials originally predicted the final accord would be penned by autumn, 1985.

However, a major earthquake damaged many of the offices occupied by Mexico's communications authority, de-

laying the final signing of the accord. That was followed, earlier this year, by a downturn in overall bilateral relations stemming from US accusations of corruption in the Mexican government.

Observers now say that relations appear to be improving, and David said he is "hopeful" about the final agreement.

He adds that the FCC has "taken care of all domestic matters" regarding the agreement, including sending show cause orders to the 350 daytimers on Mexican clears. The orders, which were mailed in June, specify the stations' power levels.

Those stations, which are on the seven Mexican clear channels (540, 730, 800, 900, 1050, 1220 and 1570 kHz), must wait for the final agreement before implementing night power levels.

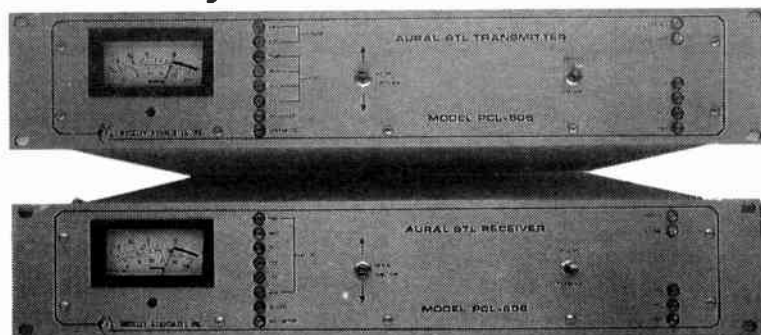
Once the agreement is signed, the Commission will then notify each station that it can add night operations, provided it has responded to the earlier show cause order.

The other 2,300 AM daytimers not on Mexican clear channels will be able to expand their PSS operations past 6 PM local time once the final accord is signed. These stations do not need show cause orders, the FCC has said.

For more information, contact Jonathan David at the FCC: 202-632-6955.



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RCA Parts Question Addressed

by Alex Zavistovich

Indianapolis IN . . . Although still in the planning stage, the Society of Broadcast Engineers (SBE) will be working with CompuServe, a telephone-accessed computer system, to provide an exchange of information on used parts and low stock replacement items for broadcast equipment, including RCA products.

Richard Rudman, SBE president, said his organization sees "orphaned equipment" as an industry-wide problem, in which the question of RCA parts availability plays a significant part.

Industry concerns over the continued availability of parts for RCA's various

broadcast products have persisted since the company announced the phaseout of its Broadcast Systems Division in October 1985.

The phaseout, stemming from competitive pressures and continuing losses over 1983 and 1984, has resulted in some RCA television product lines being sold to other companies.

Despite these concerns, RCA Broadcast Systems Product Operations Manager Tony Gargano said RCA's policies regarding radio products are largely unchanged.

RCA Broadcast Systems "has not been active in radio for at least five to seven years," Gargano said. Parts support for

RCA products, however, will continue to be provided by the company's Distributor and Special Products Division (DSPD).

DSPD

DSPD is a procurer of parts and a stocking warehouse for RCA products, Gargano explained. It also maintains records of numerous sources of material and engineering/parts drawings.

The division maintains inventoried replacement parts for RCA's consumer electronic and broadcast equipment products. Director of Industrial Tubes and Parts Product Management Eugene Dymacek added that, following the phaseout, DSPD also took on items which previously had been sold directly by the Broadcast Division.

DSPD is committed to supply RCA radio transmitter and ancillary equipment for a minimum of 12 years after a particular product is discontinued, Gargano said.

The division makes every effort to ensure that parts for their products are on hand, he said. Sometimes that requires having the division make an "all-time

buy" of items.

If a supplier announces it is planning to discontinue an item, Gargano said, DSPD estimates the number of units it will require to cover the term of its commitment for a product. That amount is then purchased from the supplier in a single transaction.

DSPD also maintains a cross-referenced list of its parts, which includes the name of each vendor and the vendor's stock number for each part. In extreme cases, Dymacek said, DSPD will give this information to customers.

But, he said, because vendors frequently make revisions to their own lists, the DSPD would rather try to locate the part for the customer, rather than risk providing wrong information.

Proprietary concerns

Despite the current service available from DSPD, some radio stations have expressed concern about the future availability of proprietary parts for RCA equipment.

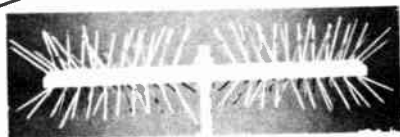
WAMU-FM, Washington, DC, has two RCA transmitters and two exciters. Chief Engineer Mike Burns said he has not yet had to order proprietary parts from RCA. He stopped ordering non-proprietary parts from the company after

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DST Filing 'Possible'

by David Hughes

Washington DC . . . Industry sources indicated in late July that work is underway to develop a request for a rulemaking to be filed with the FCC that would help daytimers cope with the recently approved Congressional bill to extend daylight savings time (DST).

President Reagan in July signed into law a bill that would extend DST three

weeks earlier in the spring. Instead of starting on the last weekend of April, most states will move their clocks ahead one hour on the first weekend in April, beginning next year.

Since sunrise will come an hour later for three weeks, daytimers are concerned that they will lose an hour of AM drive time.

"We have no developments to announce at this point, but a filing (with the FCC) is possible," said NAB Daytimers Committee Chairman David Palmer, of WATH/WTXQ, Athens, OH.

Others indicated that the NAB committee, along with at least two other organizations, may file a joint petition for rulemaking with the Commission.

"I've heard that there might be some filing," said FCC Attorney Jonathan David. "But there is still some time. The daylight savings time extension does not take place until April."

The NAB's Daytimers Committee met with FCC Mass Media Bureau Chief James McKinney in June to discuss possible solutions to the loss of AM drive-time programming. However, neither McKinney nor Palmer would reveal any specific solutions being discussed.

McKinney has maintained that because of the "laws of nature" and the "immutable laws of physics" that govern radio wave propagation, there was little the FCC could do to change daytimers' presunrise power levels (PSAs), which in most cases are below 50 W.

Daytimers did receive one consolation in the new DST bill. A House proposal that would have extended DST one week in the fall was rejected.

For more information, contact the NAB public affairs office at 202-429-5480.

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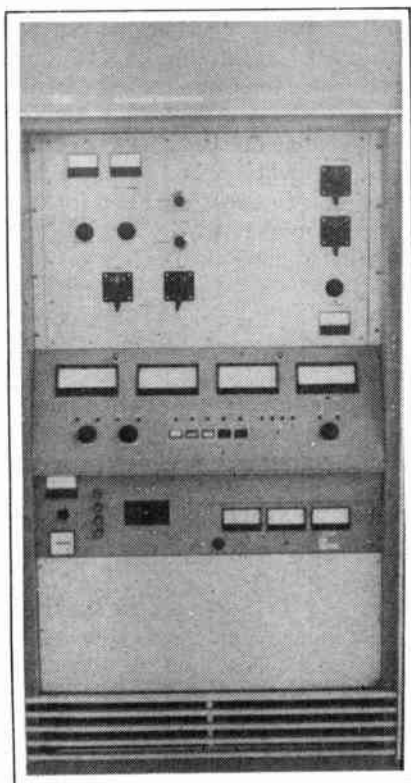
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Readers' Forum

Got something to say about *Radio World*? Any comments on articles? Call us at 800-336-3045 or send a letter to Readers' Forum (*Radio World*, Box 1214, Falls Church VA 22041).

Insoluble? Never!

Dear RW:

I would like to comment on the editorial, "Insoluble Conflicts," in the 15 May issue.

I had the opportunity of serving on the NRBA Board and voted for the merger with NAB Radio. One of my only reservations had to do with the Convention, and you have suggested exactly the solution that I have espoused . . . two conventions, with TV in the spring and Radio in the fall.

The two Management and Programming Conventions under joint NAB/NRBA sponsorship were successful, as I am sure the one this fall will be in New Orleans. It is completely logical.

While there are those who are involved in both radio and television, the vast number of radio operators are not concerned about the television business. It is very frustrating to be looking for a new audio processor and find it necessary to climb over two dozen TV cameras. No wonder radio equipment exhibitors get just as frustrated as station owners and engineers. It is a totally unsatisfactory situation.

Furthermore, the NAB Convention has become outrageously big. I've been around this business long enough to remember when the entire NAB Convention could be held in one large hotel. But 40,000 people . . . that's like three infantry divisions with no generals and no organic transportation. The logistics are

impossible.

The conflicts are not insoluble. The NRBA Directors voted the organization out of existence to give radio a stronger, more unified voice. The only real connection between radio and television is the fact that we are both regulated by the FCC, though mostly under different regulations. And, of course, there is some joint ownership.

I think a fall meeting is the real solution. Engineering sessions on radio can be beefed up, and radio equipment manufacturers can be sure that they can reach their audience.

With the huge number of stations today, the only sensible answer is an NAB-TV Convention, and an NAB-Radio Convention. This would also reduce the size of the convention so that there are more than two or three cities with sufficient facilities to handle such gatherings. I am aware that there are people at the NAB who share this feeling, and I hope that it will become the pattern of the future.

W. LeRoy Schneck
President/GM

WNAE/WRRN, Warren, PA

Qualified diagnosis

Dear RW:

After 44 years as an engineer at WQXR and WQXR-FM, one of the finest classical music stations in the world, and 15 years as chief until I retired on 28 March, I feel I am qualified to comment on the AM stereo situation.

During my tenure as chief, I had to make many decisions, one of the most important was on the type of AM stereo system that we were to use. Technically, the Kahn stereo system appeared to be best, but a simple listening test back in 1983 clinched it when the horrendous "platform motion" of stations using phase separation stereo was most obvious to me.

I believe that most engineers share my views about AM stereo and are familiar with the "platform motion," the poor mono, the increase in noise by 4.7 dB delivered by a Motorola-only radio, not to mention the splatter onto adjacent channels.

Many stations knowingly and unwisely adopted the Motorola AM stereo system because management personnel were swayed by the high pressure "hype" Motorola continues to use in their effort to "strong-arm" their way totally into the market. I hear that some stations were enticed into the Motorola camp by "loaners"—for budget conscious owners, a deal hard to resist.

Still Leonard Kahn persists in this "David and Goliath" battle, and Kahn stations still serve more listeners in major markets than the inferior Motorola

NAB's and NPR's comments on the FCC's proposal to expand FM translator service to include microwave and satellite feeds are self-serving, and do not warrant prohibiting the new application of this technology in radio broadcasting.

The FCC's Notice of Proposed Rule Making (NPRM), issued in response to the latest of several such requests by the Moody Bible Institute of Chicago, would allow the use of microwave or satellite feeds to FM translators. The NPRM, which should not be considered as a program-related issue, rightfully should be judged on its technical merits alone.

The FCC's NPRM would place narrow restrictions on who would be allowed to use FM translators, and in what manner. Limited to noncommercial entities operating between 88.1 and 91.9 MHz, translator use under the proposal would only permit direct-broadcast, over-the-air signals from the parent station. All translators would have to be owned and operated by the parent station, and it alone would be permitted

Expand Use of FM Service

to apply for available channels for translator use within each community it sought to serve.

NPR objects to expanding the use of FM translators because it feels that they will work against the growth of full-service, noncommercial radio. In addition, it states that translators will not be in the public interest, as they will deprive communities of local control. Finally, NPR objects to the possibility that a "de facto" satellite network could be established which would not be subject to the same restrictions of full-service operations.

NAB's arguments are similarly program related, though it raises the question of possible interference to TV6. Certainly the Commission should not limit the application of a technology in its entirety when it can place restrictions protecting existing and future full-service TV6 channel use.

As long as full-service licensing takes precedence, and as long as interference to TV6 is prevented, the public interest would best be served by allowing this extended use of FM translators. Open channels on the band belong, after all, to the public, which deserves better than silence.

—RW

system does. Despite the tremendous pressure from Motorola, General Motors, Delco, et al, Kahn stations flourish while Motorola stations drop away. Several stations have simply turned the stereo off, probably due to the poor performance which managers and owners are now hearing with their own ears and seeing in the ratings.

(A Motorola station in Syracuse featured recently in Motorola's latest release has dropped over 35% in the last rating period, while the two Kahn stations in Syracuse rose by almost 33%.)

If I, as an engineer, didn't believe in the Kahn system, there is no inducement that could get me to participate actively in convincing others of its merits.

I can't stress enough the importance of following good engineering principles. AM radio, in order to compete, needs the best engineering decisions. I could sit back and retire but I could not, in clear conscience, walk away from this battle.

I hope others, so inspired, will join in getting the truth out about AM stereo once and for all. Any station that places high priority on its engineering can't help but choose the Kahn system. It should have become the industry standard by now, and AM's own future is too important to consider any other system.

Zaven N. Masoomian
826 Preston Road
East Meadow NY 11554

Cleaning up

Dear RW:

Just a comment about letters from Ed Jurich and James Leonard that ran in the 1 June edition of RW.

How nice the AM band would be if everyone looked at AM's problems like they do. Imagine that, clean, clear, high fidelity sound on the AM band.

Just recently I had for the first time the opportunity to listen to one of the Sony wideband stereo receivers. While the stereo is nice, what really impressed me was the quality. Boy, does that old Gates 5H sound good on that radio. And when we drop to our MW-1 at night, the local FMs ought to be jealous.

Stereo? Well, let's face it. How much difference does stereo make on a ghetto blaster with the speakers less than a foot apart? Or on a table top radio? Or, for that matter, in the door panels of my old pickup?

Trying to get the speakers balanced so you can hear the stereo is a losing proposition anyway in the car. It's kind of like who's on first.

Come on folks, let's get with the program. The big "Q" is what matters here. Quality. Quality transmission, quality reception, and while we're at it, quality programming!

Just a note to the other AMS in the
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Radio World

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More Readers Forum

(continued from page 5)

market. You guys sound like #####. For the health of AM radio, clean up your act.

Tim Low
CE, KRED/DJ-92
Eureka, CA

Stereo wars, indeed!

Dear RW:

Oh, I just love it. It's just like old times! AM stereo wars again.

It would appear that broadcasters would still rather fight about AM stereo than win with it. At least, the trade press evidence points that way.

I enjoyed Gerry LeBow's guest editorial (RW, 15 April) wishing for a Motorola sellout, but I was sorry to see that it did not arrive at the RW offices in time for you to publish in the appropriate issue. Surely it would have been a great article 1 April.

Motorola's real commitment to AM stereo would seem to be the costs involved in the decoder IC chip, rather than the broadcast equipment supply activity. I suspect no one could collect enough money from all the broadcasting operations to purchase the IC invest-

ment!

Motorola, a major participant in early automotive radio development, should be congratulated for its adventurous expedition into the AM stereo marketplace. As a participant in the Great AM Stereo War and a prior RW contributor, I hope you can communicate this significant dual aspect of AM stereo to your readers.

Walt Barcus had an excellent letter in the same issue. He seems to have noticed some of the AM stereo problems, even though he is involved with an FM broadcast operation.

As the inventor of the system originally chosen by the FCC, I certainly agree with the comments Barcus made regarding the marketplace approach. Magnavox correctly judged the end effect of the marketplace-directed FCC decision on 4 March 1982, and elected thereafter to quietly deemphasize its AM stereo activity and invest in other activities.

Bill Sacks' column (RW, 15 May) speaks to the success that Magnavox/N.V. Philips can bring to bear on positive programs such as the CD player effort. Magnavox did maintain a major positive effort before the FCC until the

4 March '82 decision.

The deep scars received from the Quadraphonic marketplace battles are still remembered by the old hands in the consumer industry. Does anyone in broadcasting remember the FM quadraphonic broadcasting nonresult?

If broadcasters had settled down to the business of winning on 4 March 1982 (or even better, on 9 April 1980, at the initial decision), they would have been using an excellent and widely available AM stereo system for several years now. AM stereo could have been helping AM broadcasters for a long time. It would have been an accepted and universal part of consumer electronics by now. Incidentally, the PMX system can still be heard on the East Coast at night (1190 kHz).

AM stereo has been interesting stuff. It has come from disinterest in the work of the National AM Stereophonic Radio Committee, through the international intrigue of the McNally affair, to a "breach of duty" (University of Pennsylvania Law Review, Vol 133:265) and the raucous behavior that drew crowds at several broadcast conventions.

The complaint by KCI (Kahn Communications, Inc.) to the FCC relative to spectrum spreading by the C-QUAM™ system is old stuff.

The spectral characteristics of C-QUAM, PMX and Belar systems was

discussed in the Proceedings of the National AM Stereophonic Radio Committee, December 1977 (for example, section H, test A.6) and by the proponents in their filings to the FCC (for example, Magnavox-Comments to the Notice of Inquiry, Docket 21313, Figures H and L; and Fig. B21 of the 15 May 1979 Response to the NPR).

The FCC decision matrix 3/4/82 identified and discounted the spectral characteristics of the various systems. *Old news is no news!*

There is nothing new in forcing a system to illegal things. Any broadcast engineer can make a monaural AM transmitter exceed occupied bandwidth rules: just modulate at 15.5 kHz with more than 11.2% modulation, and you have done it. Most AM stations could easily put such a signal on the air!

The activities of the "Kill C-QUAM Immediately" (KCI) group are indeed nifty to watch. It will be interesting to see if activities from an island of parochial interests can continue to influence the status of AM broadcasting indefinitely. AM Stereo Wars indeed!

The proponents may be the visible victims of such nonsense, but it is the AM broadcasters (all of them) who have been and are the real victims in this overplayed battle.

Robert D. Streeter, P.E.
Pres., AM Stereo/AMS, Inc.

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Circle Reader Service 7 on Page 33

World Radio History

FCC Dismisses Kahn Complaint

(continued from page 1)

Before the letter was sent to KCI, Stanley had told RW that the FOB's report would "probably" be made available to the public, but he could not say for sure. Stanley could not be reached to comment after the date the letter was sent.

However, OET Engineer Bruce Franca said the report was an "internal memo" and was "not in written form to give out." He added that the report had not even been released to Kahn, who, Franca said, had not requested it.

Kahn had filed a complaint against its chief AM stereo system competitor,

Motorola, on 14 March. However in a 10 April letter, the FCC dismissed the complaint. A day later, Kahn filed a second complaint which he said contained additional information in support of the alleged type acceptance violations which involved what he said was C-QUAM's failure to adhere to FCC carrier frequency requirements.

The letter

Some observers said they were surprised at the relatively short length of the FCC's 18 July letter to KCI, considering the number of field tests conducted. The

document contained only seven paragraphs, with four of those containing background information.

"We believe that these field measurements confirm our earlier findings that the procedures used for type acceptance were appropriate," Stanley said in the letter. "The Commission has not required compliance with occupied bandwidth limits, using single test tones higher than 7.5 kHz or modulation percentages higher than 50 percent."

He added: "We also indicated that we would expect single tones at such frequencies and modulation levels to be extremely rare in broadcast material. The field measurements of C-QUAM stations confirm this fact."

Stanley also said that it is a station operator's responsibility, as opposed to the equipment manufacturer, to ensure that the station complies with the FCC emissions rules.

"We believe that the field measurements show clearly that it is possible to operate the C-QUAM type of stereo exciter in compliance with the Commission's rules," he concluded in the letter.

Petition not filed yet

In another AM stereo matter, at RW press time in late July, Texar Inc. officials said they had not yet filed a petition for rule making asking the FCC to abandon its marketplace approach and select an

AM stereo standard, as reported in the 1 August issue of RW. No filing date was announced.

"We are putting it together very carefully," said David Van Allen, senior design engineer with Texar, an audio processing equipment manufacturer. "It will be filed very soon."

Pointing to manufacturer reports of sluggish AM stereo receiver sales, and decisions by Sony and Pioneer to discontinue some AM stereo units, Texar President Glen Clark said consumers are confused by the continuing battle between the Kahn-Hazeltine ISB system and Motorola's C-QUAM system.

Both Clark and Van Allen stressed that the petition will not specify which system the Commission should choose. However, both maintain that if a single system is not selected soon, then more receiver manufacturers will pull out.

To date, only about 10% of US AM stations are fitted for stereo, with the C-QUAM system outnumbering the Kahn system.

Van Allen added that Texar has received a "good response" to an advertisement it first took out in the 15 July RW urging a campaign for a single AM stereo standard. "It really sparked some emotion. We've heard from both Motorola and Kahn supporters, along with radio stations and equipment manufacturers."

For more information on the FCC study, contact Bruce Franca at 202-632-7060. For more information on the AM stereo standard petition, contact Glen Clark at Texar: 412-856-4276.

Metric Curve Date Set

by David Hughes

Washington DC . . . The FCC has set 1 January 1987 as the effective date for the use of new AM metric curves.

In keeping with international agreements, including the 1984 US/Canadian AM Agreement and the 1981 Region 2 AM Agreement (dubbed the "Rio" agreement), the new groundwave curves were approved by the FCC in March 1985 to replace the old English unit curves in Rule Section 73.184.

However, the Commission adopted a partial stay of the rule in May 1985 after some broadcast interests complained that more time was needed to increase the availability of the new curves and to use them in studies.

"Now that the new curves are being reproduced for distribution in the near future, it is now possible to dissolve the stay" and specify an effective date, the FCC said in a late June 1986 order.

The FCC said it believes that a 1

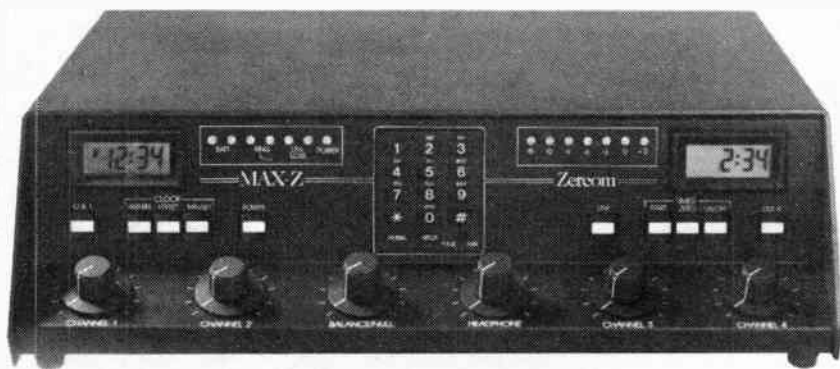
January 1987 deadline is "far enough in advance to provide time for all parties to convert to use of the new curves."

While the Commission said that all applications filed on or after the deadline must feature the new curves, it will continue to process applications "under the rules in effect at the time of their filing," even though the documents containing the old curves may remain on file after the metric deadline.

The FCC said it will issue a printout of the computer program that was employed to calculate the points used in plotting the new groundwave curves. The Commission will also make available a listing of the calculated points for the curves in "look-up" tables via its copy contractor, International Transcription Services (ITS).

The metric curve rules are contained in FCC docket MM 84-752. For more information, contact Jonathan David at the FCC: 202-632-6955. ITS can be reached at 202-296-7322.

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RTNDA Show to Feature ENG

by Alex Zavistovich

Salt Lake City UT . . . The 41st Annual Radio-Television News Directors Association (RTNDA) conference, to be held 26-29 August at the Salt Palace Convention Center, will feature special sessions for radio journalists and the largest exhibit of newsgathering technology ever organized by the association.

RTNDA Exhibits Manager Eddie Barker stated that this year's exhibit will be at least one-third larger than the one held in 1985.

The Salt Lake City show will feature displays ranging from 100 to 2,500 square feet and will occupy more than 100,000 square feet overall. More than 90 exhibitors will participate.

Exhibitors include Conus Communications, Microdyne Corporation, Thomson-CSF Broadcast and Shure Brothers, among others.

Electronic news products to be shown include computers, recorders and cellular telephones. Researchers, programmers, consultants, and news and wire services will also have displays.

RTNDA Executive Vice President Ernie Schultz conceded that RTNDA exhibitors tend to orient their product displays to television rather than radio.

"Exhibits are 90% geared towards TV," Schultz said, "but that's the real world."

Still, Schultz maintained, there is no radio equipment at other conventions which will not also be on display at RTNDA.

RTNDA has taken pains to ensure that conference sessions are balanced, he added, pointing out that there are a number of joint meetings scheduled, and as many "break-out" sessions for radio as there are for television news.

Of particular interest to radio engineers will be the Friday morning "Radio News Idea Exchange."

Since developments in radio newsgathering occur so rapidly that they are difficult to keep up with, the idea exchange will provide a forum to discuss some of these developments, Schultz suggested.

RTNDA will also feature sessions on the future of radio news, radio newswrit-

ing and radio news promotion.

This year, RTNDA is offering complimentary one-day registration to station and network engineers who attend the convention and visit the exhibition on Friday.

The association has reserved over 1,600 rooms and suites at six hotels in the city, most within block or two of the convention center.

Parts Issue Addressed

(continued from page 4)

the phaseout was announced, opting instead to go directly to the manufacturers.

Burns said that, through the manufacturers, he can get either an exact or very compatible replacement part. Although locating the correct replacement part is sometimes a long process, Burns admits, it is also less expensive and therefore worth the search.

KIIS-FM, Los Angeles, has two 20 kW and two 10 kW RCA transmitters. CE Mike Callaghan said that, although RCA is providing good support and his station is having no problem obtaining parts now, he is concerned about their availability in the future.

"We know RCA is still selling parts," Callaghan pointed out, "but we also know they won't last forever. The question is, what do we do when we need a part and they tell us they don't have any more?"

That question has led Callaghan to start exploring products made by other transmitter manufacturers.

WCXR-FM, Washington, DC, uses two 20 kW RCA transmitters. The station's CE, John Bisset, recalled having one of the blower motors go out, rendering the transmitter useless.

In related news, FCC Chairman Mark Fowler will receive the RTNDA Distinguished Service Award on 23 July in Washington, DC. Fowler was selected, RTNDA announced, because of "his commitment to end government regulation of the content of electronic journalism and for his efforts to achieve for broadcast and cable news full First Amendment parity with print journalism."

For more information on the association's exhibit and conference, contact RTNDA at 202-659-6510.

Bisset said that, although he was able to purchase a replacement from RCA, he was told that the motor was one of two left, and that "the shelves were bare."

But Dymacek said having only two of a particular item in stock "is not unusual." There simply may not have been a need for any more.

DSPD, Dymacek explained, is "guided by movement history as to which parts are continued in inventory," and in what quantity. The division's computer routinely provides a review record of parts in stock and their movement.

Dielectric's Wally Warren, formerly RCA product manager for AM and FM transmitters and antennas, said he believes DSPD is genuinely concerned about accommodating RCA product owners. RCA requires the division, Warren said, to provide either the exact replacement part or one with an identical electrical and mechanical configuration.

He added that the RCA Broadcast Systems Division's phaseout "hasn't reduced the value of RCA transmitters on the used equipment list." The equipment is still in demand, he said.

For more information on the DSPD, contact Eugene Dymacek at 609-853-2586. Contact the SBE at 317-842-0836.

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Communication Begets Quality

by Ty Ford

Baltimore MD ... I'd like to open this edition of "Producer's File" with thanks and a tip of the hat to the following: Mike Starling, CE of KPBS San Diego; Mike Kuehl, production specialist at KSTP, Minneapolis/St. Paul and Keith Bowman, chief studio engineer at WHIS/J104 Bluefield, WV.

All three responded to my 15 June column on basic communication between engineers and production people. (Let's not forget that in some cases one person does both engineering and production, which accounts for these folks talking to themselves from time to time.)

Producer's File

Engineer Bowman adds that if preventive maintenance (e.g., cleaning and adjusting) fails to put the punch back in your audio, it's time to check the electrolytic caps. If one is bad, the others may not be far from failing. This is especially true in circuits that are over seven years old.

Regular inspection with a distortion analyzer on the individual components and total system can also prove helpful in forecasting breakdowns.

Many times, however, studios are too busy to stop for extensive preventive maintenance. Even if you sweep the studios monthly and the failure occurs one day later, you obviously can't wait

Tyree S. Ford, a radio audio production consultant, helps stations optimize their use of production equipment and airstaff skills.

for another 29 days to isolate the problem.

When tech problems occur, nothing is better than instant, succinct verbal communication.

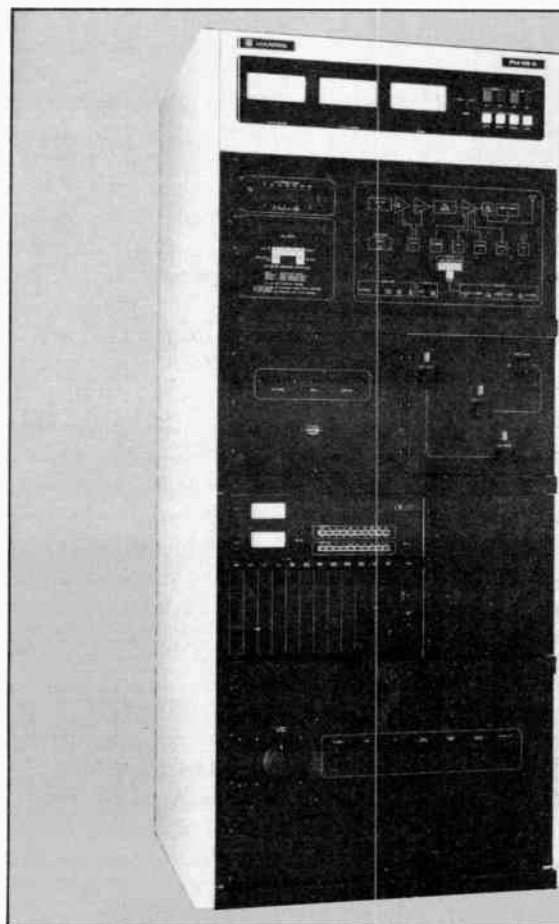
You don't need any test gear to know that a cart machine has crapped out. What you *do* need is someone to recognize the problem and articulate it to the engineer so that it may be corrected quickly.

Stations in which the self-fulfilling prophecy—that engineers and production people relate well to their equipment, but not to people—will continue to suffer from poor communication, reduced productivity and other symptoms of this bad attitude. The best managers know this and make a continuing effort to keep communications open and positive.

As a production director, it's impor-

tant to act instead of react. When an A/E shows up at your door angry and frustrated that a client has just called in a last-minute copy change, he or she may expect *you* to be angry and frustrated, too. Defuse the situation by remaining calm. Use the situation to strengthen the bond with that person. Get the job done and move on. To do otherwise is to waste time and energy.

(continued on page 10)



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Communication Begets Quality

(continued from page 9)

It's amazing what can be done when an entire staff realizes that "the competition" is the other stations in the market and not the guy or gal in the next room. Any thoughts you may have on this subject would be welcome.

In search of the muse

Nothing is more exasperating to a copywriting production person than to hit one of those occasional dry spots

where the ideas just don't come.

There are a few cures for cranial constipation which have effectively been used in the past that deserve mention.

First consider the cause of the block. Maybe you've just been served with divorce papers, the latest ratings show you down three shares, your new job "promotion" includes everything you've been doing plus a whole lot more, or maybe your dog died.

Any or all of these can shut down the

juices. For some, simply identifying the source will eliminate it.

For chronic sufferers, there are other means.

If you've been close-focused on your own station for too long, you can succumb to "idea inbreeding," or using the same techniques, mechanisms, and tricks over and over.

Try listening to other stations, not necessarily to steal their ideas, but to provide yourself with a fresh frame of reference. If you have the luxury of time, take a vacation, or take a day-trip to another equal or better market and monitor a few stations.

Television and movies can be a great source for material. They are easy to parody, as are some current events, "people" style magazines and tabloid-type articles.

Browsing through the sound effects library will often uncover sounds that can spark an entire concept. If you get one spark, keep searching for a few more.

While searching for a new premise for a station t-shirt promo, I found rhino and hippo noises. This sparked the idea for a safari into a closet in search of the lost t-shirt. The old overstuffed closet sound effect worked perfectly.

Of course, the t-shirt was never found, so the listener was redirected to go out and buy a new one. Add a little music

under the "sell," a Tarzan yell for authenticity, and you're home free.

So far, all of these methods require only one person. Remember that collaborative efforts can bring great results. This includes brainstorming with an A/E, the client, your spouse, or anybody with whom you feel comfortable. Since the true difference between collaboration and compromise is one of attitude, and if both participants are aware of that difference and aspire for the best final product, the results will almost always be collaborative.

Gathering your thoughts

When your mental gridlock decides to let go, you might find you have a little trouble collecting all of the ideas. Keep a pad of paper and a pencil on the nightstand.

Quite often it's during those quiet moments just before sleep or just after you've woken up that the cosmic cork is yanked, and there you are with a dozen great ideas.

Some people use a cassette machine to capture these ideas before they escape. Cassette machines are especially handy when you're caught behind the wheel, and find driving and writing too dangerous.

How do you jump-start your creativity? What other kind of production problems are you running into? Feel free to contact me by letter or phone: TSF, 3804 Ednor Rd., Baltimore MD 21218 or 301-889-6201.

'Til next time, keep your heads clean.

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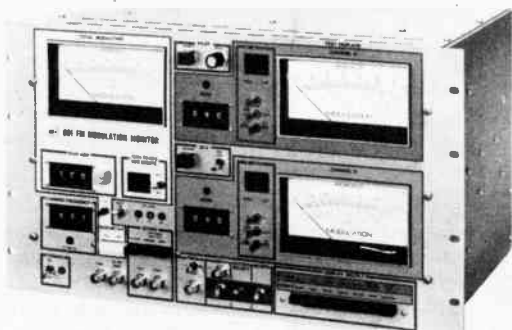
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Digital Counters Solve Problems

by Peter Burk

Part IV

Harvard MA . . . Digital counters solve a wide variety of problems in digital circuits. Last month we used a simple counter to control a sequential process. Other applications include counting pulses, keeping time, measuring frequency and frequency division.

The digital designer has a broad arsenal of integrated counters at his disposal, obviating the need to build counters one bit at a time. Even so, it is important to master the fundamentals, since each type of counter has its limitations.

Counters are nearly always based on flip-flops. For now, think of a flip-flop as a one bit counter. Each pulse on the trigger input causes the output to change state. String four flip-flops together as in Figure 1 and we have a four-bit counter.

To understand this circuit, recall that each flip-flop triggers on one edge of the input or clock signal. Assume negative edge-triggering. Imagine an LED or other indicator attached to each of the four "Q" outputs. Each output represents one bit of our four-bit counter.

If the initial state is all zeros (0000), the first complete input pulse will result in a transition of the "A" flip-flop, taking us to 0001. The "B" clock input is now high and is ready to turn on the "B" output as soon as "A" goes back off.

Walk through several transitions and verify that the counter advances through an exact binary counting sequence. Since the input pulses eventually "ripple" through all of the flip-flops, this counter

is called a ripple counter.

When the counter is advanced past the highest possible count (1111), it rolls over to 0. With four bits, the counter can count 16 states, including zero. Any length counter can be built, with the maximum number of counts equal to 2^n where n is the number of flip-flops.

The total number of counts is called the modulus, making our four-bit example a "modulo-16" binary counter.

What can we do with it? Since each flip-flop effectively divides the input frequency by two, we can take any output from the ripple counter as a divide by 2^n . A 304 kHz clock input would produce 38 kHz at "C" and 19 kHz at "D." As a fringe benefit, the two outputs will be in phase and the duty cycle will be exactly 50% regardless of the clock duty cycle.

Powers of two are convenient for binary numbers, but human beings are more comfortable with decimal numbers. A decade counter would certainly be handy. If four bits is modulo-16 and three bits is modulo-8, then how do we make a modulo-10 counter?

One way is to use our ripple counter from Figure 1 and add feedback to force the counter to skip some of the counts. Figure 2 illustrates one possible method.

For the first seven counts, "D" doesn't change from zero, so the counter produces a natural binary sequence. On the eighth clock pulse, the count goes to 1000. Since the "D" input is high, "A" and "B" are forced high by feedback to their direct set inputs. This causes the 1000 count to be replaced immediately with 1110. The next pulse advances the counter to 1111 which is the last count for a total of ten. Counts of any length can be created by using feedback.

Ripple counters are simple to under-

Figure 1. A four-bit ripple counter made from four flip-flops.

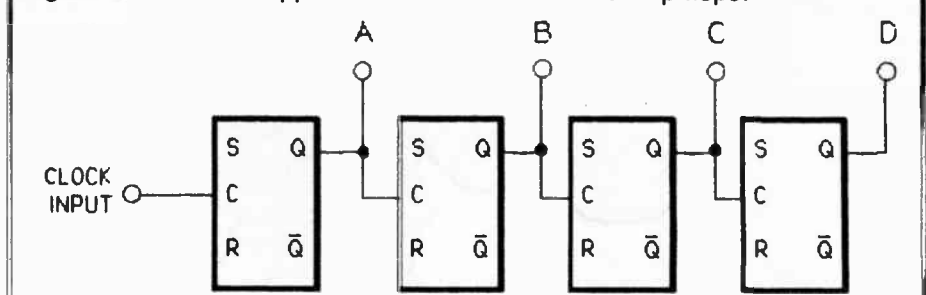
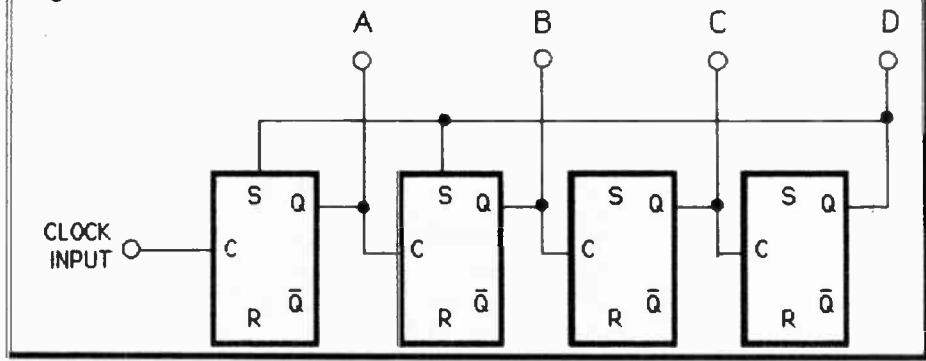


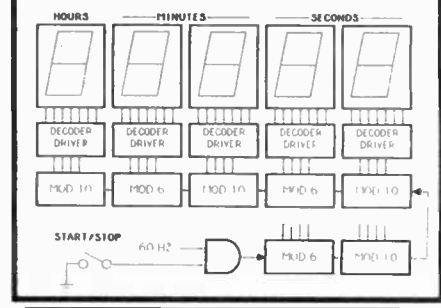
Figure 2. The addition of feedback creates a decade counter.



stand and use, but they are not without drawbacks. The biggest problem is the delay as the signal ripples through each flip-flop. As more bits are added, the delay gets longer, meaning that the back end of the counter isn't changing at the same time as the front.

This is only a problem where the outputs are to be latched simultaneously as would be the case in a microprocessor system. To see the effect of this, imagine that the latch is strobed immediately after the seventh clock pulse. Perhaps the first three flip-flops have toggled from one to zero, but the fourth hasn't changed from zero to one yet, due to the delay. For this brief instant, the count reads 0000 instead of the desired 1000. An error of this magnitude would give anybody fits!

Figure 3. A digital timer using counters as discussed in the text.



"Settling time" describes how long you must wait after a clock pulse before the output is valid, and is approximately the delay time times the number of flip-flops. The settling time places a severe restriction on the upper frequency that a ripple counter can handle.

A solution to the delay problem is a parallel or "synchronous" counter. JK flip-flops are normally used, with the clock inputs gated by combinations of the outputs as required to produce the desired count sequence. All of the outputs change at the same time, making it easy to read or latch the output.

For standard sequences, it is easier to buy synchronous counters already built as ICs than it is to build them from individual flip-flops. Common moduli such as 6, 8, 10, 12, and 16 are readily available.

We haven't discussed using the outputs of a counter to directly display the count. Timers, clocks, frequency counters and event counters all require that we display the output in readable form.

Since a basic counter presents its outputs as binary numbers, we need something to convert or decode the output into something friendly, like a seven-segment display. Fortunately, ICs are available that can convert the four-bit binary outputs into seven segment outputs, eliminating decode logic with dozens of gates.

Figure 3 illustrates the use of standard counters and decoder/drivers to display

(continued on page 12)

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Contract Engineering

Contract Engineering Explored

Falls Church VA . . . In this issue, Radio World inaugurates a regular feature section devoted to the problems, issues and rewards of contract engineering.

Since engineering certification require-

ments were deregulated by the FCC, the radio engineering profession has become very volatile and unstable. The advent of increased automation and microprocessor-controlled gear have further con-

tributed to the demise of the full-time, on-site CE.

The situation today appears to be an indicator of what is to come for radio broadcast engineers in the future. RW

has noticed that, even in major markets, seemingly successful station CEs are setting up their own contract engineering businesses on the side.

In markets of all sizes, contract engineers are servicing many of stations, often handling 5, 7, 12 or more stations by themselves, or with the help of an assistant or part-time operators.

Here are some of the questions the new section will explore:

Is it the volatility of the marketplace that is driving engineers to abandon full-time positions to opt for the security (or risks) of operating their own businesses?

Is it because salaries for full-time positions are so low that CEs are forced out of these positions out of economic necessity?

Are CEs no longer challenged by the tasks presented at one sole station?

Are GMs letting their engineers go, realizing that they can spend less on technical support and take home a bigger percentage of the gross?

The biggest question of all is, are radio stations suffering as a result of these changes?

What RW hopes to do with its new Contract Engineering section is to examine the causes behind the rise in contract engineering and to explore the hands-on issues in the day-to-day practice of typical (and not-so-typical) contract engineers.

We're interested in big practices and in solo efforts—and we'll be exploring every aspect of contract engineering, from business to technical issues.

We hope this section will generate comments and ideas—from contract engineers and all our other readers. Let us know what you think!

Counters

(continued from page 11)

elapsed time. To understand the operation of the timer, start with the 60-cycle clock pulses and follow them through the divide by 6 and divide by 10. This gives us a 1-second clock pulse to drive the seconds digit of the clock. Each counter or divider produces an output which is used by the following stage as an input all the way through to the last counter, which displays hours.

The circuit in Figure 3 is adequate for displaying time, but would pose problems if the time were to be latched. Even if we use synchronous counters, we are still rippling from one stage to the next.

This is a nontrivial problem in microprocessor applications, and is usually solved by one of several rather kludgy methods. The most common solution is to have the software read the time twice and compare the readings. If they are the same, the number is assumed to be correct. If not, the time has to be read again.

The timer circuit in Figure 3 was intended as an example, but could easily be built for a production timer if desired. If there is sufficient interest, we'll publish a detailed schematic.

Look for more on digital counters next month. We'll prove they can do more than just count.

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DELTA ELECTRONICS



Contract Engineering

Considering ± of Contracting

by Barry Mishkind

Tucson AZ ... You say you want a challenge in life? Stimulation? Are you tired of the same daily grind?

Why not consider consulting a number of stations, perhaps in the business of contract engineering.

One of the joys of being a contract engineer is the variety that it brings to life.

You work in different locations, with many different types of equipment, and, as you are the boss, you get to set your own working hours—that is, until the day comes when several stations go down at the same time. Then you get the challenge and stimulation in one shot!

For those who give the subject plenty of forethought, and who realize that being a contract engineer is a business like any other, with all the problems, paperwork, and other attendant joys, contract engineering can turn out to be quite rewarding both professionally and financially.

Knowing the essentials and how to avoid the pitfalls are the ideas behind Radio World's new section dealing with the contract engineer.

Defining your business

First things first. Who and where are your clients going to be?

This is important, as not everyone lives in an area with a million stations within 20 or 30 miles. Unless you have several main clients in your hometown, you had better like to drive a lot, in all kinds of weather. (That means the first "tool" you will need is a reliable vehicle, suitable for the area in which you will work.)

This may seem like an odd question, but will the prospective clients pay enough to make the venture worthwhile? I have personally turned down more stations than I've taken on, due to owners who think \$50 or \$75 is enough for me to drive a couple of hours each way and deal with any maintenance problems that might have cropped up in the last six months or so.

By defining your area of interest, you can get a list of all of the stations in the area, and identify the ones that do not have a fulltime engineer, whether it be for cost reasons or simple unavailability in the market. A letter to the manager, followed up by a phone call, will reveal if there is any interest.

At this point you need to have ready answers to several questions:

- What is your background and experience?
- Do you have recommendations?
- Do you have your own tools and test gear?
- How many clients are you serving,

Barry Mishkind, aka RW's "Eclectic Engineer," is a station consultant in Tucson, where he is building "yet another" radio station. He can be reached at 602-296-3797.

and where?

- Are you reachable at all times?
- How much do you charge?

Let's consider these points, and how you cannot only be prepared to answer the questions, but also have a profitable business as a contract engineer.

Tell them who you are

Whether you put a resume in your initial letter (the *best* approach), or simply expect to answer questions later, it is important to have listed the things you have done that prepare you for this job.

Eclectic Engineer

What electronics courses did you take in school, at what level? Do you have a degree? What licenses or certifications do you hold? What maintenance experience have you had at other radio stations? Are you familiar with all the equipment to run AM, FM, STL, RPU, automation systems, etc.?

What additional skills can you offer, such as general maintenance or computer knowledge?

Remember, you are selling your skills as a professional. The client has the right to know if you *know* his type of operation, or if you will be doing OJT.

Closely allied with your background are recommendations from previous employers and stations for whom you have worked, even if only helping another engineer build or test a facility. A letter of appreciation is nice to show, but be sure that any person you name as a reference

knows what you are doing, so they are not surprised when a call comes in checking on you. Of course, after a time, if you do good work, you *will* become well known and, joy of joys, stations will *start calling you* to help them out!

Tools of the trade

Next comes the question of how you will do your job. You will have to have some tools, and likely some test gear.

If all your stations are local, and well equipped, this may be minimal, as you can use the station's equipment. At times, I have even written into the contract that it was the station's responsibility to provide basic test gear. More on this later.

On the other hand, serving a lot of tiny stations in the rurals may well require that you provide everything.

A middle course might be a station that will lease you their test equipment for a fee or percentage of your fees.

In any event, it is counterproductive to pull up to any station and be without the basic needs to do your job. Investing in a good DMM and scope is a start, but where will the tones and distortion readings come from while you are working? These questions need to be answered before you start seeking clients.

One place to look for your initial inventory is the "Broadcast Equipment Exchange" in the pages of this very newspaper. Other engineers in the area may also have some used equipment in the back room, and you may be able to find some real bargains.

Less costly, but still necessary, are spare parts. Again, there may be a wide variety of situations among the stations

you plan to service. One may stock all critical parts one or two deep. Another may simply have an account at the local Radio Shack.

Anticipate that there will be items that you cannot purchase in the middle of the night. A box of assorted ICs, resistors, capacitors, switches, pushbuttons, pots, etc., in the trunk will make life so much easier than you might believe.

Don't forget the hand tools, soldering tools, alligator clips, head degausser, patch cables and other items.

You literally cannot carry enough for all the unexpected things that *will* occur.

If you are not willing to invest enough cash to have the items mentioned, and more, you cannot do a quality job. If you are unable to do this, you may not be in a financial position to go out on your own at this time. First, think through carefully and realistically what you can or can't do.

Beep beep beeeeeeeep

To be successful, you must satisfy the client that he can receive service when necessary. That goes double if he is off the air. And here are two mutually conflicting requirements.

Obviously, unless you have a great deal with one station, you need to work for several. The manager of a potential client will want to know how available you are if he needs you. He may even be curious to know if you work for a direct competitor.

If you have several clients in a market, and a storm hits, which will you care for first? Don't think this doesn't happen.

(continued on page 16)

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Contract Engineering

Small Arc Revealing

by Henry Ruh

Chicago IL ... The station had been on the air for some time using a Gates FM 10B war-horse transmitter. It was old, but like all good things, was performing well and had nearly zero downtime.

The problem was a persistent hum in the audio. The engineer had checked the studio equipment, STL and everything else and could not find the hum. It was not a baseband hum.

While all FM noise and distortion figures were reasonable (except for the hum), the AM noise was filled with AC component and measured about 27 dB S/N!

A check of the exciter and driver showed no problem, but the final was where the hum was entering the signal.

Normal checks of the power supply showed that there was no fault in the rectifiers, filter caps or choke. The screen supply was clean also.

Not having a high voltage probe for the scope was a problem. It was easy enough to monitor the screen voltage directly (less than 1,000 V) and the bias voltage.

Trying to scope the high voltage at the metering point (about 1 V) had too much RF interference. Back to the basics.

The exposed connections in the HV supply were tight and clean.

The Variac on the screen was in good condition with no signs of arcing.

Henry Ruh is CE of WMAQ-TV and a frequent contributor to RW. He can be reached at 312-861-5535.

As I set the meter down behind the Variac (having removed the main air blower), I noticed a small arc. Probing the various cables did not locate the arc, but a few taps on the cabinet did!

The arc was located on the main AC input lines. These are connected to compression clamps. The AC then runs across three copper straps to compression straps on the other side. On the far side, six wires connected the AC to the main two breakers. There was little left of the

compression clamps.

Apparently the AC mains had had a lightning strike. The arc-over caused an initial burn of the supporting phenolic, which allowed the metal parts of the clamp to work loose from vibration from the air blower, which is mounted to the same base plate a few inches away. Normal inspection would not find the problem since the connections were hidden.

Removing the blower allowed visual inspection. Over the weeks, the weakened

connection continued to arc and burn until the wires and clamps only made casual connection. The I²R losses became high enough that the power supply filtering became insufficient and the hum developed. Replacing the cables and the clamps solved the problem; the hum, AC noise and AM noise went away.

Moral of the story: be sure to check even the hard-to-get to connections when doing your transmitter inspections, even the AC mains! Case closed.

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Considering ± of Contracting

(continued from page 13)

One night a storm hit here in Tucson, and six transmitters went down at the same time, involving two clients and another AM/FM that I was covering for another engineer.

(One of my favorite cartoons shows a man with smoke coming from his pocket, and a cohort saying "three signals hit his beeper at the same time!") It is a nightmare which *does* happen.

I have tried to resolve this by having a clear understanding with each client, and encouraging the use of auxiliary transmitters. Yet, I still have to contend with the "how soon will you get us back up?" syndrome.

One way to minimize this problem is to try to keep your client list at a reasonable level, consistent with your financial needs. In other words, don't get greedy.

There are a lot of guys out there that take on too many stations, even during fair weather. If you can't do a good job for each station, it reflects poorly on you, and will have an adverse affect later.

If possible, it's best to avoid contracts with stations that will not contract for enough time to do proper preventive maintenance. In turn, this limits the number of clients you can handle at one time.

Again, it is better to turn down a prospective client that calls if you cannot do a good quality job than to make a quick buck. That prospective client may well call again later on if he feels you really have his interests at heart—and, isn't that really what a service business is all about?

On the other hand, out in some rural areas, it may be that there are isolated stations that will not pay except when they are off the air. In the meantime, these stations get by letting the PD do light maintenance.

In this case, be sure that your fee reflects the value of your specialized expertise and availability. Your 24-hour-on-call service should decidedly not be free.

In addition to all your other costs of doing business, you have to add the costs of a pager, mobile phone and/or back-up engineers. Good communication is not cheap; however, it pays off as managers are impressed with prompt response to their calls.

The bottom line

To properly consider all the aspects of how to charge would take several whole articles. You will likely see several such treatments in these pages in the future.

Just now, we can consider some highlights.

Your charge must be calculated to cover your living expenses and profit. Yet, do not forget that as a self-employed person, you must pay the taxes that an employer would take out. A nasty surprise occurs each springtime if you forget.

Also, do not forget the costs of your equipment, pager, auto and supplies.

Unless you don't expect ever to relax, you must plan for and cover the costs of vacation time away from work.

You may think that \$15 or \$20 an hour sounds good, but with everything figured in, it turns out to be a lot less than you might think.

There is some debate over whether you should contract for a flat fee from stations, work only on an hourly basis, or a combination. This is something you must decide for yourself as to what works best. Some stations need to keep costs steady, some only ask that you do what is absolutely necessary, and still others want everything done regardless of cost.

Usually a station will agree to a flat fee contract with an escape clause for emergency calls or special construction to be an extra charge.

The more flexible you can be without giving away the house, the easier you will find it to write contracts.

Contracts

Speaking of contracts (and what would a contract engineer be without a contract?), the important thing to remember is to be specific. Spell out *exactly* what you will do for the station, and on *what terms*. If you are to be the chief operator, this should be noted in the contract, as well as the duties you will perform as such.

Also, be sure to clearly spell out the station's responsibility to you, both in terms of payment, parts reimbursement, and agreement to act on any report you may make regarding the legal operation of the facility.

A simple contract is all that is necessary to satisfy the FCC and does not require a lot of legal advice. A page and a half in your word processor (you do have a computer, don't you?) can be customized for a client in a short time.

Contract engineering can be a lot of fun and can open up your world in many ways. If you think you'd like to do it, sit down and count the costs as well as the benefits. Radio World will be there to help.

Remember, this is your newspaper. Let RW know what questions or needs that you may have, and watch for valuable tips in these pages.

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Circle Reader Service 40 on Page 33

World Radio History

Venting Spleen of AM Stereo

by Bill Sacks

Arlington VA ... In last month's column (RW, 15 July), I made a comment about the Delco radio not being multimode. That certainly made the phone ring! It seems that no matter in what context you use the term "AM stereo," it comes off as an inflammatory remark.

But, as Will Rogers said, "All I know is what I read in the newspapers."

I got a call from Rich Potykea, manager of Linear IC Applications at Motorola. That department had worked

Straight Talk

closely with Delco during the developmental stage of the radio. He stated, "there were no properly licensed multimode chips available, and that Sony had withdrawn the multimode receivers from the market."

In addition, he said, the only licensed C-QUAM decoder ICs were made by Motorola, Sprague, Toko (only for sale in Japan) and Toshiba. These chips are pin-for-pin compatible with Motorola's MC 13020. He said 5,000,000 C-QUAM decoder chips had been sold worldwide so far and the business was growing.

Rich also stated that the Sony chip had no 1/cosine θ correction and could not detect C-QUAM properly. Nor did it have a pilot detector, was additionally prone to low frequency distortion, and could be fooled easily by low frequency

Bill Sacks, a senior RW columnist, is president of Straight Wire Audio. You can call him at 800-368-2081 or 703-522-7780.

phase modulation (used on some stations for utility load control).

He further went on to say that Sanyo had announced a multimode chip, but he did not believe that they would put it into production because of poor C-QUAM performance and lack of a license from Motorola.

National has withdrawn their Kahn decoder chip from the market, Rich added.

To sum it up, he told me that my comment in last month's column was wrong because there were no properly licensed multimode chips available in the US. Simple enough, I thought, still feeling a bit like a stunned Will Rogers.

He also mentioned that low current versions of the C-QUAM decoder ICs (for personal portables) were now in breadboard form and would be out soon. The new C-QUAM chips will supposedly have more features, including a whistle filter.

I figured it might be a good idea to call my friend Leonard Kahn, who I hoped would set me straight on the matter.

Whoooooe . . . !

I guessed right—Leonard did have a few things to say, not all of them complimentary about Motorola.

He first informed me that Sanyo had a great new boom box out with multimode.

Kahn claimed that Motorola is infringing on Kahn's patent #4,018,994 by using the cosine correction. He also informed me that the trade-off in using this technique is additional noise instead of the distortion, and that the C-QUAM decoder IC shuts off at a 24 dB SNR.

Leonard also countered by informing me that Sanyo has a new radio with multimode—the MW 250. He also said

that Sanyo would be shipping its multimode chips at the rate of 200,000 per month by the end of the year.

"Uh, I only work here . . . "

Since I now had two different stories, it was time to go to the horse's mouth, so to speak, and ask Sony. I lassoed Charles Kato, Sony's Audio Product marketing manager.

Kato said that their original two multimode radios were discontinued because they had reached the limit of their projected product life. Sony is a very market-driven company and its average product life for small radios was under two years; its original AM stereo radios had been out for a healthy three years.

Kato informed me that its new multimode boom box, CFS 6000, is an AM/FM/cassette (with auto reverse and Dolby B); it has five-band graphic EQ and operates on AC or batteries. The "Boom-Boom" box is a three-piece unit with detachable three-way speakers and a gutsy power amplifier. The retail price is \$129.95.

Mr. Kato thought that there was at least one currently available Sony car radio that was multimode. But he said that was a "another group," and he did not know the model number. He stressed that Sony's policy would not allow them to produce any product without the

proper licensing, but once again said this was out of his area of responsibility, and that he could only assume that it was taken care of properly.

Just call me "Will"

This is a mess and I'm sorry I stepped into it (Will Rogers *never* stepped into a mess, at least not publicly).

I was involved with the EIA/NAB multichannel television sound group as a proponent of a noise reduction system. This was a very competitive, open forum with considerable A/B testing. There were also double-blind tests using trained listeners and a psychoacoustician.

I knew we weren't going to win, so I withdrew from the competition before the final vote and pledged my support to the future winner, (dbx). It is time to do this with AM stereo, but it is only possible if both systems are submitted for side-by-side impartial evaluation.

That is why we have trade associations. Tests and measurements using simulated interference and noise can be complemented with field testing on real stations in the real world.

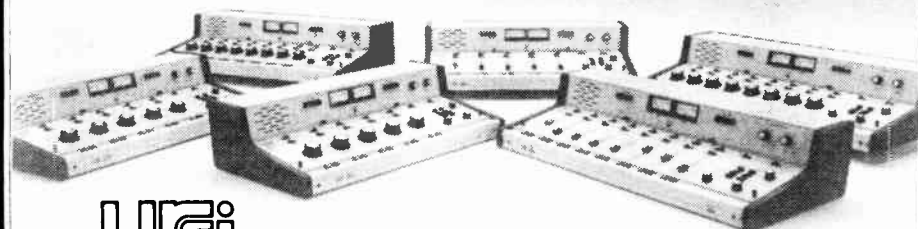
I agree with the Texar editorial/advertisement run 15 July and 1 August in RW. It is time for a single standard. Let's put some of this engineering talent behind the AM improvement committee.

Happy trails and stay straight!

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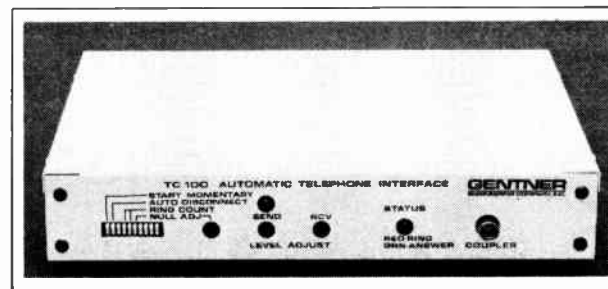
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How to Develop Media Strategy

by John M. Cummuta

Chicago IL ... Over the past several months we've been covering the rather technical aspects of correctly establishing a marketing plan for a business. Some

John Cummuta is RW management editor and GM at WCFL, Chicago. Call him at 312-963-5000.

of the topics have been pretty dry, and in reviewing past columns, I see that a lot of information was crammed in them. Marketing is not something you can adequately explain in 25 words or less.

This article deals with something a little closer to home for broadcasters—namely, how to properly select the right medium or media for a given advertising or marketing effort.

I might as well say it right up front; radio isn't always the best choice, or even a smart choice. The medium best suited for your purpose depends on who you are trying to reach, and what you expect to accomplish.

Your media strategy should define how you want to use your advertising budget to reach the maximum number of people in your target audience efficient-

ly and effectively. It's also based on the primary image you wish your target audience to have of you. Thus, your strategy should take into account where you're coming from (image) and whom you're targeting that image at (target market).

It logically follows, then, that media strategy will dictate media selection, because that selection should be in harmony with your intended image and the target toward which it's aimed.

For example, if you were trying to project an image for wholesome family products or services for low income individuals, you most likely wouldn't advertise in *Playboy*. Why? Because the *Playboy* image is not harmonious with yours and it's not aimed at low income families.

Budget

Before we move too far into the reasons for selecting one medium over another, let's go back to our original statement that the purpose of the media strategy is to define "how you want to use your advertising budget to reach the maximum number of people in your target audience."

How do you determine your advertising budget?

There are three ways.

The first, an all-too-common method, is to base advertising expenditures on a percentage of sales. This concept has little meaning, for two reasons.

Advertising expenditures, as a percentage of sales, vary dramatically from industry to industry. Some cosmetic companies spend nearly 20% of their annual sales dollars on advertising, while dairy companies spend as little as 1.5%.

Then, if your sales are small, you'll spend a small amount on advertising, guaranteeing you a future of small sales. While the larger competitors might be spending the same percentage, they are spending larger amounts, thereby increasing their lead over you.

The second common method of determining budget is to match the competition's expenditures. This is not as counterproductive as is using the percentage of income method, but at best it simply assures a future of status quo.

The best way of determining your advertising budget is by deciding precisely what you wish to accomplish with it. Then spend whatever it takes.

Reach/frequency formula

Once you've clearly identified your target audience and the level of impact you wish to have, you can calculate how many impressions various advertising schemes will give you. The formula is: $Reach \times Frequency = \text{Gross Number of Impressions}$.

Frequency is the average number of times your target audience has the opportunity of seeing or hearing your ad.

Reach is the percentage or number of your target audience that has the opportunity of receiving your message at least once. This is a net figure, and each person is counted only once.

Gross Number of Impressions is the gross number of times your target audience has the opportunity of seeing or hearing your ad.

The most important rule to remember
(continued on page 21)

CRL
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stand out from the crowd

You can't compete effectively for listeners if your station sounds just like everyone else's. And the way to stand out is with outstanding sound of the kind you get with CRL's outstanding FM-4 system.

CRL's FM-4 gives you the spectral shaping flexibility you need to sound different from other stations using the single unit processor. The CRL advantage comes from our intelligent building block approach. An approach that gives you the options you want.

Begin with our SPP 800 Stereo Preparation Processor and our SEP 800 Spectral Energy Processor for individually selectable four-band compression. Then add our SMP 800 Stereo Modulation Processor and our SG 800 Stereo Generator and you are equipped to stand out on the airwaves as never before.

If you haven't heard what CRL technology can do, you don't know what you're missing. For a 10-day free trial at your station just call CRL toll-free at (800) 535-7648 and we'll make immediate arrangements for your local CRL dealer to give you a demonstration.

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Court Rules on Radio Parentage

by Floyd Hall

Crestline CA ... DID YOU KNOW THAT ... ?

Marconi was not the father of radio? No way! But let me explain.

I have said this before, but I have come up with some new information. A while back I wrote a little piece about seeing Nikola Tesla give a demonstration of his famous Tesla coil at a Chatauqua. I was a curious young boy, and the demonstration gave me some thought. What about this guy?

Well, I hunted around, and came up with a biography of Nikola Tesla, *Tesla, Man of Time*, written by Margaret Cheney, a science writer. If any of you are interested in the development of electrical and electronic science, get a copy.

Now, I started out by saying that Marconi was not (as the FCC says in its telegrams), "Repeat," was not the father of radio! You want some proof? Listen carefully!

Old Timer

On 21 June 1943, the United States Supreme Court reversed an initial finding, and ruled that, "Tesla had anticipated all other contenders with his fundamental radio patents" (See *United States Reports & Cases Adjudged in the Supreme Court of the United States*, Vol. 320, "Marconi Wireless Co. of America Versus United States," pp 1-80).

Dr. James R. Wait writes, "The simple picture shown, based on Tesla's disclosure in 1893, is the birth of wireless communication."

The strange thing is that Tesla was the father of AC distribution. It was he who invented the rotating magnetic field and the AC motor, and, with George Westinghouse, started and developed the distribution of AC as we know it today.

At the time, in the late 1890s, Thomas Edison and his Edison Electric Co. was supplying DC light power to sections of New York City, and he fought Tesla and Westinghouse with every dirty means possible. In advertising and pamphlet distribution, he assured the public that Tesla's alternating current was lethal, and that if one came into contact with it, even momentarily, it would kill! Of course, Edison said his direct current—I suppose of the same voltage—was absolutely safe!

In light of our knowledge today, all this seems incredible.

Remember, I told you a long time ago that Marconi did not invent radio! No! Tesla did, and his American patents, and our Supreme Court, prove it!

Haywire modifications

OK. Every now and then I run into a situation in which a CE at a station has decided that the manufacturer of his transmitter, or other equipment, didn't know what they were doing, so he modifies it to make it work better—so he thinks—and usually in the process haywires it.

I ran into one recently, a 10 kW FM transmitter. Originally this transmitter had a fuse block, to which 120 V was connected from an outside source, and distributed throughout the transmitter for control, filaments, etc.

Now, this guy decided it was a nuisance to have to run 120 V to this fuse block, so he ran one leg of the 240 V, 3-phase to the block, and grounded the other side!

Of course, this gave him "about" 120 V for his control circuits, but set up all kinds of loops and tension points (I discovered this by blowing my ohmmeter, and burning my thumb!). Naturally, he never recorded any of this.

This brings to mind the fact that, at many stations, it is difficult to find an instruction book for the equipment, much less the last "Antenna Proof of Performance." This latter is required to be

available for inspection, if not for the use of the engineer to find out about his directional antenna!

A goof

Speaking of directional antennas, I want to tell you about a goof of mine not long ago. This station has a three-tower, in-line array, and we were planning to move their Class B FM operation from *(continued on page 20)*

RADIO Classics

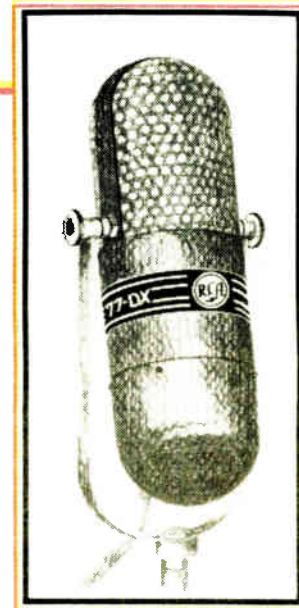
What makes a *Radio Classic*? Timeless design, flawless performance, outstanding value, and above all — bullet-proof reliability. Because, in radio, we don't coddle our classics.

The RCA 77DX is one such product. It set new standards in microphone performance. Even now, decades later, its quality still endures. Arrakis Systems' SC audio consoles are *Radio Classics* too. Introduced in 1980, the SC series set new standards in design, performance and value. Today, Arrakis SC consoles are the choice of more radio stations worldwide than any competitive unit in their class. Shown below is the 2000SC, an outstanding value at \$4695. Like all Arrakis audio consoles, the 2000SC is ultra-reliable. And it will continue to deliver outstanding performance as the years go by. After all, that's what it takes to be a *Radio Classic*.

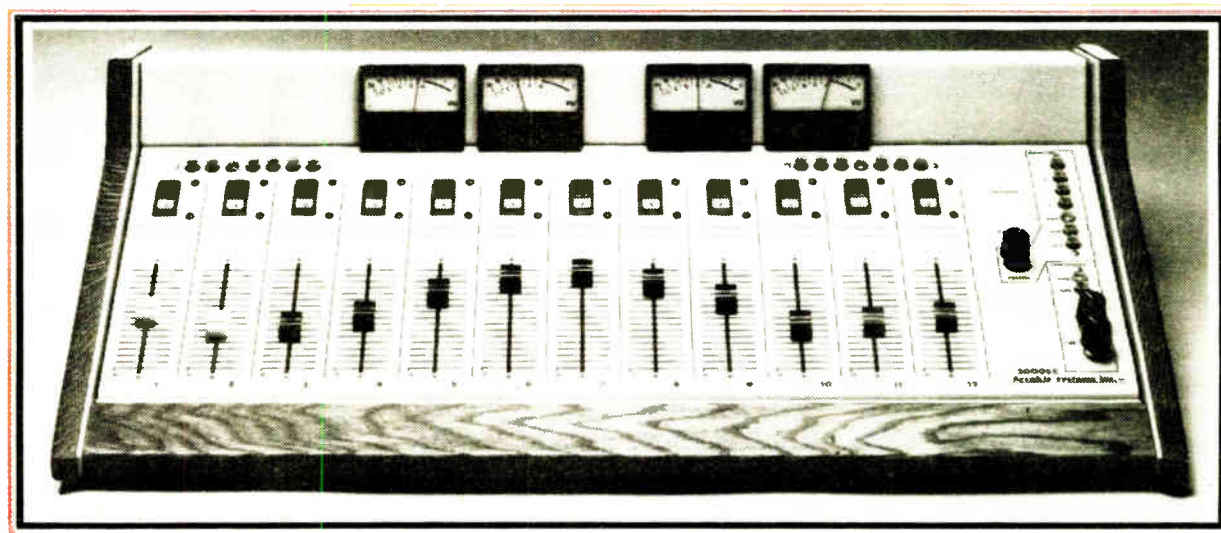


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- Only 3 IC types employed, all plug-in.

NOBODY BUILDS CONSOLES LIKE ARRAKIS.

Arrakis Systems Inc. 2609 Riverbend Court Fort Collins, CO 80525

Court Rules on Radio

(continued from page 19)

a difficult mountain site, and put the antenna on the center tower of the AM array.

Now, because of the terrain surrounding this area, I said, "You don't need a circularly polarized antenna." I had available, for practically nothing, a good horizontal antenna—5 bays—and I said, "we can get a full 50 kW with your 10 kW transmitter."

He agreed, so we went ahead. (By the way, contrary to the beliefs and preaching of all young proponents of circularly polarized antennas for FM transmission, it has absolutely no effect on FM reception in automobiles! If you want to argue about this, just let me know, and I will quote you some data obtained by my old friend Victor Andrew, in the early days of the propaganda about circular polarization).

Now, this station is not rich, so I hunted around for an isocoupler for a reasonable amount, without success. The price of these things is out of reason. I know what's in 'em. I used to make 'em. So-o-o, I told the last supplier I talked to to forget it—I would insulate the line. This we did, for about 10% of the cost.

You wouldn't believe the guff I got from this. Everybody, including the tower man who hung it up, said it wouldn't work! Sheez! I have put FM antennas and transmission lines on AM

towers before anybody ever heard of an "isocoupler!"

Now, here is the goof. When I first arrived at the station, I logged the operating parameters of the transmitter and directional antenna, as I always do, and made a mental note that the DA was out anyway, and would need some adjustment.

Now, when an electrician came in to install some conduit and wiring, he ran a trencher right around the transmitter building, right through the transmission lines, sampling lines, control lines, tower lighting lines and telephone lines and put us out of business.

To save about 500 words, we spliced everything out, and I went to work to tune up the DA.

I cranked for about an hour, with very poor results, then finally saw some light; I made a few tests, and found the coax to the reference tower was open. I blamed the guy who made the splice, but later that night, I remembered my log of the operating parameters made before we started work; got out my old notebook; and whaddayaknow, that line was open before—nobody knows how long before!

Well, of course, this only goes to show that a careful check on the operating parameters of a directional antenna should be made from time to time. It is surprising how little change in indicated parameters can sometimes result when a

line opens up. You can feed two towers of a three-tower array, and you would be surprised at the slight change in current and phase that will occur with the third tower.

Of course, there will always be a considerable change in the impedance of the common point, but you can adjust the transmitter tuning and load adjustment and come out about the same. In some cases I have seen, even the monitoring points didn't vary too much. In the case I cited above, all the monitoring points were way below maximum. But of course, the station's coverage wasn't worth a damn!

It seems these days, with the laxity of FCC inspections, and no requirements for qualified technicians at stations with directional antennas, that almost nobody cares about the accuracy of the operation, or the pattern. In many cases, in the protection directions, the directional antenna is reducing signal toward the station's major population. If this is down, so is their coverage, with subsequent loss of audience.

Directional antennas are really simple

to maintain. As I have said many times before, you just have to keep them clean, tighten up the connections once in a while, and watch the common point current.

I was working on an antenna recently when the FM transmitter went down. They asked me to come over and see if I could find the trouble and get them back on the air.

The transmitter was a 20 kW well-known make, and there was no drive on the PA. I pulled out a couple of 4CX300Bs, and they looked very black. I held one of them up to the light, and so help me, the cooling fins of this tube were absolutely blocked with bugs! Bugs! Small insects of some kind!

No way could any air get through. So, both tubes were shot. Don't ask me why. Of course, there were no air filters in the back door of this transmitter, so what could you expect. I don't know.

Floyd Hall is a regular RW columnist and an engineering consultant at Consulting Radio Engineers, Crestline, CA. Call him at 714-338-3338.

Satellite Antenna Survey

by Richard Josephson

St. Cloud MN . . . Station managers for 100 of the 124 Minnesota FM radio stations listed in the *Broadcasting/Cablecasting Yearbook 1985* recently responded to a survey asking for information about their use of satellite antennas.

Results showed that 80% use satellite antennas and that more commercial stations, 85%, use satellite antennas than non-commercial stations, 69%.

Only 11% of the stations with power levels of less than 500 W ERP were using satellite antennas.

Sixty-four percent were using their satellite antennas for news, 36% for programming and 11% for SCA programming.

Fifty-five percent were using them for more than one of these purposes. Of 12 other uses listed, none were listed by more than 3% of the stations.

Clearly, satellite antennas are experiencing extensive use by FM radio stations, especially those stations with more power.

Richard Josephson is an assistant professor at St. Cloud State University, St. Cloud, MN.

Antenna versatility is also evident, considering the scope of purposes listed in addition to the primary purposes of news, programming, and SCA programming.

The information was gathered between 14 March 1986 and 11 April 1986.

Translators

(continued from page 2)

qualifications. NPR was concerned over the possible establishment of a "de facto network of translators" operating outside the FCC's regulatory framework for full-service radio.

Such a "network" would not operate in the public interest, NPR maintained, because parent stations whose translators were removed from the primary station could not have their programming influenced or affected by the citizens to whom they were broadcasting.

Ultimately, NPR contended, the MBI proposal may impede the development of full-service public radio.

FCC docket number is MM 86-112. For further information, contact Marcia Glauberman at 202-632-6302.

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How to Develop Media Strategy

(continued from page 18)

about reach and frequency is that you always build frequency first, then expand reach. In other words, dominate one medium before you move into another. Dominate one newspaper before you add a second. If you can't afford to dominate, or at least make a strong impression in a given medium, don't get into it at all.

There are a few important points to be made regarding the reach and frequency numbers. Research indicates that only about half of the people using a given medium at any point in time actually receive the message of your ad. The others are in the kitchen, looking at a different page or daydreaming. So you have to run a frequency twice as high as the number of actual exposures you need.

Research also has determined that the most effective number of exposures is between two and four. That is, the average person will come to a decision about your message after hearing it between two and four times.

So, considering that that same average person will perceive your message only about half the number of times he's ex-

posed to it, you'll need to run a schedule with a frequency of between four and eight to achieve effective exposure.

The A.I.D.A. sequence

A.I.D.A. stands for *Awareness, Interest, Desire, Action*, the sequence the average person goes through before coming to the buying point in response to advertising.

Now we can discover how different media can play their effective roles in this sequence.

Let's use the example of a tire dealer. He probably spends most of his money in the newspapers, but what really happens when we consider the AIDA principle? Most likely he's offering specials on his tires, and the deals are probably good.

But maybe the average person who does need new tires doesn't know it. Unaware of his need, the would-be consumer shows no interest in the ad, and turns the page. The ad, even though it is a good one, fails to meet its potential.

Now let's say that the same tire dealer complements the newspaper campaign

with an awareness campaign on radio that explains the symptoms of worn or wearing tires and details the specials listed in the newspaper.

The purpose of the radio flight is to give the potential customer an awareness of his need and an interest in looking for a deal on new tires. Now when he sees the special offer in the paper, it raises his Interest to Desire, and he is much more likely to take Action.

Another example might be the selling of high-ticket items, such as boats or office equipment, which require large advertising schedules. These sales can rarely be accomplished with one impression through one medium. People just don't make snap decisions on large expenditures.

Proper use of diversified media might include a direct-mail campaign to a highly targeted market of likely prospects for these high-ticket items. The mail campaign could be followed by personal phone calls made for setting up appointments for in-person sales presentations.

The scenario could be further expanded by introducing a radio or other

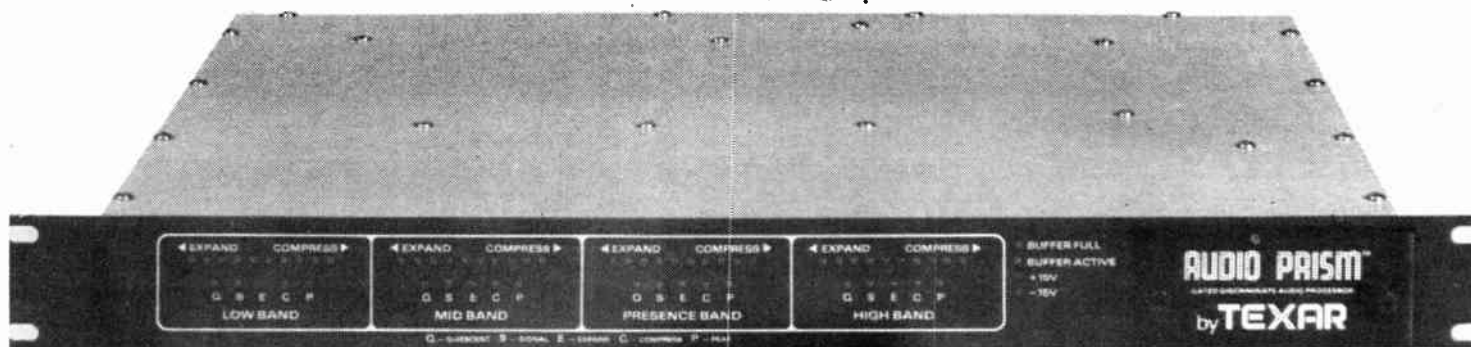
mass-media advertising campaign to create a general Awareness of the product or service. The direct-mail package might raise the prospect to a level of Interest. The phone contact could create enough Desire to get you an appointment. And the in-person presentation would certainly move the prospect to the Action of buying what you're selling.

There! We've successfully blended four media into an effective and efficient advertising campaign, which was certainly a part of an intelligently designed marketing plan.

Once again, we've covered a lot of ground with a little ink. I suggest to anyone who's serious about understanding marketing, and the role it can play in the success of a business, that he read all the books he can get his hands on. I recommend concentrating on books published in the last four or five years.

We've shown you that different media can accomplish different tasks, and that there is a bit of science involved in determining what number of commercials, whether broadcast or print, are needed to achieve a given goal. With this understanding, you should be able to better promote your station to its target audience, and better help your commercial clients to achieve their marketing goals.

POWER DOESN'T HAVE TO BE UGLY!



"Make it louder!" You have to for maximum signal range and maximum listener cumes. "Now it's too harsh!" Up goes listener burn-out, and down go average-quarter-hours.

It's a contradictory situation and it's a tough one to be in. There just doesn't seem to be a combination of settings on the audio processors that makes everyone happy. Still looking for the elusive "magic combination"? Maybe you've done as much as you can with what you have. Maybe what

you need is more technology on your side.

The digitally-controlled TEXAR AUDIO PRISM™ can put the clean power of digital technology to work for you. Digital technology spawned the personal computer revolution, makes CD players work, and can put clarity back in your air sound without sacrificing loudness.

The AUDIO PRISM has been the audio processor of choice for the #1,

#2 and #3 rated stations in America's largest market, New York City ... for four Arbitrons in a row.*

Get the clean power of digital control working for you today. Call Barry Honel at (412) 85-MICRO and arrange for a 10 day demo in your station. Considering demoing another brand of processor? Let us know! We'll make every effort to make the delivery dates coincide so you can hear the difference for yourself.

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* Summer '85, Fall '85, Winter '86 and Spring '86 Arbitron Ratings, New York MSA, Total Persons 12+ Share, Mon-Sun, 6A-12M. (Used with permission.)

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Thanks again!

Chris Kidd
KIDD COMMUNICATIONS

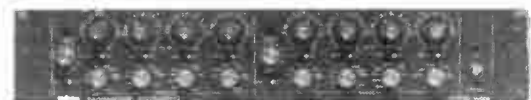
Back in 1978, KIDD COMMUNICATIONS made its first sale, a turn-key installation for KYDS - Sacramento, California.

In 1980 we became an authorized ORBAN Broadcast Dealer. Our first sale was the last Model 8000. Since that time, our sales of AM, FM, and TV Optimods as well as ORBAN Pro-Audio Products have totaled over *three quarters of a million dollars!* We'd like to say:

THANKS AMERICA!!!

to our friends and customers throughout the nation who have purchased from us.

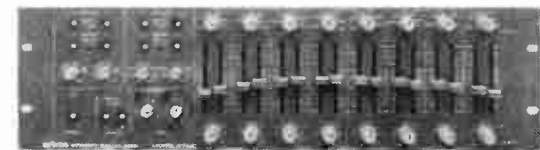
As processing and stereo generator needs develop, talk to KIDD COMMUNICATIONS. We are experts in ORBAN products. Our extensive product knowledge, experience and good working relationship with the factory can help you select the right product from the outset and receive it on time!!!



622B Parametric Equalizer \$879



418A Stereo Compressor/Limiter \$899



674 Stereo Graphic Parametric Equalizer
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Buyers Guide

Consoles

Autogram AC-6: Built to Last

by Nick Pollacia, Jr.
Owner/GM, Pene Broadcasting

Leesville LA ... Ever hear the sounds an old tube console makes when an announcer dumps a cold drink inside?

First there is this hiss, followed by a whine, which dissolves into a sound similar to *frrrrt!*

Then comes silence and a wonderful shade of white on the face of the befuddled operator who can literally see his whole career going up in smoke.

Even though they were vulnerable to such things, the old tube-type consoles were nearly indestructible—or better yet, announcer proof! So when you want to replace a piece of equipment that has served for 25 years, it is with a bit of trepidation that you start to consider the new guys on the block.

Everyone has their own list of expectations in starting the search for new equipment. At the head of the list is cost; you always expect that the one you really want will cost more than you can afford.

Next is the great variable—what you want from a piece of equipment. In our case we wanted a console that could operate with a minimum of "hair pulling" in an RF-prone environment stemming from our co-located studios and transmitter site.

An angel, in the guise of a quiet con-

sulting engineer, suggested the Autogram AC-6 for use in a newly remodeled production room. With 23 inputs, it offered an enormous amount of flexibility and came attached to a price tag we could afford. Most important, its design seemed to offer us the RF protection we needed.

User Report

Three years later I still consider that decision one of my most "inspired"—so much so that last year we added the AC-8 for use in the FM control room.

Autogram consoles are virtual audio "battleships," featuring all-aluminum "bullet-proof" construction. They're durable enough to withstand the best that your "worst" can dish out.

The front panel is designed for func-

tionality. It's uncluttered and dominated by large, illuminated true VU meters. You can arrange your audio sources any way you want them.

We have found that transitional time needed for learning is virtually nonexistent with new announcers because the console is so easy to operate. The announcer has in front of him/her everything needed: from remote control, start/stop switches, to an optional auto clock that gives time, temperature and count-up time.

The Autogram console is designed to meet any interior decorating requirement, and has an engraved front panel for long-lasting legends.

Maintenance for the Autogram is as straightforward as is its operation. The Autogram utilizes canned modules that can be changed by nontechnical people. Each of the modules is warranted for two

years, and the factory in Plano, Texas offers technical assistance and prompt service on modules and parts.

After the two-year warranty period, Autogram offers a direct exchange on modules at a nominal cost. The modules are identical in the AC-6, AC-8 and the IC-10, which means a minimum requirement of spare modules.

All in all, for us it was the perfect blend of technical excellence with functional, durable design. It's built to last and it sounds great!

One other thing ... there's a sloped top, to make it impossible to put a cold drink where it never should have been ... !

Editor's note: For more information, contact Ernest T. Ankele, Jr. at Autogram, 214-424-8585. The author can be contacted at 318-239-3403.

KIIS Finds BMX-III a Good Risk

by Mike Callaghan, CE
KIIS-FM

Los Angeles CA ... When you considered high quality audio consoles in 1945, chances are you thought of a nice, spacious Western Electric. In 1965, it

would have been an RCA BC-7 or a Collins 212. In 1985, the console that came to mind most often would probably be one built by Pacific Recorders, in Carlsbad, CA. Their line of BMX-II boards was well advertised, widely used and well thought of.

At KIIS, we were faced with building four new studios in early 1985. In selecting consoles, we also thought of Pacific Recorders. They had recently introduced a new model, the BMX-III. It was to be a compromise between the ABX, their full multitrack production board, and the well-established but less lavish BMX-II.

It takes courage to be a pioneer; when the order was placed we knew we'd be starting without spare modules, extender cards or even instruction manuals.

These boards had their share of initial problems, and we learned a lot that we wouldn't have learned otherwise. They require the usual amount of maintenance.

Pacific Recorders is providing the parts we need, and at reasonable cost. Technical help is easily available and knowledgeable when it comes to special modifications, and we are gratified with the product and the service it provides.

Once our startup problems were behind us, the boards went on the air without further mishap or incident.

Exemplary layout

Functionally, the boards are very well laid out. Extra panel space is available on either side of the factory-supplied modules for custom switches and lights. The operating controls are easy to reach and manipulate. The buffer-amplifier-driven meters are large and well placed,

and the design logic includes some nice features.

These include the ability to feed outside inputs into extra positions on the auxiliary meter selector. We bring outputs from the FM and AM stereo modulation monitors into these, so that we can continuously monitor both channels returning from the transmitters. This reveals when a channel goes dead somewhere in the transmission chain.

User Report

These meters also switch to the cue bus when any module is dropped into cue, offering an easy way to check source levels off the air without sliding up a pot or going into audition.

The solo bus also drives the auxiliary meter, but we have never used the solo provisions on these boards. The one comment most heard from the air staff was that of the futility of the solo system and its controls.

The talkback module can be used for a superbly functional intercom system. When a remote station calls, the level of the monitor speakers drops while the intercom voice comes through the stereo cue speakers. A small electret mic on the meter panel provides the talkback. Incoming and outgoing speech levels are adjustable from the top panel.

The optional test oscillator produces 15 frequencies between 30 Hz and 20 kHz, and drives any of the three stereo output busses. A 30 Hz "slate" tone is
(continued on page 25)

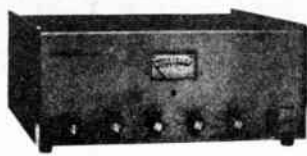
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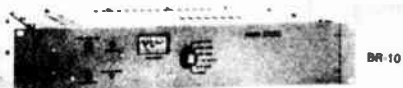


Models RPT-25 and RPT-40 RPU Transmitters provide uncompromised performance in portable and mobile remote broadcast service.
Single Freq.
RPT 25 \$1745
RPT 40 \$1595



PORTABLE - MOBILE
Model RPT15 Transmitter
Single Freq.
RPT 15 \$945

Model BR-10 is a rack-mounted VHF or UHF base station receiver designed for broadcast remote pickup service. This receiver has dual frequency capability built in.
BR 10 Single Freq. \$1045



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Telex: 51-4733 ELECTREX MIA

Buyers Guide

Medalist Earns Name

by Sam Garfield, Grp Dir Eng
Beasley Brcdcast Grp

Goldsboro NC ... The Beasley Broadcast Group has upgraded eight studio facilities at six of its affiliates in the last year. Of the eight, seven have been Medalist consoles from Harris Corporation. This includes WVSR-FM, Charleston, WV; WYAV-FM, Myrtle Beach, SC; WBLX-FM, Mobile, AL; WKML-FM, Fayetteville, NC and WRNS-FM, Kinston, NC.

In selecting a console, several considerations of features, performance and price were reviewed. The Harris Medalist met our objectives.

Installation went smoothly. The documentation provided was accurate, and backup support from the factory was available 24 hours a day for any unanswered questions. Also provided with the console was a "punch down tool," Phillips screwdriver for module installation, wire retaining caps, and function labels to affix to the input selectors.

The metal chassis is punched very adequately to allow clean wiring and easy access to all the attachment terminals, whether on output or various inputs. Audio cable connections and remote

functions are located just underneath the channel module and are made with a unique "Barrel slot." Using the punch down tool, we have had no poor or intermittent connections. This makes installation fairly easy and removal to change location rather fast work.

Ergonomic features

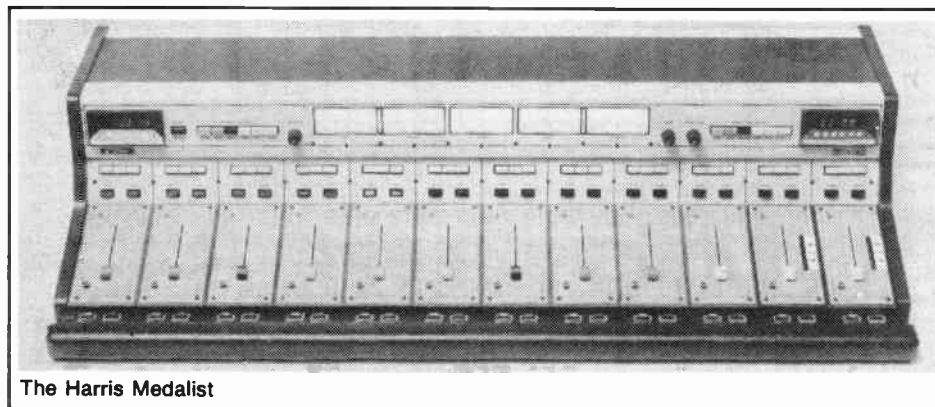
Provided on the Gold Medalist is a start-stop remote panel that is comfortably padded, allowing the operator to rest his hands while waiting to start the next event.

User Report

The start and stop functions are routed to any of the three channel assignments selected per module. Functions of the remote panel include pulse or continuous (internal selectable) start/stop signal to the equipment, pass or mute audio, and a reset pulse for the countdown timer.

Performance characteristics

On the Gold Medalist console is a three-section source select switch provided on each channel, allowing up to



The Harris Medalist

36 line level inputs. Position 1 of any channel is easily converted to microphone level with the addition of the preamp, which mounts inside the console chassis.

A total of 12 microphone preamps can be installed. Connecting terminals are available on the microphone preamp board for insertion of a "microphone processor." We have used the UREI LA-4 limiter at this point with great success.

The inputs to each channel are active balanced and may be assigned to either program or audition output bus or both. The channel modules are available with either linear or rotary faders. The faders lay on a gentle slope for ease of use.

A cue button is provided on all modules for fast switching to the cue bus, regardless of fader position. The cue amplifier and its 5" speaker are built into the

console and provide surprisingly reasonable sound.

The input gain to each selectable channel input can be easily set by changing the input pad resistors (2). A chart is provided so that gain selection is made without trial and error. We have interfaced anything from an Otari reel-to-reel with a +4 VU output to a Sony consumer-type digital compact disc player.

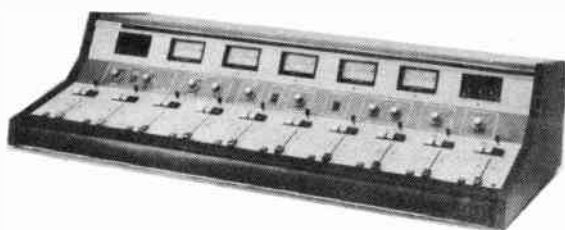
We have never needed to use a matching device to feed the console. A mono sum output is provided with an operator selector switch for picking up either program or the audition channel.

The power supply is separate and designed for rack mounting. Monitor muting is also contained in this power supply module, thus eliminating having to route high level audio back into the in-

(continued on page 29)

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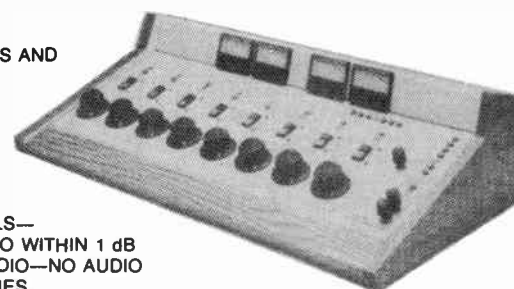


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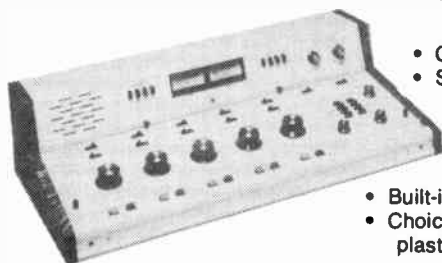


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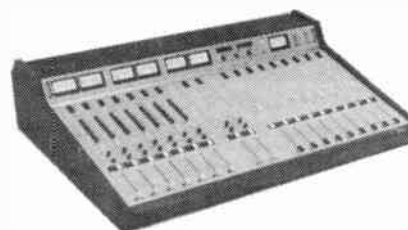
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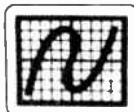


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Buyers Guide

KIIS Finds BMX-III A Good Risk

(continued from page 23)

keyed by a separate button.

The mic modules each select between two inputs. This works well for us; some of our air staff prefer the Sennheiser MD-421 and others like the Electro-Voice RE-20. We have one of each mounted on either side of the console, and two screw-driver-adjust trimpots allow us to balance their gains. A switchable pan pot provides special stereo effects, if desired.

The line input modules also have two trimpots, but these balance the left and right channels for both A and B inputs. These modules also have the switched pan pot, as well as a Stereo, Left, Right, and L+R selector.

Each input module has three push-on, push-off switches to selectively feed the Program, Audition, or Utility stereo busses. They all also have cue and solo capabilities. Both the mic and line level modules are available with extra "send" outputs for special effects.

On the BMX-14, only the program channels have dedicated meters. The audition and utility channels may be wired and switched into a second set of auxiliary meters.

On the BMX-18, program and audition have dedicated indicators, and a third set covers the utility and auxiliary functions. The ability to feed more than one bus allows some interesting mix-minus configurations.

The signal paths are broken and looped through rear panel Molex connectors just before the sliding faders, at a nominal level of -10 dBm. This is a good location and level for compressors, equalizers and effects.

The Control Room Monitor module selects the monitor source and sets headphone, monitor, cue and talkback levels. A push-on/push-off button allows dropping the headphones across cue when being used.

Additional modules provide for extra studios, announce booths, echo send and return, monaural output, and telco mixing, if desired.

The optional Digiclock uses highly visible gas-discharge displays. Setting the time involves touching a small magnetic wand to just the right point on the front of the clock face to trigger one of three magnetic sensors. These serve to either advance the time, or to stop the clock altogether. The procedure involves determination and patience.

Unfortunately, the clocks use an internal crystal as a time base, and its natural drift implies biweekly resetting. If a 60 Hz power reference were substituted, better longterm accuracy would result.

The Digitimer uses the same gas displays, and is reset either by starting an input module or by a separate control panel. It has a rear-panel defeatable 1/10 second digit, which we elected to disable because of the confusion provoked by the flickering figures.

The remote control scheme designed into the board includes the ability to start and stop any source from the control

module. Pacific will supply interfaces to connect with virtually any audio source. Pressing Start on a tape module will switch the audio on and start the machine. Tapping Stop kills the audio and halts the machine.

However, as wired and shipped, pressing the tape deck's local stop button turns the module and its audio off, and it must be restored with the start switch on the console, which, of course, restarts the tape deck. This little quirk makes it rather inconvenient to edit a tape using anything besides the cue bus, which, although stereo, restricts you to the quality of the cue speakers.

As a result, we've defeated this portion of the console logic. Stopping one of our tape decks locally now leaves the console audio switched on until pushed off at the module.

Audio circuitry is built using prevailing high quality opamps. The line output modules have individual channel gain trim, an output impedance of 40 ohms, and are rated at +24 dBm output. Jensen JE-123 transformers may be fitted, if desired.

Audio performance is state-of-the-art, requiring precise care with respect to grounding and interconnections to take full advantage of the audio capabilities.

Control functions use common CMOS logic, with small relays doing most of the audio switching. On-the-air light outputs supply 12 V at 150 mA to drive conventional or solid-state relays, while cutout signals are open collectors to ground.

The modules use double-sided glass PC boards, and component replacement is simple and straightforward. A special tool is supplied to help extract lens caps, and I find a piece of flexible tubing used as a "Chinese finger torture" device helps pull the lamps out.

Audio, control, and power connections appear as Molex connections on the rear panel. Some of these are difficult to reach once the consoles are installed in a table.

The external power supply provides ± 22 V for the audio chips, 12 V for logic and 48 V for phantom mic power. Pacific thoughtfully provided voltage test points on the 7" x 19" rack panel. Operating switches are recessed to avoid accidental embarrassment, and dual redundant supplies are an option.

Although the supply is heavy and well built, if the line voltage drops below about 111 V, the circuit falls out of regulation, causing an increase in system noise level.

Staff reactions

Operationally, the staff seems very satisfied with the BMX-III's. When asked what their favorite and most aggravating features were, the positive responses included the open layout, the fact that it was hard to make a mistake using the board, and the way the intercom worked. The few negatives commonly included the solo bus and the fact that accidental operation of it can cause

the headphones to go dead.

From a maintenance viewpoint, we have had the usual number of dead and noisy ICs. Audio chip problems seem to outnumber logic chip problems about 3:1. The chips are socketed and easy to replace.

The elaborate instruction manual is well laid out and concise, with easy-to-locate drawings and part numbers. Circuit descriptions are complete and valuable when tracking down logic or audio problems.

Spare modules and board extenders are imperative when working on any modular console, and the extenders Pacific Recorders makes are works of art, with aluminum frames to provide mechanical support for the modules while out of the console.

The Schadow-type switches used in the monitor and remote selector panels seem to have a limited life. The latches wear out and they refuse to stay depressed. They may be replaced either with parts from Pacific Recorders or with

comparable parts from local distributors.

The Penny & Giles slide pots get noisy and require occasional cleaning. This is easily done by disassembling the sliders, rinsing them under clean water, drying with a Q-tip, and reassembling them.

In short, your state of satisfaction with the BMX-III depends on what you are replacing. If you're moving up, you'll be amazed at the audio quality and operational ease of the board. If you graduated from one of the old boat anchors built around Capitol key switches and Davenport attenuators that never seem to get dirty, you'll appreciate the fine sound, but will wonder why you spend so much time at the sink cleaning slide pots.

But if you've replaced any of the true state-of-the-art consoles built in the last few years, you'll certainly accept the BMX-III as one of them—a good console doing the job for which it was intended.

Editor's note: Call Jack Williams at PR&E at 619-438-3911. The author can be reached at 213-462-6211.

Customized Consoles Prove ADM Reliable

by Mike Schwartz, Eng Mgr
WMC-AM/FM/TV
Robert Benjamin, Eng. Asst.
WMC-AM/FM

Memphis TN ... After many years of service from our old consoles in our AM and FM facilities, and with the growth of our stations, it became obvious that we needed new studios. A new wing was added to our building for FM, and the AM was gutted and expanded.

We investigated many major brands of consoles for our project, finally settling on the ADM ST series of consoles.

One of the main reasons for selecting ADM was its willingness to customize to our specific application; all we had to do was supply them with our visions of what the consoles should do.

AM production first

The first console to be delivered and installed was a two-track/four-track production version for AM. It has two stereo output busses that ADM supplied as four channels with individual faders. The faders use a spiral which drives a pot connected to a VCA for smooth operation, minimum failure and no noise. This is ADM's Slidex attenuator.

The console also includes a stereo auxiliary bus, intercoms to six studios, preselects for two of the input modules, an internal cue speaker, two monitor modules, internal timer and clock, in-board processors, and other features. These features allowed a minimum of external equipment, with all controls within easy reach of the operator, including a remote control panel for turntables and

tape machines (2 two tracks, 1 four track, 2 cart machines and a cassette) that match the console.

We experienced virtually no problems with this console from the very first time it was turned on.

AM air console arrives

The next one we received was the AM air console. This one has two independent stereo busses; no auxiliary bus, pan or gain controls exposed; redundant power supplies and a few other minor differences appropriate to an air console.

Each module is equipped with machine logic such that—with an interface we

(continued on page 32)

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E.O.E.

Buyers Guide

UA-2 Amp Performs

by Bill Sacks, Pres
Straight Wire Audio

Arlington VA ... Before starting Straight Wire Audio (SWA), I made my living as a CE and as an audio consultant.

While rebuilding broadcast audio facilities, I always needed a universal amplifier module that could perform a wide variety of audio functions. Ideally, I wanted to be able to go into a facility and bring a station's old audio console and peripheral equipment up to modern specs in as short a time as possible.

The challenge was to produce a good-sounding universal amplifier module that could be used interchangeably at any audio signal level from mic to line or load impedance from 10 ohms and up, balanced or unbalanced, throughout a broadcast plant.

High RF immunity was a must. One card had to be applicable as a mic pre-amp, a line amp, a DA, an active summing amp, a cue speaker amp or a matchbox wraparound for high Z equipment. Long-term reliability was also a primary design criteria.

UA-2 amplifier

The result was the UA-2, which became the standard audio amp in many top-notch facilities worldwide. Based on

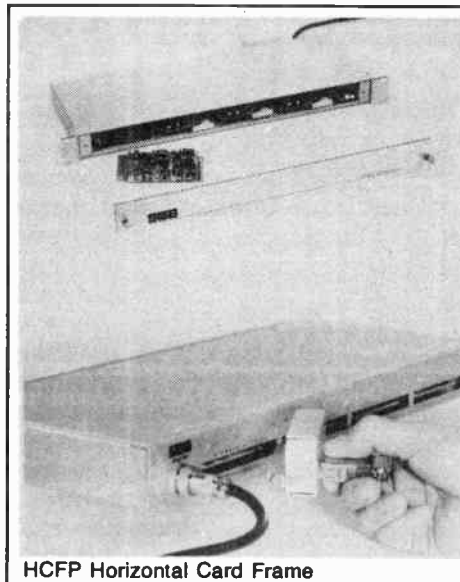
the concept of a truly universal amplifier card, the UA-2 has gone through three generations in eight years. The original model cards (UA-1s) are still operating in major broadcast facilities at original spec.

The UA-2's high performance opamp topography provides typical distortion figures of 0.0015% and solid RF immunity. A typical noise figure for a UA-2 operating as a distribution amp exceeds -90 dB.

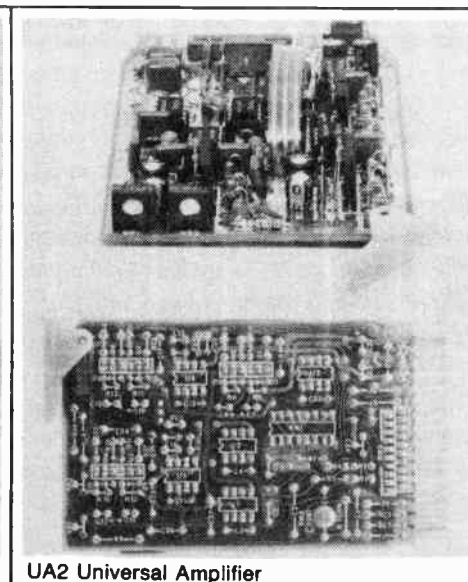
A UA-2 configured as a line/distribution amp is state-of-the-art, with one of the most powerful output stages that you'll find in any DA. The output stage has eight balanced 600 ohm feeds on each card and can comfortably feed over 60 600-ohm loads paralleled across its 9th high-power, low-Z output with more than 20 dB of headroom.

The characteristics of the UA-2 are usually determined by the mating edge connector's wiring. The unit can be a high gain mic/program line amp, and its unbalanced interface matchbox configuration has a distribution amp output. Active isolated summing amp applications of the UA-2 can have balanced or unbalanced summing point inputs.

Among the hundreds of applications, the same card also can serve as a cue speaker amp. I'll be happy to spend time



HCFP Horizontal Card Frame



UA2 Universal Amplifier

with you on the phone to work out any specific applications you may have for your facility.

Two independent stages

The basic UA-2 card is two independent amp stages: a balanced input stage and a balanced output stage. Each stage has its own independently adjustable conductive plastic gain control pot.

These pots are made to SWA specifications, and are environmentally sealed with Cramolin liquid inside. Among the thousands in the field, we have not had a noisy pot during the past six years.

Either or both of the on-board conductive plastic gain controls can be fully disabled if you desire. The stage's gain can then be controlled by a resistor on the mating edge connector. You can optionally set the minimum gain with the outboard resistor, which can be used in tandem with the on-board gain control now functioning as a trimmer.

The input stage is a precision balanced low-noise instrumentation amp that is balanced to ground or any other reference point.

The UA-2 also has a pair of balanced low Z active input summing point inputs. The output of this first stage can easily drive a 10 ohm unbalanced load. The input stage can be ordered independently on a UA-2 card without the output stage components (as a UA .5 IN).

The output stage has two inputs: a high impedance, noninverting unbal-

anced input, and a low impedance active summing point input. There are eight 600 ohm balanced outputs (which are back-feed-isolated from each other by more than 80 dB) and a ninth output which can drive a balanced 10 ohm load. The output stage can be ordered independently as a UA .5 OUT.

Line/mic/DA applications

Balanced line/mic/DA applications connect the stages together via a jumper or coupling capacitor that is mounted on the card's mating edge connector.

I have worked with hundreds of broadcast engineers to help them develop specific UA-2 installation procedures for a variety of broadcast consoles and peripheral equipment.

Most older consoles can be fitted with new high-performance guts in a few hours. The specifications of the rebuilt console are superior to most new consoles and at a fraction of the cost.

The entire UA series of amplifiers are available in rack-mounted units, as individual cards and as easy-to-assemble card kits.

SWA has developed a wide range of mounting options—from single card holders to a variety of rack mount, modular, connectorized enclosures—with and without power supplies.

Editor's note: For further information, contact the author at Straight Wire Audio: 703-522-7780 or 800-368-2081.

When quality talks, everybody listens.

Interfaces unbalanced equipment to your system without transformers and doubles as a distribution amp.

Fully independent input and output stages on a single card provide both 90 dB of input CMRR and 8 isolated 600 OHM differential outputs for your high Z unbalanced units.

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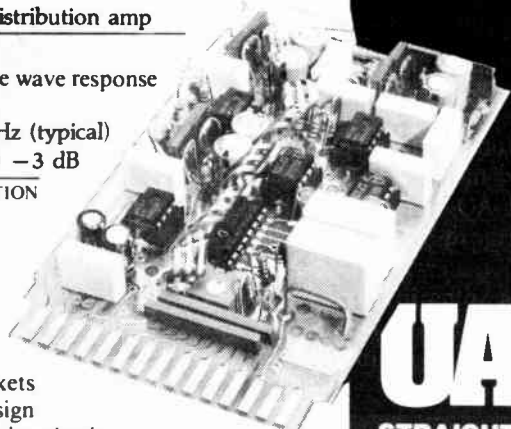
- 1 by 8 DA
- Line amp
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Buyers Guide

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by Bruce Browning, Tech. Dir.
Brown Institute, Brdcst. Div.

Minneapolis MN ... Brown Institute has taught the fundamentals of broadcasting to thousands of students for more than 40 years.

Now, as a division of the National Education Center, which operates more than 40 private trade/technical schools across the nation, Brown Institute is expanding and upgrading its facilities in Minneapolis. The first part of the expansion was construction of a new \$7.5 million building to house our broadcast, industrial electronics and diversified business administration training facilities.

The training we offer in our certificate program and the technical facilities we provide are intended to give our students the kind of hands-on experience they

User Report

need to gain an entry-level position in the broadcast industry. Therefore, the equipment in our 15 "on-air" studios is very much the same as that found at most stations (we have, in addition, five multi-track production studios and six devoted to voice work and production of audition tapes).

Upon moving to the new facilities, we had the opportunity to flush-out some 15- to 20-year-old outdated equipment with newer types that would more accurately reflect the actual equipment now in use in the industry.

Meeting our needs

After looking at a lot of spec sheets, I came to the conclusion that the basic electrical specs on most consoles these days are pretty similar, and that buying a console that didn't have decent SNR, distortion, frequency response, etc., might even be a hard thing to do. That says a lot for the technology!

Most of my concern, therefore, was with the quality of construction, the ease of maintenance and overall reliability in a facility such as ours.

My concerns were not only as the initial decision-maker, but also as installer and ultimately as maintenance technician.

I was looking for a relatively bullet-proof console. With first-time operators, fancy knobs and lights are of no benefit. We need equipment that will stand up to misuse and even outright abuse.

After talking with our local dealer, AVC Systems, and several local broadcasters whose opinions I value, I bought nine UREI Model 1683 eight-mixer consoles using Penny & Giles straight-line faders, and six UREI Model 1682 eight-mixer consoles using Shallco attenuators. Each console was outfitted with an optional mono summing amplifier and, instead of one mic preamp per board, we got four.

UREI also has an optional turntable

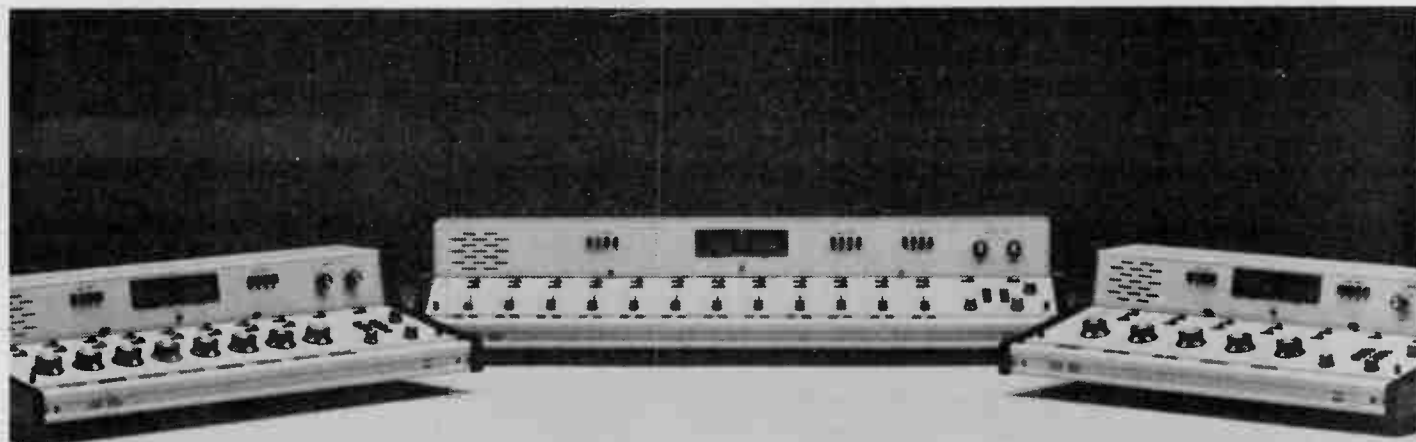
preamp Model 1101, which is designed to take DC power from the console, therefore reducing the cost of the preamp and reducing the possibility that hum field from the preamp might get coupled into the very sensitive turntable wiring. We bought 35 of them.

One further aid in selecting these parti-

cular consoles, and which I highly recommend, was getting a copy of the instruction manual. A new console has aspects that are both familiar and unknown. The familiar part you see in the picture in the data sheet. The unknown lurks deep inside where it may be waiting to trap the unwary buyer. A look

through the manual may well trigger questions that should be asked before you buy. With more than 70 pages, the manual for the UREI consoles told me many things that the spec sheet didn't.

I was initially impressed with the clean, straightforward layout of the UREI
(continued on page 33)



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UREI has some consoling news for stations with ideas that are bigger than their budgets: our superior line of broadcast consoles put a better on-air board within your reach.

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Working jocks and announcers helped us lay out a control panel that puts you instantly at ease. Phone jacks are logically placed. Recessed push buttons and gold-contact rocker switches operate surely, quietly. Cueing and monitoring are simple, yet versatile. Plus, you choose the attenuators—Penny and Giles faders, Shallco or conductive plastic pots.

We consulted station engineers to bring you consoles that perform reliably, adapt easily and install quickly, without special tools or accessories. Hinged panels allow fast access to plug-in cards and circuitry. And no other consoles in this class can deliver greater head room, lower noise or less distortion.

Built-in flexibility plus optional accessories such as our copy stand and turntable preamp mean any UREI console can adapt to your station's special on-air needs. Standard features include monitor, cue, headphone amp and cue speaker. Reliability is built-in too. Because UREI has been researching and advancing broadcast products for over 25 years.

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UREI

Buyers Guide

Air 7/Pro 7 Gives Sound Results

by Sam Caputa, CE
KEZK/WRTH Radio

St. Louis MO . . . Nearly unlimited versatility, excellent performance, and sound, reliable layout and construction typify the Air 7/Pro 7 series of audio mixing consoles made by Harrison Sys-

tems of Nashville, TN.

Additional features, such as the selection and format of the various modules, accessories and metering (combined with the ability to put meters almost anywhere on the console) made the Air 7/Pro 7 series the favorable choice for all of our needs.

A full-featured, professional quality, modular console system, it was developed for broadcast on-air or production use where the complexity and price of a fully equipped studio production console is not practical.

The frame, meter bridge and motherboard for the Air 7 and Pro 7 console

configurations are virtually identical. The difference lies in the types of modules and some of the accessories. All types of modules and mainframes are interchangeable, which is quite valuable if you are considering installing both types of these consoles in your facility.

The mainframes mount in a console or tabletop cutout. They are 24" deep and require 8.5" clearance behind the back of the board to allow the meter bridge—revealing all input, output and control logic connections to and from the console—to swing back.

I find this to be an optimum location for the console interconnections; during installation, it is always easier to make connections while looking down at the terminals from a sitting or standing position. This location also allows you to make on-air changes with a minimum of interruption to the announcer.

The mainframe sizes include 16, 20, 28 and 32 slots across with each slot being approximately 1.7" wide. The frame extends only 4.5" below the countertop, allowing maximum legroom. I have found the most popular frame size for broadcast studios to be the 28 slot size, with a width slightly over 48".

User Report

No matter how you choose to configure the console, you will need a total of 8 slots for the master and monitor modules and the accessory tray and modules. With the 28 slot size, this allows you a maximum of 20 input modules, which is more than adequate for the majority of broadcast applications.

The hinged meter bridge is made up of 6" x 6" Lexan panels (there are 7 across on the 28 slot size), each able to house a cluster of 4 moving coil meters, 4 36-segment LED bar meters or one of two selectable clock/timer modules. All modules for the console are one piece per channel, and are held in by one thumbscrew at the top and one bottom Phillips screw.

Each module has a small handle at the top to ease insertion and removal (no puller is required). A unique card guide system is used to align the modules and keep the PCB boards from touching each other.

The console uses a separate power supply with plenty of reserve capability.

The standard variety of input modules are available, along with a remote input module that has an 8-input button selector right on the module that gives priority to the last button pressed, instead of using mechanical latching. Gain control of the input modules is done with voltage controlled amplifiers controlled by Penny & Giles 3000 series faders which are completely shielded from PPA (paperclip and Pepsi attack!).

A unique feature of the input modules is called "APL/Audition." When the APL/AUD button is pressed, the input source for that module is placed in the stereo monitor bus, with its volume controlled by the input fader. This allows

(continued on page 32)

You'll
Sound Better
ON THE AIR

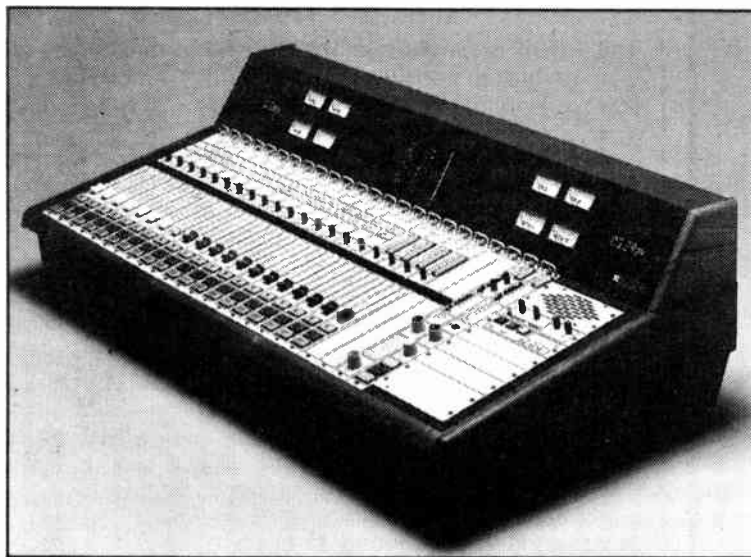
Introducing the new Harrison AIR-7

AIR-7 is better. Simply because no other console combines better sound with reliability and value. The AIR-7 features recording studio quality electronics—the same kind of quality that goes into Harrison recording, television, and film post-production consoles.

We know you need a console you can rely on. One that delivers better sound, is consistent and *affordable* too. That's why Harrison has developed the AIR-7 broadcast console. Harrison's trademark of built-in reli-

ability insures long-term performance. The AIR-7 design includes unique audition switch logic, the key to easy, error-free operation.

Only Harrison could produce this operationally-superior console. At Harrison Systems, we concentrate on doing one thing—building better consoles. And the AIR-7 is just that—a better broadcast console. We think you'll find AIR-7 is what you're looking for. Call or write us for more information.



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Circle Reader Service 10 on Page 33

Buyers Guide

Studer Offers Multiple Options

by Bruce Borgerson, Dir of PR
Studer Revox America

Nashville TN ... Modular design, a wide range of options, and field programmable switching functions make the Studer 970 adaptable to a wide range of on-air/continuity and production uses. With such flexibility, you might call the 970 a console with "multiple personalities."

To enhance operating flexibility, the 970 offers three large, backlit control buttons on each input module. Linked to an

internal logic-controlled switching network, these buttons may be assigned to several functions, including channel on/off, pre-fader listen (PFL), after-pan listen (APL), audition and on-air. Each switching function may be linked with an appropriate machine control or status signal.

The 970 design, based on a popular on-air frame format, can be configured in several standard versions. Each base frame accommodates nine 40mm wide modules. Three or four base frames, including one for a script/producer area,

are normally combined to make up a complete console.

In terms of ruggedness and audio quality, the 970 falls in the "no compromise" category. Construction standards match those for Studer recorders, and the low noise and distortion prepare the 970 for the all-digital music sources of the future. Solid-state switching is used in critical audio paths, and insert points are electronically balanced.

The 970 accepts any combination of mono or stereo input modules. Mono inputs feature a proprietary microphone

input circuit, 3-band equalizer section, 2 auxiliary outputs (pre- or post-fader), overload LED, external channel mute, fader start with logic control and master selection with pan pot. Stereo high level inputs are available with or without equalizers.

The 970 master module has three functional sections: the master section, separate high level input/master selection and compressor/limiter. The compressor/limiter may be used as a line protector or looped into any input channel.

Other module options for the 970 include studio/auxiliary/talkback and control room monitor with up to nine sources. Customers may select either VU or PPM metering with either conventional or bar-graph display.

Studer 970 series consoles should be available for US delivery in late 1986. Price for a standard 12-input, dual stereo output console will be approximately \$25K.

Editor's note: For more information, contact Bruce Borgerson at Studer Revox America: 615-254-5651.

Harris Medalist Lives Up to Its Name

(continued from page 24)

side of the console. Muting and warning light assignment is possible for three different locations.

There are separate headphone and monitoring selectors, each having a six position source selector and level control.

The output of the monitoring selector supplies a signal to an external power amplifier of your choice. The headphone amplifier, however, is built in and provides sufficient power to most headphones.

The output amplifiers are active balanced. All three outputs (program, audition or mono) use the same card and are interchangeable in a crisis situation. Illuminated VU metering is provided for all five output channels. The VU metering is driven by a separate bridging op-amp, thus providing isolation to the output audio.

A 12-hour clock and a count-down/up

timer that resets to zero is optionally available and mounts to the front of the console for easy operator viewing.

RFI filtering

If you are concerned about RFI, Harris addresses this quite well. All circuit designs include RFI filtering.

Some additional niceties include spring finger contact for the top-hinged cover and paint removal for the contacting surface. A stud for attachment of a station ground is provided.

At one installation (WVSR-FM), the console resides in the same location as the 25 kW FM transmitter and 1 kW AM. The tower is virtually just next to the building. We've had no problems.

In summary, we have found in tests that the consoles exceed the factory test specifications. The transparency of the console is excellent. The best part is that the console works when it is turned on.

We have yet to experience an initial type of failure. A console of this type is a pleasure to install and maintain.

Editor's note: Sam Garfield is group director of engineering for the Beasley Broadcast Group. He can be reached at 919-734-8000. For more information on the Medalist Series, contact Wally Kabrick at Harris: 217-222-8200.

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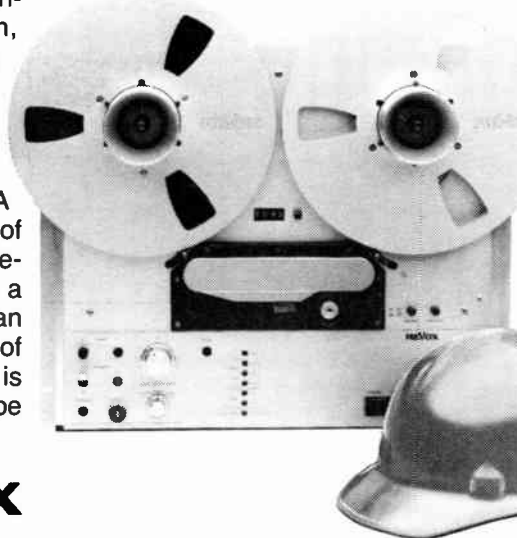
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Revox reliability is no accident. It is based on a solid die-cast chassis, heavy-duty reel motors, a servo capstan motor, and contactless switching. In the Studer Revox tradition, every part is assembled and checked with meticulous precision.

The PR99 Playback Only also offers front panel controls for repro level, EOM stop delay time, and treble EQ for low and high speeds. A front panel light indicates presence of EOM signal. Audio, status, and remote signals are carried through a single multipin connector, so you can replace playback units in a matter of minutes. The PR99 Playback Only is available in 3.75/7.5 or 7.5/15 ips tape speed combinations.

One more thing: this rugged machine also goes to work for less money. It has a suggested list price lower than the primary competition.

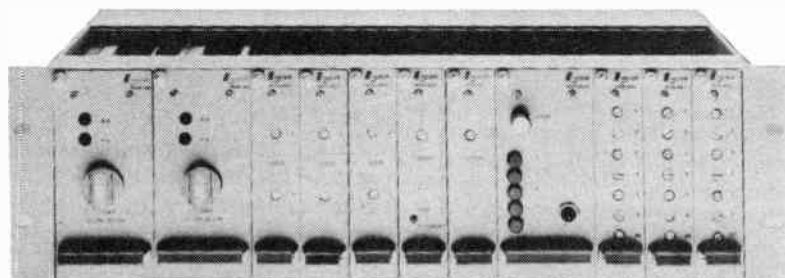
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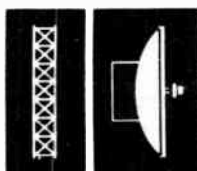
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BE Modifies Its 350

by Tim Bealor, Audio Prod Mgr
Broadcast Electronics, Inc.

Quincy IL . . . For several years the 350 Series consoles have been very popular for a wide variety of on-air and production applications. They are known throughout the industry as one of the most dependable vertical fader consoles available at an economical price.

Naturally, there is a strong aversion to changing a product that is already successful, but at Broadcast Electronics we recognize that technology and the marketplace never stand still. We conducted a careful design evaluation and decided that the time was right to modify the 350s to reflect the changing needs of our customers. The result is the new 350A.

At first glance, the cosmetic changes are probably the most obvious. A two-tone technical white and gray finish has been added to make the consoles more attractive. This new finish is protected by a laminated polycarbonate overlay.

But there are other changes that go far beyond a new coat of paint.

All 10 vertical attenuators in the 350As now utilize Penny & Giles precision faders. The Penny & Giles faders offer smoother operation and a greater degree of reliability. Each fader features a detent "drop cue" at the bottom travel of the control.

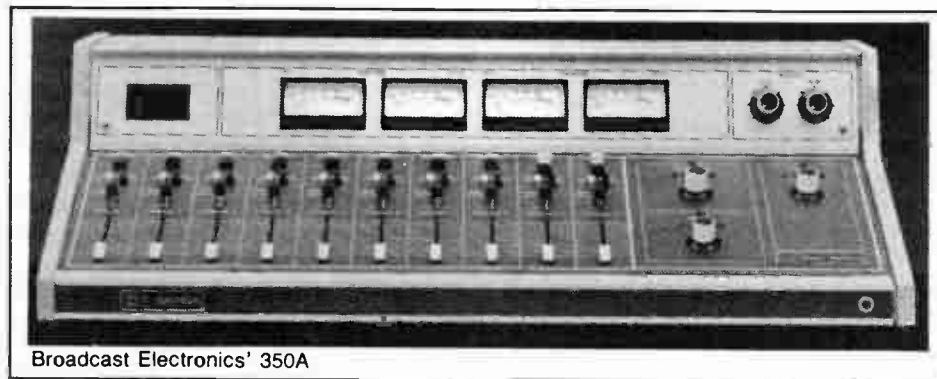
Cue mode switching can also be operated through a switch located just above each fader. This permits easy input monitoring without disturbing the preset fader level. If desired, the operator can add the channel to the output mix by simply moving the switch to the PGM-AUD position.

The new 350As also feature separate audition and program metering. Now the operator can observe audition and program levels simultaneously without having to manually switch the metering assignments. The stereo 10S350A console offers a total of four meters (Audition Left and Right, Program Left and Right) while the monaural 10M350A console has two meters (mono Audition and mono Program).

The metering cluster has been placed in the center of both consoles to facilitate easier viewing by the operator.

Of course, the 350As still retain many of the design features that have made them so popular. For example, the pre-amplifier modules still offer integral input presets. This allows the user to designate each input channel for either low impedance microphone or line level service.

Mixers 1-8 accept two inputs per mixer. Mixers 9 and 10 accept three inputs each. Input preselection is accomplished through interlocking pushbutton



Broadcast Electronics' 350A

switches. The mixer outputs may be fed separately or simultaneously to the dual output channels through the 350A's advanced FET switching.

The new 350A consoles also retain full system monitoring capability with 8 W of full fidelity audio (headphone output level equals 1 W maximum). Speaker muting is normally assigned to Mixers 1 and 2.

However, the user can now modify or extend the muting capability to other channels through diode matrixing. Contacts for an external warning light control are included on each muting relay.

Our customers will be pleased to know that the 350As still feature ex-

cellent performance specifications. Frequency response is rated at +0, -1 dB from 30 Hz to 20 kHz. THD and IMD are maintained at less than 0.05% at +18 dBm output. The unweighted S/N is rated at 70 dB or greater below +18 dBm output.

In the new 350A Series consoles, we've tried to strike a balance between the need to incorporate updated features and the desire to maintain established performance and economy. We feel that we have succeeded.

Editor's note: Tim Bealor is audio product manager at Broadcast Electronics. He can be reached at 217-224-9600.

ATI Aims for 'the Improbable'

by Ed Mullin
ATI Technologies, Inc.

Horsham PA . . . The statement "The difficulty of design of a good broadcast console is inversely proportional to its projected selling price" would, I suspect, receive little argument from most experienced audio design engineers.

Since lower-cost consoles in particular tend to be used more often in startup

operations, they are called on to provide do-absolutely-everything flexibility, all-your-eggs-in-one-basket reliability, work-with-anything-and RF immunity and hardly-ever-see-an-engineer maintainability.

The manufacturer whose console somehow falls short of these ideals finds that years hence he has an army of aggravated and vocal users anxious to tell him and the world where he went wrong,

with no quarter given or allowance made for his console's modest initial cost.

That no manufacturer in their right mind would want to attempt such a design is attested to by the scarcity these days of full function, on-air boards in the targeted \$3K price range of the ATI Vanguard Series consoles. That ATI has attempted the improbable can be attributed to the seductive lure of a recognized "hole in the market," the irresistible challenge of a rigorous design effort and latent masochistic tendencies.

ATI's Vanguard Series Consoles are 12-input, 8-mixer, dual stereo output, on-air boards developed by meticulously examining each and every aspect of the design process to find better, more reliable and more cost-effective ways to perform all the traditional console functions.

Sealed membrane switches

One of the key elements in the economy of the Vanguard Series consoles is a digitally scanned matrix of 46 hermetically sealed membrane switches integrated into the panel. They replace all the conventional, expensive, trouble-prone pushbutton and lever key switches normally used for input selection and mixer output bus and cue assignment.

Switching is positive, with quiet tactile feedback provided by inverting stainless steel domes above each switch. The rated membrane switch life of 5 million operations is 10 to 100 times better than conventional mechanical switches and corresponds to a lifetime of 25 years operated every 3 minutes, round the clock.

All panel markings are reverse screened onto the inner protected side of a
(continued on next page)

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Buyers Guide

ATI Vanguard Meets CE Needs

(continued from previous page) tough, seamless polycarbonate overlay that seals and protects all the switches and covers the entire visible surface.

Clear windows show LED readouts which display the status of each mixer and input.

All faders and level controls supply only variable DC levels for dbx™ voltage-controlled amplifiers in the audio circuits.

Since the faders do not carry audio, they cannot generate noise and can be relatively inexpensive rotary or linear types which will work perfectly until the day their elements turn completely to dust.

The removal of most large switching components from the panel allows use of a very simple and compact console mechanical package, unmatched for accessibility and economy.

Modular for easy maintenance

The restriction of all audio signals to a compact circuit board package eliminates many potential sources of crosstalk, hum pickup and RF susceptibility.

Modular electronics for easy maintenance was a prime design requirement. The four-layer, horizontal, mother-daughter board circuit package has alternate layers of ground plane shielding sandwiching the audio circuitry and audio busses to form a fully modular, easily tested and repaired, shielded system with none of the labor intensive and failure prone hand audio wiring of traditional consoles.

Gold-on-gold mother-daughter board connectors allow easy maintenance while assuring excellent, longterm reliability. Another major cost saving was achieved by bringing studio wiring directly to the edges of the motherboard using solderless, insulation displacement, punch-down-type connectors.

Interchangeable plug-in input modules feature balanced instrumentation amplifiers for each input feeding current mode, logic controlled FET switches which are also used for output bus selection. Dual muting is provided and each input is separately jumper-plug programmable for nominal input levels of -20, -10 or +4 dBu for fast and easy installation level matching. Dual stereo program amplifier boards also provide dual summed mono outputs.

A three-input monitor driver board has muted low level outputs for two external power amplifiers. A three-input headphone amplifier drives dual phone jacks. The 6 W cue amplifier drives the cue speaker, which is cleverly hidden behind the solid panel overlay.

A pair of VU meters switched between PGM1 and PGM2 outputs may be replaced with optional four-channel, two-color vacuum fluorescent displays.

Two mono, transformerless microphone preamps are supplied, wired through pan-pots to the high level stereo inputs of mixers 1 and 2. The preamps

are unique, high-performance, extremely low-noise instrumentation amplifiers with completely protected inputs and DC servo control of operating point for optimum headroom.

A separate power supply module removes lethal AC voltages from the console, allows a much more compact audio

package, prevents hum pickup and greatly reduces the possibility of problems from power-line conducted RF, transients, ground loops and thrashing engineers with their wire strippers welded to the AC line terminals.

The ATI Vanguard Series Eight Mixer. Dual Stereo Consoles are an excellent

choice for small- to medium-sized studios requiring excellent audio performance in high RF environments.

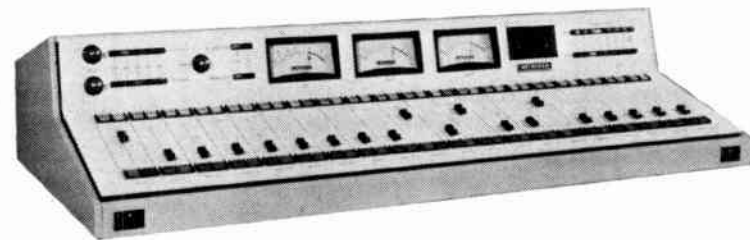
The designer's direct phone number is included with every console so that you can call him any time you want to tell him how much you like your ATI board.

Editor's note: For more information, contact Ed Mullin or Sam Wenzel at ATI/Audio Technologies, Inc.: 215-443-0330.

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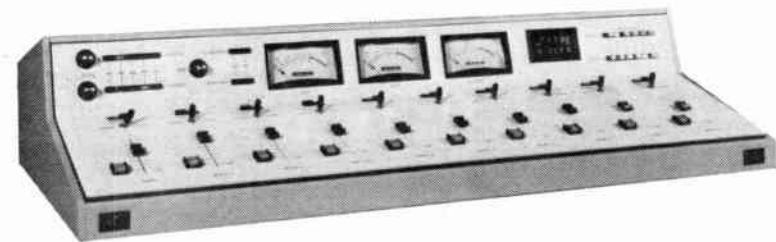


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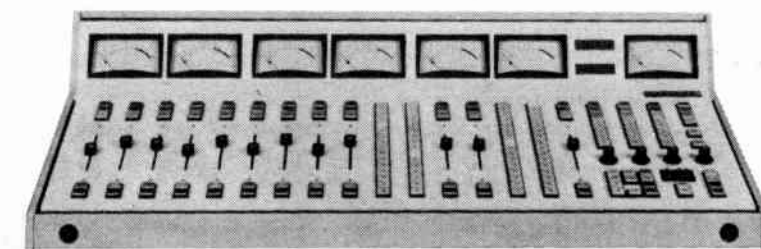
- AC-8 has 26 stereo inputs; one high level cassette
- IC-10 has 28 stereo inputs; one high level cassette
- Optional "AutoClock"® for all models



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AUTOGRAM

Buyers Guide

Air 7/Pro 7 Gives Sound Results

(continued from page 28)

one to audition the source through the quality studio monitor speakers without danger of it being sent to the program bus accidentally.

All input modules have a stereo, mono, left, right mode switch (mono modules have a pan pot).

Output assignment is accomplished in several ways. Four buttons at the top of the module assign the input to any or all of the two stereo and two mono busses.

A knob labeled "Aux Level" sends a variable feed to a separate output bus, and a button labeled "Clean Feed" sends the input feed to yet another separate output bus at a preset level. Both of these feeds can be either pre- or post-fader. These auxiliary sends are very useful for things like phone feeds.

Also included on the input modules is a "B Input" switch, giving the modules dual input capability.

If the console is used in a production studio and more features are desired, a more complex pro version model is available. It includes extensive equalization, variable input padding, phase reversal, high and low pass filtering, additional aux sends and the ability to operate with a video switcher/editor interface, an option.

All input modules have selectable phantom power for condenser microphones and external patching ability for individual input processing. The less-complex air version input modules have full logic interface ability with any machines that use common ground control logic. Any source deck can be interfaced; however it may require a buffer relay or other circuitry. An optional card is now available that gives separate logic control outputs for the "B Input" mode. This is very handy for situations where there are two remote "startable" sources on the same module.

The master modules for the Air 7 configuration each contain one stereo and one mono bus. The top of the module is blank to avoid unauthorized tampering.

A complex master module, available for production use, has a stereo master

fader and separate knobs to control the level of auxiliary and mono busses. A test oscillator signal can also be inserted onto the various busses.

Monitor modules

There are two monitor modules available: one used for the control room and the other for monitoring to two studios. Both modules monitor inputs from all stereo and mono busses, along with up to four external inputs.

The control room monitor module has a headphone driver with a separate input selector, two-knob equalizer and volume control. The studio monitor module has its own input selector and separate volume controls for each studio, and includes a microphone for sending line cue messages to the pro version input modules and complex master modules, when selected.

Stereo group control modules

Stereo group control modules are available as options. Up to four of these modules can be used, giving eight intermediate control busses in four stereo groups. The busses on these modules can be fader controlled, and can be assigned to either the master busses, the monitor busses or as direct outputs.

As with all output busses in either configuration, these stereo group busses can be fully metered. These group sends are

very useful as metered feeds to two-track recorders, cart recorders, or a standby on-air feed.

Two of these groups can be used as a four-track send; all four groups can be used as an eight-track send, and you still have two stereo master busses, two mono busses and two aux busses left to do whatever you want with.

Auxiliary rack section

An auxiliary rack section of the console takes up four slots. It contains a cue speaker, tone oscillator, cue selector and level control, tally logic control, and a clock and time control modules. Also included are blank panels for tape remote and custom switch panels.

The published specs on the Air 7/Pro 7 series are very good and are not much different from the published specs of any other high-quality professional mixing console, but if you base your decision on specs alone you may be missing the boat. Contact Harrison Systems or a dealer you know that sells Harrison consoles and arrange for a demonstration. I guarantee it will be well worth your time and trouble.

Last, but certainly not least, listen to the console with as good a quality of source material and monitoring as can be arranged. I know of no written specification of complex audio waveform measurement that can adequately substitute

for a critical listening test. The real difference in audio performance becomes apparent by listening, not by reading specs, and the Harrison console's excellent performance is no exception.

To date, I have specified and ordered four Air 7 consoles and one Pro 7 console, three of which have been installed in the St. Louis area. The consoles have been operating very well with a minimum of problems. I was a bit concerned with the 90-day warranty period stated by Harrison; however I have found them to be very helpful, reasonable and responsive to the problems that have arisen.

As with many newer products, the documentation was initially weak in some areas, but during that time Harrison was very helpful over the phone. There have been many updates sent out since then and the documentation on the consoles presently is very good.

I suggest that if you are in the market for an audio console, contact Harrison systems or a Harrison dealer and tell them to send you a product information sheet and reference manual for an Air 7 or Pro 7 console and arrange for a demonstration.

Spend some time reading the literature to familiarize yourself with the operation and flow of the console. Then go for the demonstration. You'll find that the console sells itself.

Editor's note: For more information, call Sam Caputa at KEZK/WRTH: 314-727-2160, or Martin Burnes at Harrison Systems: 1-800-821-1560.

Consoles From ADM Customized

(continued from page 25)

built—the operator never has to touch a cart machine once it is loaded. The console and the cart machine keep track of what the other is doing.

The integration of the station two-way base via the cue speaker and intercom system eliminates the need for any two-way equipment in the control room.

FM studios: Astounding results

The FM studios were next. Their consoles are nearly identical to the AM. One important change we made involved our desire to rid the entire FM air chain of

audio transformers. Since we are using ADM DAs, we simply ordered a pair of their differential output modules for the program channels.

In the console, it was possible to remove the transformers at the output with no adverse effects. The result was astounding!

Although the measured specs—such as response, THD, IMD, and S/N ratio—did not appreciably change, the perceived sonic quality became radically different, even in the control room monitors (which still had their transformers).

A few resistors were all it took to configure the inputs for direct operation. Using a cart recorder and a phono preamp with direct ins and outs, and with Straight Wire Audio cards in our ITC 3Ds, a cart subjectively sounds better than the same record playing in the control room!

FM production

The last of these consoles installed was the one for FM production. It was a clone of its AM counterpart. The only real difference was the addition of a two track/four track monitor configuration to ease a bit of four-track sync confusion with our production people.

It worked so well in FM we had ADM build us the same system for our AM console. Because of compatibility, ADM was able to fabricate the identical system and, with their step-by-step instructions,

we installed all the electronics and matching control panels in four hours.

It is important to mention that, in our consoles, the auxiliary bus is used as a mix-minus in the air consoles, and an echo or processor send in the production versions. Obviously, a mix-minus could be generated with the production versions; instead, we had ADM provide a mono output module for caller send.

One feature we especially like is the in-board mic processors. We use the equalizer and compressor, available as options. The compressor is an exceptionally smooth sounding, nearly transparent unit that equals or exceeds anything that we have heard or tried.

Both of our stations' production sessions go well into the night and of course our air operations are 24 hours. We have had no electronic failures to date, and only rare, if typical, mechanical failures such as a switch or monitor control. All problems have been quickly resolved, cost free, by phone, even with our three-year-old AM consoles, because of ADM's five year warranty.

All in all, we have found our four ADM ST-160s to be an adaptable workhorse with very few shortcomings and a near perfect reliability record.

Editor's note: For more information, contact Murray Shields at ADM: 313-524-2100. The authors may be reached at 901-726-0555.

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UREI Withstands Student Abuse

(continued from page 27)

consoles. Having both rotary and linear fader style consoles in the facility allows our students to become proficient in the use of either.

I was also impressed that I could get a quality console with Penny & Giles slide pots at an affordable price. In addition, I was happy to be able to get Shallco rotary attenuators. Both of these units have good reputations for ruggedness and reliability.

Although UREI does offer this console with conductive plastic rotary pots, I've never seen one of those pots that could stand the strain of being slammed into cue constantly by unfamiliar board operators—remember, when our students first get here, they may never have even seen a broadcast studio before.

Easy installation

The consoles are easy to install and work on. The use of modular amplifiers and standard components will allow me to minimize my parts inventory.

At the time of this writing, we have finished 6 of the 15 studios. The installations have gone smoothly.

The console manual recommends wiring just the monitor speakers and one or two inputs first, and making a quick check for RFI, noise or other problems to avoid the possibility of having to un-wire completely to isolate a problem which may be in the wiring method. Though a good idea, with 26 studios to wire, we did not feel that we had time to spare, so we just wired the first studio according to plan. Everything worked fine with no hums, buzzes or RFI!

Grounding design

I feel that part of the reason for the lack of problems had to do with the grounding system of the console. Unlike

many consoles, the power transformer for the UREI boards is contained in a separate box which is connected to the console by a multi-conductor cable. This keeps hum field out of the console. The third wire safety ground of the AC cord connects to this box, but does not connect to the console.

The console ground is a 1/4-20 bolt just inside the console and next to one of the large holes provided for cable entrance. The engineers at UREI realized that the installer would connect console ground to the best ground that he could find, but that this would not always be conduit ground. In our installations, all cable shields connect at the console end only, which is ground central.

Finetuning installation

After the success with the first studio, we continued on. I should point out that much of the installation work was done by students who had never before wired a console. UREI's use of barrier strips for most connections to the outside world certainly simplified the job.

Wiring of remote start/stop does require soldering to pads on a long, narrow printed circuit board beneath the channel on/off pushbuttons.

UREI uses DPDT momentary push-buttons, with one of the poles left free for customer wiring. Because the actual channel switching is done by FETs on the input amplifier cards, there is no problem with hum fields from the remote control wiring getting into the audio.

We also remoted the channel on/off for the three additional studio microphones by paralleling the contacts of the console on/off switches.

Remote indication of channel on/off was done by paralleling the console lamps and using an LED with a dropping resistor. One of my few criticisms of the

console is that not enough free pads were provided to do all of this wiring, so I found myself wrapping wires around other wires for strength. All of the logic wiring was done with 4-conductor telephone cable, which made for a very neat installation.

Each studio, in addition to the console and the normal complement of turntables, cart machines, etc., has three additional announcer positions. Each position has a microphone and a panel with a headphone jack, headphone volume control and channel on/off pushbuttons with LED status indicators. The headphones are powered by a Tascam headphone D/A. The input to the D/A is taken from the output of the console headphone select switch.

Students, instructors pleased

Reaction to the new consoles has been universally positive. Both students and instructors have been pleased with the clean, easy-to-understand layout of the controls, as well as the quality of the sound.

The sound is marvelous! We have been especially pleased with the large amount of headroom, which is especial-

ly nice for neophyte operators. I have not been able to get time yet to make specific performance measurements on the consoles, but based on my listening tests, I expect no problems.

Problems found during installation included: one sticky meter, one console that had distortion (corrected by removing modules, cleaning connectors and re-installing) and a couple of consoles that had a wiring error associated with the mono summing amp which is normally installed by the customer. UREI found the problem before I did, and called to tell me how to quickly fix it.

Buying 15 consoles from one manufacturer is a pretty stiff commitment, but given the quality of the boards, the reduced parts inventory cost and the reputation of both UREI and JBL, who market the product, I feel we have made a choice that we will be happy with for years to come.

Editor's note: For more information, contact John Eargle or Ron Means at JBL/UREI: 818-893-8411. Bruce Browning is technical director, Broadcast Division, Brown Institute Campus/National Education Center. He can be reached at 612-721-2481.

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I. Type of Firm

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3. Educational FM station	8. Consultant/ind engineer
4. Combination AM/FM station	9. Mfg. distributor or dealer
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II. Job Function

A. Ownership	D. Programming/production
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008	028	048	068	088
009	029	049	069	089
010	030	050	070	090
011	031	051	071	091
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013	033	053	073	093
014	034	054	074	094
015	035	055	075	095
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Buyers Guide

Perfectionist Gets High Marks

by Randy Schell, Pres/Owner
Schelectronics Tech. Serv.

Houston TX . . . To be honest my introduction to the Logitek Perfectionist was accidental. I had originally intended to purchase a different console for the construction of 92ROK in DeRidder, Louisi-

ana, but the manufacturer was unable to meet our delivery deadline. We searched for another console that would meet our feature and price requirements, and found the Perfectionist.

The Logitek performed as well as the other console we wanted and turned out to have a great many more features. The

Perfectionist has four inputs per mixing channel instead of three, and an additional external monitor input, elapsed time and real time clocks, mono monitor pushbutton, and a light for connection to a modulation monitor for remote peak flashing indication. There's even a pushbutton to swap the audition and program

bus assignment.

With the exception of input selection, the switching is all done with Hall effect pushbuttons so you can select the program channel, audition channel, or both. And you can do it quietly. Of course, there are remote starts that follow the input select switches. Although the standard configuration is with Penny & Giles slide faders, the Perfectionist is also available with P&G rotaries.

User Report

Some of the most attractive features are ones operators never see. The console is very low profile, so it's easy to design a studio around. Logitek has accomplished this in part by sinking the console into the desk, but the major reason for its low profile lies in the way audio and control connections are made to it.

There are not terminal blocks inside the console. All inputs and outputs have been prewired to external telephone-type
(continued on next page)

Comtech's 3.8 Meter has the Extra Performance Margin Needed for Crystal-Clear Audio Reception.

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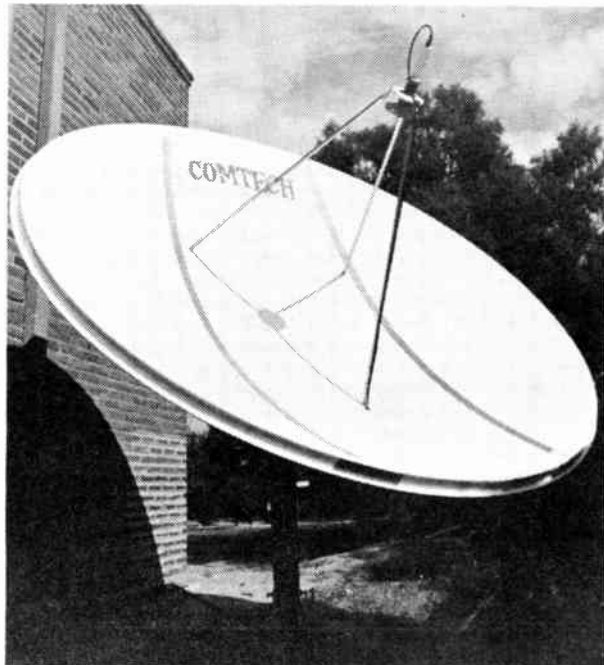
Allied Broadcast Equipment distributes Comtech Antenna systems to the radio industry nationwide. Call today for more information.

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Buyers Briefs

Arrakis Systems, Inc.

The Arrakis 2100SC, a compact (17" deep, 30" wide and 7" tall) console, offers 12 channels, 34 balanced inputs, balanced program and audition outputs with mono mix down standard, Penny & Giles slide faders and VCA level controls with stereo tracking within 1 dB.

The 12 channels feature 2 inputs per channel on channels 1 through 10, and 7 inputs each on channels 11 and 12. Two remote select switches bring in an additional 14 inputs. Cue is accomplished by a detent on the slide fader while lighted momentary switches actuate the program and audition busses. The program and audition busses are monitored by VU meters.

The only audio switches in the audio path are reed relays, which produce virtually no audio degradation.

Constructed of heavy, hard aluminum panels, with sides and armrest made of solid oak, the 2100SC is made to last. Front panel switches are Shadow by ITT, and slide faders are Penny & Giles 3000 Series. Hand wiring is reduced due to motherboard construction.

The top panel hinges back to provide

easy access to all internal electronics and wiring.

The channel control PC boards on the front panel interface the pots and switches to the DC controlled audio PC boards. Input and output audio terminal strips are located across the front of the console.

The monitor, earphone and cue power amplifiers are of a discrete design with 40 W transistors, fused, and current limited.

The power supply uses two open frame regulated modules with a 10 year mean time before failure, and a ± 15 volt, 3 amp supply operates the audio chain while a second supply operates the power amps to eliminate crosstalk.

The 2100SC is backed by a two-year limited warranty on parts and factory labor.

For more information, contact Michael Palmer at Arrakis Systems, Inc.: 303-224-2248.

Howe Audio Productions, Inc.

If you are in the process of trying to find a modular audio console and expense is an especially important con-

sideration, the Howe Series 9000 is worth a look.

The Howe Series 9000 is the only modular audio console without a main frame, a fact which translates into substantial savings to broadcasters. The unit does give a broadcaster the option, however, to add on channels and features at a later time.

The consoles are available in sizes from 8 to 22 channels, with 3 inputs and 3 outputs per channel, including mix-minus. Each channel can be either mic or line level, and each features TTL digital logic for machine controls, assignable to each input selection, VCA level control, a built-in cue speaker and headphone amp, and a clock and/or timer (both are standard in larger units).

Membrane switches and linear faders resist dust and spillage.

Options include a second clock or timer, a second cue speaker, a 10 by 1 routing switcher, and a 1 into 5 distribution amp.

All Series 9000 consoles feature a quality Lexan finish on all metal parts, providing longer wear and resistance to user abuse. Each is cabinetted in solid oak with

an oil- and urethane-sealed finish.

All Howe audio consoles carry a three year, all-inclusive warranty.

For more information, call Jeff Michaels at Howe Audio Productions, Inc.: 303-444-4693.

Broadcast Audio Corporation

An inexpensive way to increase the effective size of an audio console is to add an extender rather than buy a larger console. Properly designed, the extender will add several mixing positions to the existing audio console, without compromising performance specifications.

Broadcast Audio Corporation's System 6X extender uses the same mixer modules as other Broadcast Audio consoles and can operate in one of three modes:

- The extender mixing bus may be connected to an input of the main console, changing that mixing position to a submaster. The change enables an operator to turn on several microphones simultaneously by leaving the extender mixers in the "on" mode.

- The extender can be used as a separate audio console if it directly feeds a metered audio processing amplifier.

The System 6X extender is in a separate enclosure and can be positioned for best access and minimal use of available space. And, because there are no meters on the extenders, front panel space is available for clocks and other options.

Of course, almost any small console can be used to feed an input of the main console to expand its capacity, and may be a cost-effective method of utilizing otherwise obsolete equipment.

For more information, contact David W. Evans at Broadcast Audio Corporation: 916-635-1048.

Perfectionist Exceeds Expectations

(continued from previous page) punch blocks that can be mounted up to 6' away.

No more standing up bent over a console for hours making audio and control connections. No more crimping connectors till you have cramps in your arm. You don't even have to strip the wires. Why couldn't I have had one of these the last time I did an all night console change out?

Punch blocks are only one of the features Logitek added to make the Perfectionist easy to install. The board has four independent microphone preamps with balanced outputs that appear on the punch blocks.

Yessir, Mr. Program Director, we can put in mic compression, equalization, aural excitation, and any other gadgetization you can think of. Just let me get my punch tool and I'll have it in before your next break.

We can even move your mic from input one to some other input if you like. In fact, we can connect microphone inputs all over the board. Need a talkback? No problem. We've got a mic preamp to feed to it.

Output connections to the Perfectionist are versatile, too, with built-in audio distribution amps for both program and audition outputs. This proved particularly useful in the installation I did. Since 92ROK is a "Rockin' Hits" affiliate of Satellite Music Network, all station operations take place in one room.

The Logitek console is used on the air whenever a broadcast is done live, but its primary duty is as a production console. So, for us, the distribution amps came in very handy.

The program channel feeds cartridge recording equipment, reel recording equipment, and the "on air" switching system that selects between the satellite

feed and the console. The audition channel feeds several different pieces of audio processing and effects equipment which can be brought back up on the program channel by themselves or mixed with the original signal.

It also feeds a telephone voice coupler for playing spots back to clients. Obviously, all of that would have required an external distribution amp if the Perfectionist hadn't come with its own.

My assessment of this console would

be incomplete without a pat on the back for the people at Logitek. They managed to meet a very tight schedule without sacrificing the quality of their product. They even included the punch tool. I'm sure any one of us could ask for more, but at the moment I can't think of what it would be.

Editor's note: For more information call the author at 713-558-5121 or Scott Hochberg of Logitek at 713-782-4592.

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**Expandable
... at any time**

the Sound Solution

7000

Our premier consoles are designed for simplicity and reliability. The 7012 and 7012A consoles continue to be today's choice, allowing broadcasters excellent sound quality with efficient VCA control, all at a cost well below what others charge for less. 12 channels, 22 inputs, full stereo, with our choice of metering functions. An early an excellent console for today's broadcast needs.

7512A

This console continues the Howe tradition of simple-to-operate, reliable products, but adds features to make the operator's job even easier. These include: remote control for machines, a clock and timer, 2 talkback circuits, and much more. Comprehensive operator control and superior sound quality make the 7512A an exceptional choice.

9000

The latest in the legacy of quality consoles from Howe, the 9000 is available from 8 to 22 channels tailored to your needs. There is no costly mainframe, but full modular capability is built in. 3 inputs per channel, mix-minus on all channels, sealed membrane switches for channel and machine control, and unmatched audio performance. These features and more combine to give the broadcaster outstanding flexibility.

howe audio productions, inc.

2300 Central Avenue • Suite E • Boulder, CO 80301 (303) 444-4693 • For more information (800) 525-7520

Dazzle 'm with technical brilliance.

Everybody's talking about CD's and digital. It's as if all analog tape technology and the cart machine were obsolete. Although CD's are a terrific new program source, it should come as no surprise that carts are still the best way to handle the huge quantity of individual program elements that comprise a typical day in radio broadcasting.

What else can play spots, promos, sound effects, news actualities, ID's and music so easily?

Carts have been around for thirty years because they're a great package—easy to handle and store, easy to record and re-record, easy to label and identify. Best of all, they're cued-up from the moment you put them in the machine. Try that with a CD, turntable or reel tape!

The engineer's challenge is not CD versus the cart, vinyl LP or reel tape—but improving all broadcast

source and delivery systems. Digital audio technology is here with exciting potential for the future. For today's programming needs though, you can't beat the features and performance of our Tomcat and Micromax cart machines.

Tomcat and Micromax are equipped with our Maxtrax wide-track tape heads which give you nearly twice the stereo track width. This track format, coupled with our superior recording and reproduction circuitry, maintains the fidelity of

master quality sound sources better than any other cart machine.

A lot of #1 stations depend on Tomcats. For stations on a tighter budget, our Micromax is the best choice. Both are built rugged to last—designed with the best components money can buy. Both will make your station sound great with everything you cart-up, especially CD's.

Give us a call now for all the technical details on the "Digital Age" cart machines.

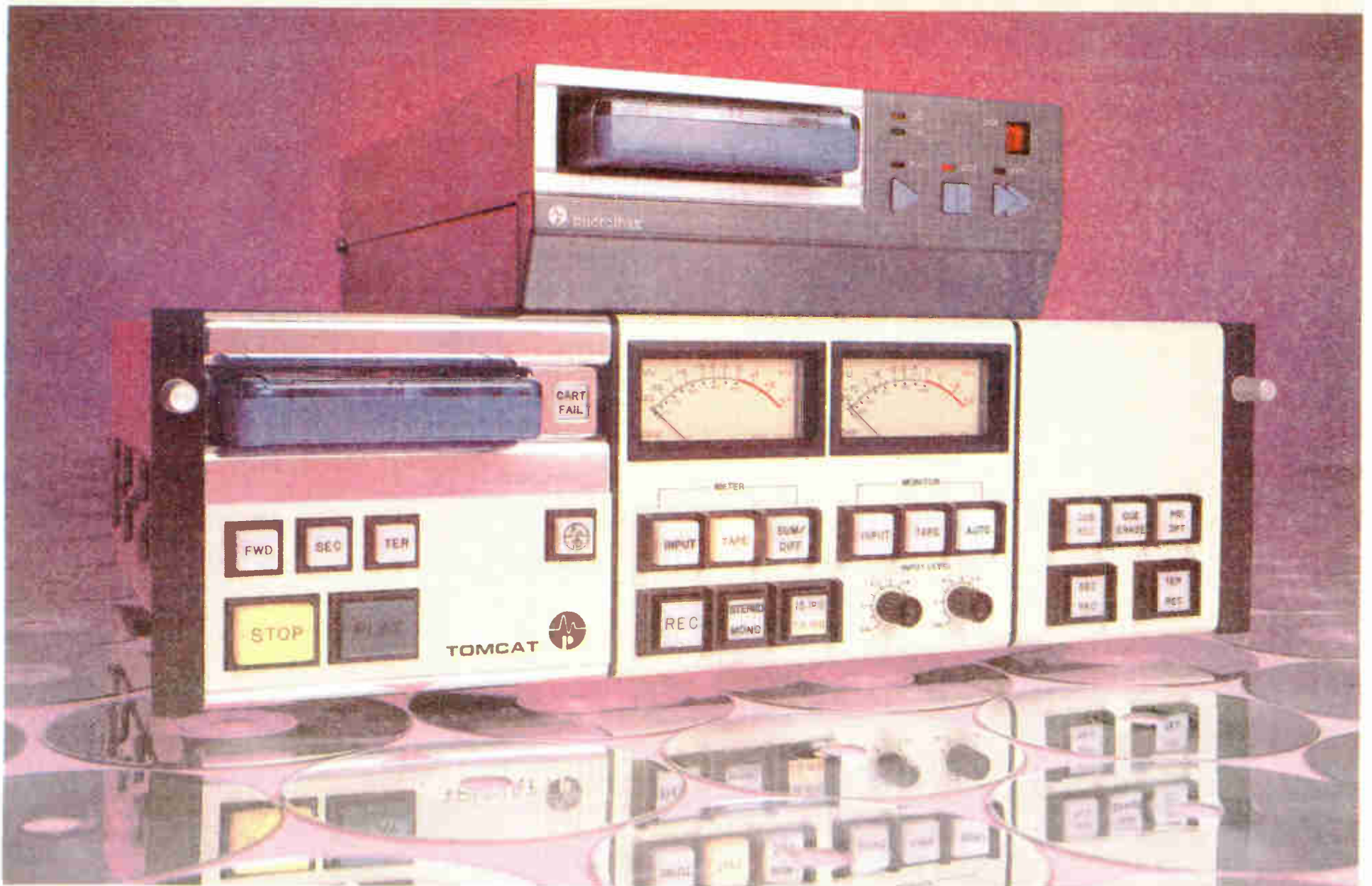
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