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Class A Power Hike Proposed

by Alan Carter

Washington DC ... New Jersey Class A FM Broadcasters have succeeded in persuading the FCC to issue a proposed rule making for a power hike from 3000 W to 6000 W.

The Commission included the power hike in a Notice of Proposed Rule Making issued at its July meeting with a proposal establishing a new intermediate FM station class.

In proposing the Class A power hike, the Commission is seeking comment on how to best implement it.

The New Jersey Class A Broadcast Association filed a petition for an across-

the-board power hike. The group argued the FCC has changed many longstanding FM allotment and assignment policies in recent years, in recognition of the maturity to the service and to increase opportunities for additional stations.

However, New Jersey broadcasters stated that as a result of the policies, Class A stations now are competing with much larger class stations in the same communities.

Different views

The New Jersey petition claimed the increase would have very little effect on

existing stations.

The NAB, however, took an opposite view, calling for power hikes on an individual basis—for those that can meet increased separation distance requirements. NAB argued the increased separation distance requirements were necessary to reduce the effect of the power increase on existing stations.

Robert McAllan, president of Press Broadcasting and a Class A owner in the New Jersey group, praised the Commission action.

"We think we have made significant progress in bringing this to fruition,"

McAllan said. "Certainly getting to the NPRM stage doesn't by any means guarantee that the outcome is going to be favorable. There is going to be a lot of work that has to be done to make sure the Commission understands and is aware of the problems facing FM broadcasters and hopefully will be sympathetic to the cause."

NAB staff engineer Stan Salek said the association is pleased commissioners noted its concern over interference. "I think that's encouraging."

Class C3

The proposal to create a new Class C3 FM calls for a maximum effective radiated power limit of 25 kW and an antenna height of 100 meters (328').

Class C3 stations would be allowed in Zone II, which represents most of the land area in the US, excluding a portion or all of several north-central to eastern states, Puerto Rico and most of California.

For FM classification, the US is divided into three zones: I, I-A and II. Zones I and I-A are areas of greater population density.

There also are six classes of commercial FM stations: Class A, 100 to 2000 W; Class B1, 3100 to 25,000 W; Class B, 25,500 to 50,000 W; Class C2, 3100 to 50,000 W; Class C1, 51,000 to 100,000 W, and Class C, 100,000 W.

(continued on page 15)

Surviving Radio's "Jungle"

by Charles Taylor

Atlanta GA ... WCCO's Bill Polish now had everything he needed.

"I went to Radio Shack this morning and spent \$2.29 for an alligator clip. It's a mini plug patch cord," said the news director of the Minneapolis AM.

Add to that the station's two Sony and one Marantz tape recorders, two mini plug-to-alligator clip patch cords, two telephones, phone wiring and two reporters and presto—a complete broadcast package.

For stations like WCCO, it's not high-tech presentation that makes the mark in convention coverage. The important factor is presence.

The outlet was one of dozens of radio broadcasters that covered the Democratic National Convention solo, representing an increasing trend away from network-only coverage on local stations, in large part because of advances in satellite and fiber optic transmission.

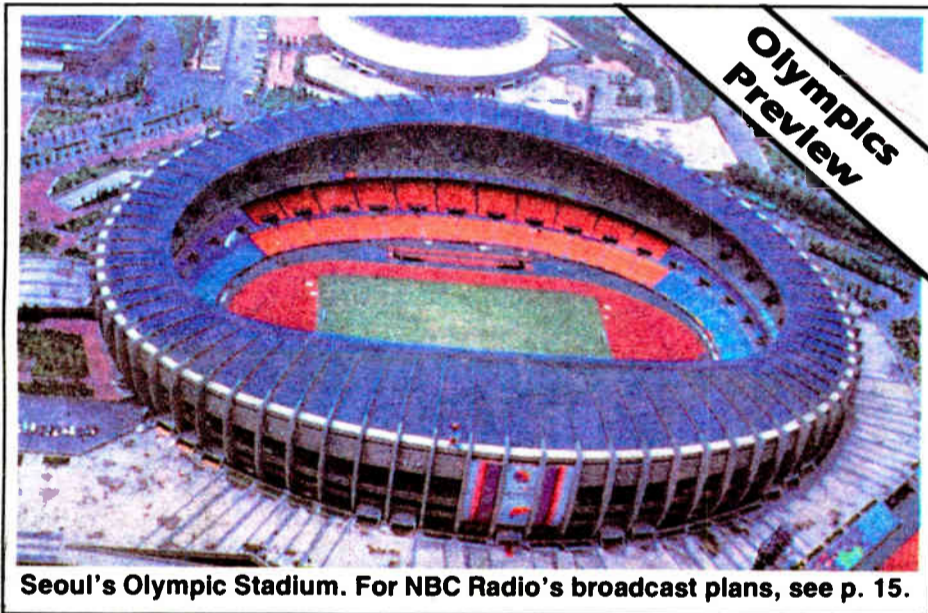
It's a local story

"The networks always covered it because they were the only, not because they were the best," said one broadcaster. "Our delegates are here; this is a story that affects our hometown. We should have always been here. The only thing holding us back was the technology."

Most stations, however, can't afford the trip autonomously, and must count on the support of network affiliations, radio groups or pre-arranged consortiums.

WCCO rented its space from CBS, with whom it is affiliated. "They rented a couple of tables and chairs. I ordered the phone lines and CBS actually strung

(continued on page 14)



Seoul's Olympic Stadium. For NBC Radio's broadcast plans, see p. 15.

After months in the field, the 1 kW solid-state passed the test



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FCC Acts On NRSC

Washington DC ... The FCC took a first step toward making the NRSC audio standard mandatory with a proposed rule making but also included a complimentary RF emission standard, an addition to which some broadcasters are expected to object.

The Notice of Proposed Rule Making adopted 20 June seeks comments on both standards or a combination.

In addition, in a second part of the NPRM, which stems from the FCC's inquiry into AM improvements begun in 1986, Commissioners would give AM stations the option of proposing facilities whose coverage area would be subject to some interference from other stations.

Permission currently is granted only to the first station proposing to provide service to an unserved community. The proposal would allow all stations the flexibility of accepting increased interference in a portion of new service areas provided they do not cause objectionable interference to other stations.

The audio standard, dubbed NRSC-1
(continued on page 10)

FCC Orders Booster Off the Air

by Charles Taylor

Walnut Creek CA . . . The FCC has ordered suspension of an FM booster here following three years of complaints that it was interfering with two adjacent stations.

The interference was caused by a 13-mile extension of the station's signal out of its coverage area into the densely populated San Francisco area, according to the Commission.

The two adjacent stations, KALW-FM (91.7) in San Francisco and KSJO-FM

(92.3) in San Jose, CA, charged that KKIS-FM (92.1) in Walnut Creek ignored repeated requests to address accusations of interference. Together, the adjacent stations have spent more than \$30,000 in legal and engineering fees to convince the FCC that KKIS operated its booster improperly.

"This has been a long, protracted, overly complex delay in solving a simple matter of interference," said Dave Evans, CE of KALW, which first noticed the interference in the summer of 1985. "This should have been handled in a

forthright and clean manner years ago. All we were asking is that the FCC enforce its own rules."

KKIS has responded that it had no reason to turn off its booster because it was operating in "complete compliance with the Commission's rules pertaining to boosters" and that "the alleged interference from (KKIS) does not exist," according to a letter the station filed with the FCC.

The station also maintained that KALW's complaints were exaggerated and perhaps provoked by the pressures of increasing competition. "All of a sudden, KKIS was not a suburban radio station, but someone who could take the dollars out of their pockets as well," said KKIS PD Sean McMahon.

The Commission also amended the rules to permit boosters to be fed by "whatever technical means," including microwave or common carrier. In the past, boosters were required to receive the primary station's signal.

The dispute surrounding KKIS's booster pertains to an unaffected guideline that an FM broadcast booster only will be authorized to serve areas within the 1 mV/m field strength contour of the primary station. FM booster stations cannot be used to expand the primary station's 1 mV/m contour.

While KKIS's booster operated at a permissible 10 W, an FCC investigation showed the station surpassed its 1mV/m contour limit by 13 km, adding a potential 570,493 listeners. When KKIS applied for the booster in 1984, the station said it was proposing to serve an additional 35,000 listeners, all within its primary contour.

But the FCC ordered the booster shut down 28 June citing "prohibited interference" to KSJO-FM and expansion of the 1 mV/m contour "far in excess of what could reasonable be considered 'spillover.'"

Birth of a controversy

Though the order to cease the booster's operation brings a cautious sigh of relief to KALW and KSJO, it doesn't erase the stations' frustration from what they view as an arduous struggle to get action from KKIS and the FCC.

It also leaves KKIS with a potential half-million fewer listeners and mandatory adjustments to its methods of transmission. Consulting Engineer Richard Green estimates those changes will cost between \$10,000 and \$15,000.

The controversy began in the summer of 1985 when listeners complained to KALW about interference. Evans estimated the station received more than 150 phone calls and letters.

Once station personnel investigated and heard the signal interfering with portions of KALW's broadcast, they felt sure the noise was a result of KKIS's booster, which was installed months before.

"We made a phone call to the station," said Evans, and "basically were told that they were licensed and were legal and weren't doing anything wrong." KKIS refused to shut down the booster to allow KALW to see if the interference would then cease, he said.

Following another phone conversation in January 1986 that Evans said was non-productive, KALW GM Daniel del Solar and Evans met with KKIS's Greene to discuss the problem.

"The result of those discussions is that (KKIS) felt we were being hostile and aggressive. They said that our tone was rude and abusive," Evans said. "All we were doing was asking them to cooperate to discover if this indeed was the source of the interference."

According to Green, the account is exaggerated.

"KKIS hired me to look at the booster," he said. "I did determine that there had been a problem. The problem was the instability with the transmit antenna and the receive antenna did not have enough isolation, so consequently there was some bandwidth excursion outside the plus or minus 75 kHz bandwidth, as

(continued on next page)

NEWS BRIEFS

Dollars and Cents

Washington DC . . . Expenses seem to be on track at the NAB based on what the Executive Committee saw in first quarter budget reports at its July meeting.

All departments were "at or below" budget, according to NAB Public Affairs and Communications VP Walter Wurfel.

This was good news for the Executive Committee after the board recently OK'd a dues increase for some members to cover more than \$1 million in unbudgeted expenses to fund various radio and TV projects.

TV Marti

Washington DC . . . The Senate on 26 July agreed to a move that would slowdown the funding process for TV Marti, a television version of Radio Marti from Voice of America that would beam US programming into Cuba.

Sen. Ernest Hollings (D-SC) agreed to a request from Sen. Claiborne Pell (D-RI) that the Foreign Relations Committee review the proposal to determine whether TV Marti violates US international treaty obligations.

As a result, the fiscal 1989 appropri-

ations bill contains only \$7.5 million for TV Marti start-up, leaving long-term funding up in the air.

Since Congress first approved funding for TV Marti AM stations in the US have reported increased interference from Cuban stations is what is believed to be a measure of protest against the new TV service.

Ban on Indecency

Washington DC . . . The Senate on 27 July amended FCC appropriations legislation that would require the Commission to expand indecency rules to around the clock by 31 January 1989.

The NAB, however, questioned the Constitutionality of the Senate action, citing a appeal to the Supreme Court on the definition of indecency. The appeal also includes questions over "channeling" indecent broadcasts to hours when children are not likely to be in the audience.

"The Senate bill, if it were to become law, would ignore the need for final judicial answer to these critical questions and would place broadcasters' license renewals in additional jeopardy," said NAB Executive VP and General Counsel Henry Bauman.

Booster operation addressed

The complaint is the first that seriously challenges booster guidelines since their operation was studied and amended in an FCC rule making in July 1987.

The rule making contained in Docket MM 87-13 relaxed booster operation by allowing an increase from the previous 10 W maximum power limit to "20% of the maximum permissible ERP for the class of primary station they rebroadcast."

INDEX

Special Political Convention Coverage:

Surviving Radio's "Jungle"	1
Processing the Politics	13
Westwood One, On the Road	13

Features:

Using the Function Generator by Thomas Vernon	19
Blueprinting Older Equipment by Bill Higgs	21
Odds and Ends for Producers by Tyree Ford	22
Buyers Guide	25

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California FM Caught In Dispute

(continued from previous page) well as splatter and destabilization."

In February, KALW wrote a letter to KKIS asking "them to cease and desist so that we could gain some facts," Evans said. "We got no response at all from the letter. We had to call them and they told us again that they were operating in accordance with the terms of their license."

By this point, KKIS said it had made adjustments on the booster. "I went through the translator and realigned the filters and had the engineer put a screen up behind the receiving antenna and re-oriented it and moved it down so that it was shielding better," Green said.

"I looked at it (afterward) and didn't see anything at all outside the normal bandwidth of an FM station. It seemed to be exactly one for one for what the off-air signal was," he said.

Green added, "During the periods I observed it, it was extremely clean. It was not producing spurious radiation. (KALW) kept complaining and we went back and looked at it again and kept working on it. If the thing was spurring or was causing any out-of-band problems, then it certainly was intermittent. I didn't happen to catch it doing it."

But according to Kin Jones, VP and chief operating officer for Omega International, a manufacturer of booster systems (but not the one at KKIS), extension of the 1 mV/m contour could not only have been identified, but controlled with relative ease.

"This particular problem is a result of inadequate design as opposed to a real technical problem," Jones said. "There's

really no excuse for (the 1 mV/m contour limit) not being controlled."

It is possible to have oscillation and regeneration when a device is receiving a signal and retransmitting on the same frequency, Jones explained.

KALW also remained skeptical and informally contacted the FCC, asking for an inspection of the booster site. The Commission found that it was operating in accordance with the terms of the license.

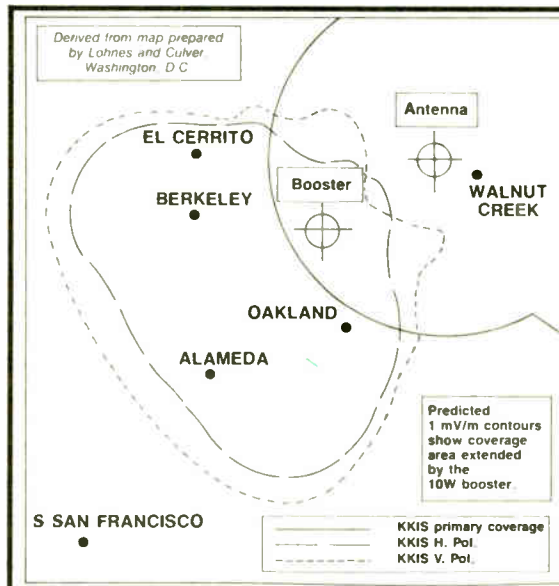
"We still felt that they were the source of the interference regardless of the terms of their booster license," Evans said.

Around this time, KSJO built a new broadcast tower, moving its transmitter and increasing its power. "We turned it on and went driving around the Bay area to listen to our new coverage. The signal was horrible," said KSJO CE David Williams.

The station called KKIS and asked it to turn off the booster. "They declined," said Williams. KSJO then paid to have the engineering consulting firm Lohnes & Culver conduct a study on the booster. That results, which KSJO filed with the FCC, showed the 1 mV/m contour of KKIS's booster operation was "grossly enlarged."

Meanwhile, on 25 June 1987, KALW had the engineering consulting firm Hammett & Edison report on KKIS's signal output and submitted it in its first official Request for Immediate Relief with the FCC.

In the request, KALW said that it was "endangered" by the operation of KKIS's



With the KKIS-FM booster in operation, both KSJO and KALW complained to the FCC of interference.

An engineering report from Hammett & Edison, commissioned by KALW, indicated the booster was extending KKIS' primary contour by about 15 km.

booster. The Hammett & Edison study showed that the booster was extending the contour of the primary station by about 15 kilometers.

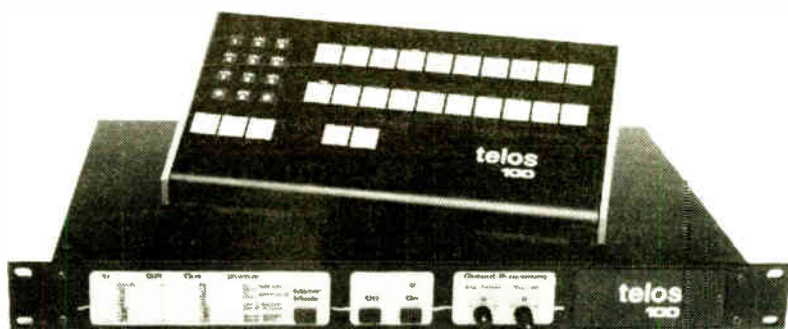
The FCC responded by requesting that KALW and KKIS resolve the problem informally; however, KKIS followed with a letter to the Commission stating that the booster station was operating in accordance with FCC rules. It also said that a formal reply would be submitted "as soon as possible."

KALW then drafted a Supplement to

its Request for Emergency Relief, stating that "the major obstacle in informally resolving this problem stems from (KKIS's) adamant denial that there is any problem whatsoever."

That pretty much confirmed that efforts for resolution between the parties were moot, putting the FCC in a position it hesitates to be in, according to Alan Schneider, chief of the FCC's Auxiliary Services Branch.

On 7 August 1987, the FCC informed (continued on page 24)



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AM Relief: On the Homestretch

by Judith Gross

Falls Church VA ... It was more than three years ago when the EIA and NAB reactivated the NRSC and tasked them with finding some relief for splattered AM stations.

Since that time terms like **preemphasis** and **RF mask** have practically become household words (well, around radio households, anyway).

Since that fateful day at the 1985 Summer CES, uncountable numbers of hours have been generously given by a handful of dedicated broadcasters, broadcast equipment and receiver manufacturers and representatives of organizations to

get the ball rolling on AM improvement.

Now, with the Commission's proposed **rule making on the NRSC standard**, all of it has finally paid off.

There were some snags along the way. Broadcasters and receiver manufacturers started out **blaming each other** for AM's problems, with the stations saying they want wider bandwidth radios and the radio makers saying "You can't have it with all that splatter on the dial."

But everybody stuck with it and even learned how to work together in the process. Now we're real close to getting a standard which will tell the radio manufacturers that AM has grown up enough to **clean up its act**.

The Commission is leaving it open as to whether there will be just an audio standard, a transmission standard or both, so now it's **up to those filing comments**. More than 800 stations have voluntarily converted to the NRSC audio standard so far.

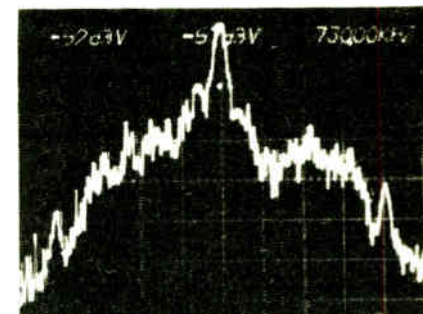
You can see for yourself what the NRSC does to station's signal from the photos (left) of WCPT in my neck of the woods, supplied by Chris Wilk of **Delta Electronics** (the Splatter Monitor developers).

CE **John Diamantis** switched the NRSC filter out for the first photo; in for the second. Note the second adjacent carrier at 750 kHz. WCPT is at 730, transmitting at 5 kW.

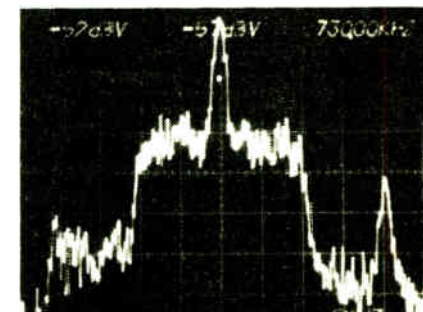
With the filter, the **unwanted sideband energy** goes, second adjacent problems are minimized and the station is more clearly defined and therefore more easily tuned in.

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☆☆☆

The Commission's other proposed rule making, on the **power hike for Class A FMs** can only be called a victory for the little guy. It began as a **grass roots effort** and picked up steam, even bucking the lack of support from the large industry organizations who usually rally their clout.

The New Jersey Class As may not get exactly what they want out of it, but the fact that it got this far is a kind of sweet victory in itself, they say. It shows that the little station **can be heard**.

Loved what FCC Chairman **Dennis Patrick** had to say about some of the arguments about Docket 80-90 and other proposals, that more stations just increase the competition and make it difficult for some to succeed.

He basically said that listeners and advertising revenues in a given area—"the marketplace"—are a better judge of whether or not there is a glut of stations than are "three bureaucrats sitting in Washington DC" ... meaning the Commission itself.

That's brave of him. Gee, the last time I called a member of a DC political organization a "bureaucrat" I got my head

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handed to me. Guess **not everyone** considers it a compliment.

Those **high-power boosters** for FM are a provocative prospect for enhancing coverage, but we don't think the FCC intended to set off a powder keg when it approved their expanded use.

It's only going to work if the stations who use them **don't abuse the privilege** and bombard their neighbors' signals, as some have apparently done.

If it's mere competition the other stations are complaining about, well then the complaints are unfounded. But remember when you were, oh say about seven years old and your second-grade teacher said "Your freedom ends at your neighbor's nose?" Well substitute "licensed coverage area" for nose and you get the picture.

☆☆☆

From RW reporter **Chuck Taylor**, who was at the **Democratic National Convention in Atlanta** for us, comes the happy news that conditions were **not as rough** for the media as you might have thought. Now *that's* a relief.

He says some of the work stations in the Georgia World Congress Center were **quite glamorous** with plush carpet (choice of blue or grey), refrigerators, catered continental breakfasts and snacks and full administrative staffs.

Then there was the **Radio Jungle**, with cement floors, exposed phone and equipment wires and newspapers stacked all over. Oh well, it's **only radio**.

He also notes that the less-than-dazzling convention coverage wasn't the only thing the **radio networks monitored**. In one network trailer, technicians zipped back and forth from room to room, with an occasional lingering glance to a TV monitor airing *Another World*.

We all have our own priorities . . .

Heard something interesting? *Spill your guts to Earwaves*. Write PO Box 1214, Falls Church VA 22041, or call me at 703-998-7600. *Best tidbit of the month wins a coveted Radio World mug.*

OPINION

Readers' Forum

If you have comments for *Radio World*, call us at 800-336-3045 or send a letter to Readers' Forum (Radio World, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7772). All letters received become the property of Radio World, to be used at our discretion and as space permits.

More on filing fees

Dear RW:

Pete Hons' letter in the 1 July issue of *Radio World* brought up the issue of the FCC's spectrum fees, which according to Mr. Hons are "outrageous."

While I do not disagree entirely with Mr. Hons, I do think it is a good idea to have a filing fee of some sort for broadcast applications. This will help separate the "riff-raff" from the serious applicants.

The \$6,000 hearing fee is another matter. In these days when almost every application is subject to a hearing, it seems like the FCC is "double-dipping." They want money when you file and more money later. And the hearing fee does not seem fair when it is imposed on the "lead applicant" in an AM or TV case.

When an initial application is filed and placed on a cut-off list, that applicant should be exempt from paying the hearing fee. The parties who file competing applications should be imposed a fee. They are, after all, the ones who necessitate the hearing.

Another FCC policy that befuddles me is the "AM daytimer preference." Why is it the FCC does everything backwards? While there's nothing wrong with awarding a preference for AM daytimers in comparative hearings for a new FM, it seems ludicrous to require the AM owner to pledge to *divest* the AM daytimer

within three years if awarded the FM.

As a practical matter the licensee should be required to *keep* the AM for three years. By transferring the AM station to another party you again have a standalone AM with little chance of success (especially since the new FM will have drained off a significant amount of business by then). Where was the NAB when all of this was first thought of?

And while I'm on my soap-box, let's talk about the FCC's "first come, first served" process for FM applications. The rules say when no applications are filed during a window filing period, the allotment becomes available on a "first come, first served" basis. The party filing the first acceptable application would thus be processed and eventually receive a CP.

The problem is that it is impossible to get reliable information from the FCC concerning what has been filed. For example, I called the FCC on 21 March to ask if any applications had been filed for Channel 282A in State College, MS for which the window closed on February
(continued on page 10)

The Notice of Proposed Rule Making for a mandatory NRSC standard issued by the FCC is the fruit of a diligent and cooperative effort by many factions in the industry.

As Chairman Dennis Patrick noted, it's the first of what will hopefully be many changes designed to clean up the ailing AM service.

The call for either the 75 μ sec ceiling on preemphasis and 10 kHz stop-band audio standard, or the RF mask transmission criteria (or a combination of both) is evidence of a shift in the Commission's posture in several important ways.

As Patrick noted, the NPRM says that the FCC will not "shy away" from imposing new technical standards, despite a recent history of deregulation on all fronts.

Support The NRSC

It is also the first time in a long time that the FCC is ready to alter the occupied bandwidth rules which have been the cornerstone of AM allocations but which unfortunately have only added to second adjacency interference problems.

And the inclusion of the audio portion of the standard is a departure from the Commission's usual desire to deal only with transmission issues and only in specific cases of interference complaints.

The proposed rule making says that AM improvement is an important enough issue to warrant dramatic changes.

Plus approval of a mandatory NRSC standard will send a clear message to receiver manufacturers that AM is ready for better radios.

It will also be a shot in the arm to manufacturers of the equipment stations need to buy in order to implement the standard.

While there may be some details to be worked out in measurement techniques for the RF mask, only adoption of both the audio and the transmission portions of the standard will insure that it is working for all AM stations.

With so many plusses and so few minuses a required NRSC audio and transmission standard can become the keystone of AM improvement.

It deserves the industry's unanimous support.

—RW

AM Stereo Sides Miss the Point

by Rob Meuser

Hamilton Ontario . . . I read with both interest and dismay the guest editorial by Bob Dietsch (RW 15 June).

While many broadcasters share his feelings toward AM radio, some parts of his editorial reveal one of the real problems that have plagued us throughout the AM stereo era. The problem to which I refer is understanding.

While Leonard Kahn can truly be credited for much vision and inventiveness toward the improvement and expansion of AM, we must put his and all the other technologies which have come up in the last dozen years in proper perspective.

Having known and respected Bob Dietsch for a number of years, I was very disappointed to see him state in writing that Kahn and only Kahn was compatible with reduced carrier operation and synchronous detectors.

Kahn's own descriptions of his systems over the years specifically states the opposite fact.

Beginning in the late fifties when Kahn introduced a single sideband AM radio system and called it, in at least one of his technical presentations, FCC Sideband (for Full Carrier Compatible Single Sideband) all of his systems have been designed for compatibility with the envelope and not the synchronous detector.

Today's radio

Both Kahn and Motorola are designed for today's radio and are not compatible in the manner that Mr. Dietsch indicated. Very specific evidence has been assembled under real world conditions

to prove that the physics are correct.

The most glaring example of this was the Sansui AM stereo tuners, which did use pure synchronous detection and were multisystem. The Kahn ISB system sounds awful on this receiver. Leonard told me at the time of this equipment's introduction that this poor performance was because it lacked an inverse modulator.

Guest Editorial

An inverse modulator is a device that forces proper recovery of certain AM stereo signals when an envelope detector is used. Many threats of law suits between Kahn and Motorola have occurred because of the apparent similarity of this device in the two systems.

Neither Kahn nor Motorola are compatible with either reduced carrier or synchronous detection. The real world results of synchronous detection are often less than claimed by its proponents.

The reason neither system is compatible is that they must transmit what amounts to a pre-distortion signal to provide the correct compensation for reception of the signal on envelope detectors.

With synchronous detectors these components are recovered as audio distortion. The existence of the components is the reason that the ongoing war of words regarding bandwidth of the AM stereo signal continues.

Remember Harris?

The only AM system that truly did what Mr. Dietsch or ABC dreamed of

was Harris. Harris also had an independent sideband version of that system; in fact its AM stereo exciter and monitor had limited ISB capability built in.

The FMX system proposed for FM is a perfect example of two signals transmitted in quadrature (like Harris) on a DSB suppressed carrier signal.

I have not written this guest editorial to either promote or criticize any one system or other, but to point out what I feel is a serious and crucial fact.

Much of the AM stereo problem today is really the fault of broadcasters, who even when well-educated and experienced often have made judgments based on partial truths or missing data.

AM stereo involves modulation theory at a very high level and even many professional broadcast engineers do not fully grasp all its nuances.

AM stereo will eventually have some impact on AM; it will not save or destroy it. Synchronous detection is another tool that has its proper place in our toolbox of techniques.

Salvation of AM depends on two factors: better programming and stronger signals with less interference.

In the end, the average listener listens to what he likes and can receive easily. Elimination of daylight-only broadcasting, vastly increased power and/or synchronous repeaters are what AM needs now.

Rob Meuser is an international broadcast consultant with IBSS and since 1980 has had extensive experience with four of the five original AM stereo systems. He can be reached at 416-692-3330.

Radio World


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Government Bars Contractor

Varian Continental Exec Under Investigation for Business Irregularities

by Charles Taylor

Palo Alto CA ... The Pentagon scandal involving alleged trafficking of confidential information between consultants and government employees used in awarding valuable military contracts has leaked into the broadcast industry.

The Continental Electronics Division of Varian Associates, a manufacturer of broadcast transmitters, has been suspended from contracting with any agency in the executive branch of the federal government.

The action is pending an investigation regarding conversations between Joe Bradley, a Continental VP, and Mark Saunders, a paid Varian consultant un-

Business News

der suspicion in a federal investigation regarding irregularities in government contracting.

Continental's business is split 50/50 between commercial and military contracts, according to Gary Simpson, a spokesperson for Varian.

The company has actively contracted with the United States Information Agency's Voice of America (VOA), which is part of the executive branch. Since 1985, the company has serviced four contracts with VOA totaling \$2.7 million, according to a VOA spokesperson.

The suspension does not affect contracts already in progress or contracts in the bidding stage, neither of which Continental currently is involved in at VOA, according to the spokesperson. It bars only contracts that have not yet been bid on.

Further, the action does not implicate the company or its employee of criminal

misconduct at this point.

The suspension specifically revolves around discussions between Bradley, the Continental employee, and Saunders, the consultant. According to federal court documents, the two were working together on several contracts being pursued by the company.

"There was some spoken action and later some alleged meetings between the two," said Simpson, "and out of that the allegations were that this suggested improper activity on the consultant's part and possibly the employee's part."

"The whole thing came as a surprise and a shock to us," he said. "Our position is that we haven't had an opportunity to hear the tapes that were the ba-

sis of the allegations."

Meanwhile, Continental has placed Bradley under paid administrative leave amidst an internal investigation.

The company also is reviewing its policies regarding the use of outside consultants in light of the happening. "We are strengthening and updating them and will be reviewing all of our outstanding consulting arrangements to make sure that they measure up to be stiffened."

According to published reports, the overall federal investigation is aimed at Washington consultants, including Saunders, who allegedly obtained information from a Pentagon employee and used it to try to influence the awarding

of military contracts worth millions of dollars.

Documents detail specific contracts allegedly affected by the trafficking of confidential information, including instances where companies were initially given low ratings by the Pentagon, then saw their chances for winning the contracts improve.

Varian Continental is among more than a dozen companies whose relationship with a consultant is being investigated. The Continental division is among 20 within Varian Enterprises, and makes up about 5% of the company's revenues.

For more information, contact Gary Simpson at Varian, 415-424-5782.

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From the Desk of Ron Jones ...

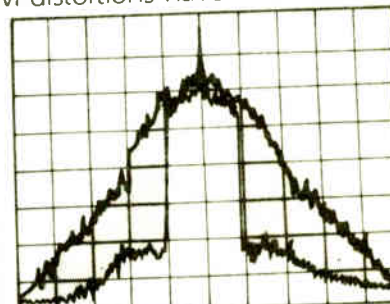
CRL has been involved with the National Radio Standards Committee (NRSC) since its inception. We feel strongly that unless something is done to improve the sound of AM stations AND the quality of AM receivers that AM broadcasting may become history.

When the voluntary NRSC standards were finalized, we immediately went to work "designing in" these circuits into three new products; our mono PMC 400A and stereo SMP 900A limiters as well as our inexpensive add on box, the SPF 300, which upgrades older processors to the NRSC standards. We cut our own profit margins to make the product affordable and used the money that we did earn to promote NRSC through mailings to the broadcasters. We have kept careful records of stations converting to NRSC and sent these lists to the NAB, FCC, and the receiver manufacturers to PROVE that AM broadcasters DO support the new standards.

As a result of feedback from broadcasters like you, we took yet another step and petitioned the FCC for rulemaking to make the implementation of the NRSC circuits part of the FCC AM quality standards.

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There is no longer any doubt that NRSC standards WILL improve sound and increase coverage. But we must have better receivers so listeners can have AM sound that can compete with FM. We believe that it will take FCC standards to guarantee that the needed receivers will be designed and put on the market.

We urge you to join us by contacting the FCC and expressing your support. While you are at it, call our toll free number now for more information on NRSC and our NRSC limiters. Better sound AND COVERAGE is just a phone call away.

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FCC Examines Renewal Abuse

by Alan Carter

Washington DC ... The FCC has launched a special investigation into alleged abuses of the renewal process focusing particularly on an individual believed responsible for dozens of applications whose propriety has been called into question.

Commissioners voted unanimously at a 20 June meeting that the staff make a final report and recommendation by the end of 1988.

This is one of the first investigations to come to light after the Commission sought industry comment on suggestions to modify its petitioning practices.

Previously, comments filed in support of Docket 87-265 generally supported such changes, citing non-specific examples of abuse.

In the Boozer case, the Commission alleged that up to 100 applications in 73 communities—filed either on behalf of, or with the assistance of Bernard Boozer, president of Paradise Broadcasting and Communications Systems—appeared to have been filed using the names of fictitious persons as principals and/or as consultants and advisors.

Multiple applications also may have been filed for the same community of license by applicants who were connected with one another, the FCC con-

tinued.

The Commission stated that information suggested that most of Boozer's applications were filed to obtain settlement agreements, rather than actual construction permits. Boozer was assisted in the filing of his applications by legal counsel, the FCC charged, and in some instances, the attorney was a principal in applications that were apparently related to Boozer.

Full support

Commissioners James Quello and Patricia Dennis endorsed the special investigation.

Tom Keller Exiting NAB for BTP

Greenwich CT ... NAB Chief Scientist Tom Keller has left the association effective 22 July to become a consultant with Broadcast Technology Partners.

BTP announced that Keller will assist in the implementation of the FMX stereo extension system of which he is co-developer.

Keller became chief scientist for NAB effective December 1987 after having served as Science and Technology vice president since October 1981. Keller had been mentioned as a candidate for the industry's test facility for advanced tele-

vision development.

Keller said he will focus his attention on helping broadcasters get on the air with FMX.

Asked about his departure from NAB, Keller said he has mixed feelings about leaving. "The last seven years have been a lot of fun, but I've got to do this. I started it, and I've got to finish it."

Keller will work out of his Washington-area residence but coordinate with BTP's Greenwich offices.

At the NAB, Keller's position of chief scientist will be eliminated, according to NAB Operations Executive VP John Abel. However, Keller's departure will leave vacant one position in the Science & Technology department which will be filled, Abel said.

FMX, designed to reduce the noise in

to the real party and interest ... "

Patrick called such actions in the renewal process "a very serious problem."

Mass Media Bureau Chief Alex Foker said the Boozer case "appears to be most egregious" but other cases are under investigation.

In addition to FCC sanctions such as losing licenses, those found guilty face criminal prosecution and fines of up to \$10,000 and five years imprisonment for each violation.

Tipped off

Boozer came to the attention of the FCC staff as the sole stockholder and president of Paradise. Paradise was the only remaining applicant for an FM con-

(continued on page 14)

stereo reception and greater stereo coverage area over regular stereo signals, was acquired from CBS and NAB last year by BTP.

Keller had been responsible for NAB's interest in FMX through its subsidiary, NAB Technology, Inc.

The FMX stereo system has been adopted by several major broadcast groups including CBS Radio, Gannett and Buckley Broadcasting. The service is presently heard on stations in Chicago, Philadelphia, Los Angeles, Detroit, Baltimore, Washington, DC, and Boston. It will soon be in New York, Dallas, Fort Worth, TX, Tampa, FL, and San Francisco.

For information on FMX, contact Broadcast Technology Partners at 203-622-2804.

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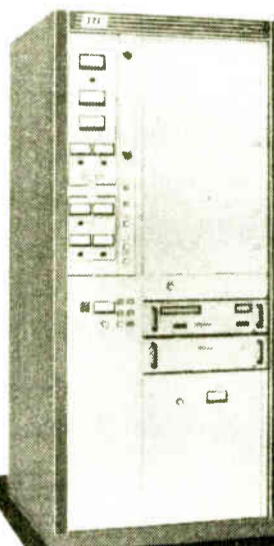
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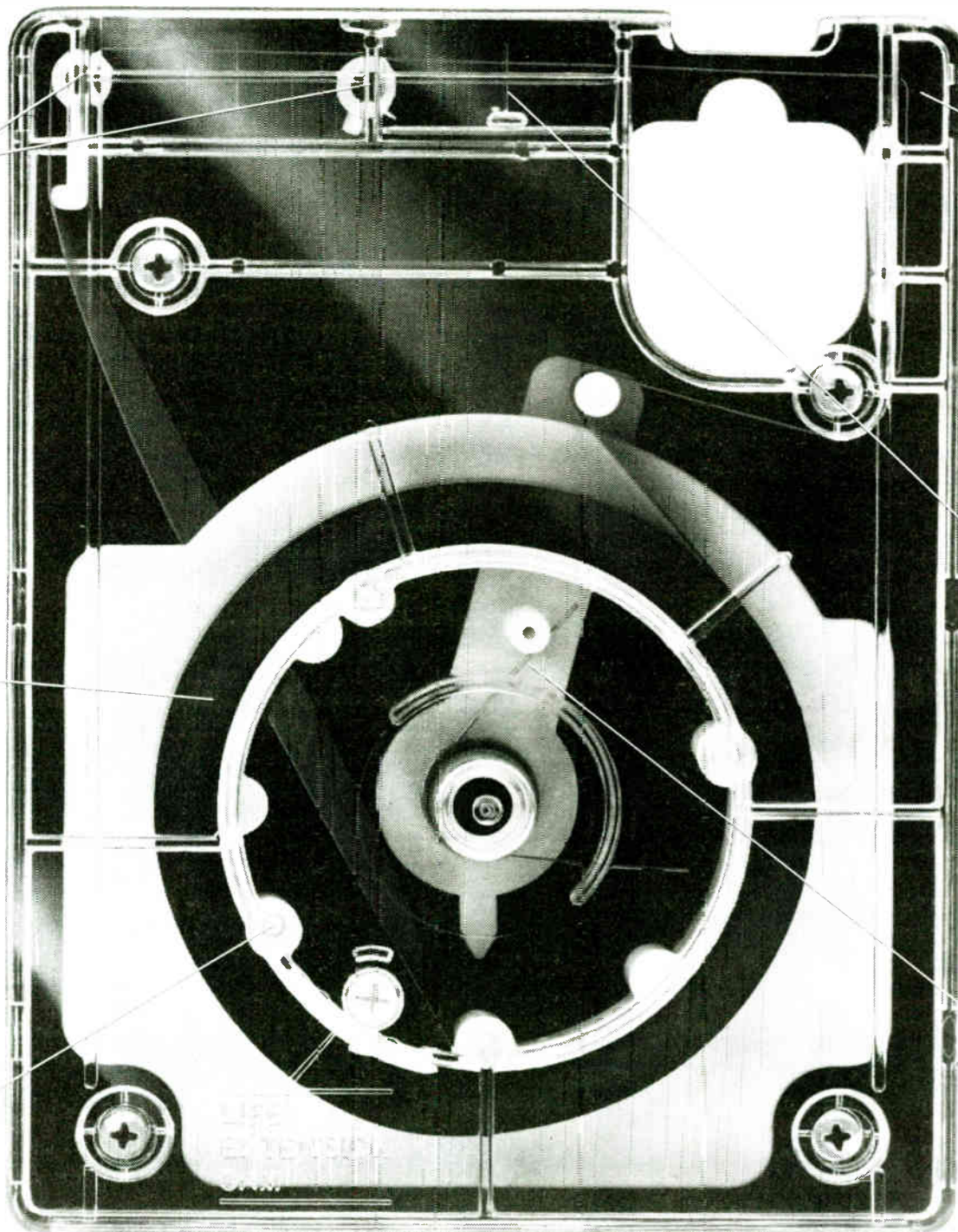
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NRSC Rule Proposed

(continued from page 1)

was developed by the National Radio Systems Committee and is in voluntary use. The voluntary standard establishes a 75 μ sec preemphasis and a 10 kHz stop-band. To date some 800 AM stations have voluntarily converted to the standard.

NRSC-2, the RF emission standard or "RF mask" that addresses the signal from the transmitter out, has a station's signal parallel to the NRSC audio standard to 10 kHz.

The emission standards are more stringent than those currently allowed by the FCC occupied bandwidth rules.

The FCC action came in response to

a mandatory NRSC audio standard submitted by the NAB. NAB staff engineer Stan Salek, coordinator for the NRSC, was optimistic about the rule making, although somewhat hesitant about the FCC having included the RF mask.

"It's what we've been waiting for," Salek said, but added, "We still don't think we're ready to drop it (NRSC-2) on the broadcasters."

Other positive comments came from Glynn Walden, AM engineering manager for Group W and a member of the NRSC. But he also had some reservations about including the transmission standard.

"We need to make the audio standard law now, and we need to certainly consider the mask as a standard in the future," Walden said. "It's very important that we establish the audio standard and it be written into law so that 75 μ sec be the standard by which we build receivers."

Walden said while Group W would support making the audio standard mandatory now, it would support instituting the transmission standard "if the mask is fair and equitable."

Received interference

At the questioning of Commissioners James Quello and Patricia Dennis, the FCC staff said the proposal on received interference should not be confused with an idea to allow "negotiated

interference"—a principle where stations would accept interference for monetary compensation.

The proposal included in the Commission's June action would allow increases in signal strength within licensees' service contours, rendering service in that area much more resistant to man-made and natural interference, according to the FCC.

While interference that would normally be expected to result from the power increase would be accepted in some of the expanded service areas, the new signal strength will increase the overall coverage of the affected station.

NAB's Salek declined to comment on the proposal. "We're going to have to see exactly how that's put together," he said.

Commission Chairman Dennis Patrick said both proposals were the first step toward improving the AM transmission signal by reducing interference and adding signal strength.

"I would add also for you skeptics out there that this item suggests that the Commission will not shy away from the adoption of technical standards where it is demonstrated that we can advance the public interest in a particular area by doing so," Patrick said.

"We have by this item proposed a technical standard which I think will go a long way toward improving the quality of the AM signal if it is ultimately adopted."

Patrick added, "It's a good day for the AM service."

The comment deadline will be set pending publication in the Federal Register. For information on the docket, contact Hank VanDeursen at the FCC, 202-632-9660.

More Letters

(continued from page 5)

17. I was told that none had been filed to date. A partner and I immediately prepared an application and filed it on March 23.

Several weeks later we discovered another application had been filed on March 15, a full week before my inquiry. No action has been taken on our application yet. We can only assume it will be dismissed when somebody discovers the earlier application.

I did call and ask about our \$1,800 filing fee, which I was told was "non-refundable." The FCC staffer I spoke with said, "You pay your money and you take your chances." If a business operated this way it would be considered a racket and its owners would be thrown in jail for ripping off the public.

Isn't it time the broadcast community and the NAB join together and pressure the FCC to operate more like a business instead of the bumbling bureaucracy it is?

Larry G. Fuss
Broadcast consultant
Opelika, AL

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RKO Fitness Litigation Goes On

by Alan Carter

Washington DC ... The FCC has approved two RKO General Inc. renewal application settlements but left unanswered an appeal on the group's fitness as a broadcast licensee, all part of a litigation process that has been ongoing for 23 years.

After a closed meeting 20 July, the FCC announced approval of settlement agreements for WHBQ-AM in Memphis, TN, and KHJ-TV in Los Angeles—deals that will net RKO about \$219 million.

"The approval will put the stations in the hands of indisputably qualified licensees and avoid countless years of continued litigation before the FCC and the

court," the FCC stated.

Commissioner Patricia Dennis, however, dissented on the ruling, calling it "unconvincing" and said it set "a worrisome precedent."

RKO attorney Timothy Dyk said RKO was "pleased" the settlements were approved and that the group "intends to pursue similar settlements in other markets." Other settlements are pending in Los Angeles, San Francisco, Chicago, Fort Lauderdale, FL, and New York, he said.

The Commission did not make a ruling on an appeal by RKO of an August 1987 ruling by an administrative law judge who determined RKO not qualified to be an FCC licensee. The ruling is

pending, after oral arguments before the Commission in April.

The agreements

In the WHBQ settlement, the FCC dismissed RKO's renewal application and approved a process through which Flinn Broadcasting will acquire the Memphis station.

The settlement granted First City Communications Inc. a mutually exclusive application for a construction permit and various auxiliary licenses. Flinn Broadcasting will acquire the physical and other assets of WHBQ through acquisition of an RKO subsidiary. The settlement stipulated that First City will then assign the license of WHBQ to Flinn.

Under the agreement, Flinn will pay RKO \$525,000 and First City \$225,000.

The second settlement—and one much more lucrative for RKO—covers the FCC's dismissal of RKO's renewal application for KHJ.

Walt Disney Co. will acquire control of KHJ through Fidelity Television Inc., to which the Commission granted a mutually exclusive application.

Disney will pay RKO \$218,625,000 and Fidelity \$105,375,000.

The action allows RKO to sell the Memphis and Los Angeles stations at substantially less than fair market value, according to the FCC.

In her dissension, Dennis said, "By citing the length of these proceedings as a reason for ending them, I fear the Commission sends the wrong signal to station licensees—the way to avoid license revocation is to prolong proceedings until the Commission loses its will to litigate further.

"If anything, the long and tortured history of these RKO proceedings is a reason to see them through to a fully and finally litigated conclusion."

Dennis also said she was concerned the FCC was compromising its integrity. "It may also unwittingly undermine efforts to improve the renewal process," she added.

"If the objection is to the all-or-nothing approach of the renewal process, then the Commission should formally adopt sanctions short of revocation that are tailored to the licensee misconduct in question."

Back to '65

The RKO renewal case dates back to 1965 when Fidelity Television challenged RKO's license for KHJ-TV in Los Angeles, and in 1969 when two Boston Groups challenged the group's license for WNAC-TV there. RKO faced another challenge for WOR-TV in New York.

The Commission denied RKO's renewal for the three stations in 1980 because of corporate misconduct. The agency found that RKO, with its parent, General Tire and Rubber Co., and its sister subsidiaries, participated in an improper reciprocal trades program with the FCC, and willfully withheld information on the WNAC proceeding.

A US Court of Appeals affirmed the FCC's decision on WNAC but rejected the New York and Los Angeles denials and directed the FCC to conduct further investigations.

The FCC awarded WNAC-TV to NETV Inc., and the US Supreme Court declined to review appeals of all three rulings.

The FCC brought in the administrative law judge, who eventually ruled RKO not qualified to be a licensee in August 1987.

Nothing in the Commission's approval of the settlement agreements for WHBQ and KHJ prejudices the pending appeal, according to the FCC.

For information from the FCC on the case, contact the agency at 202-632-5050.

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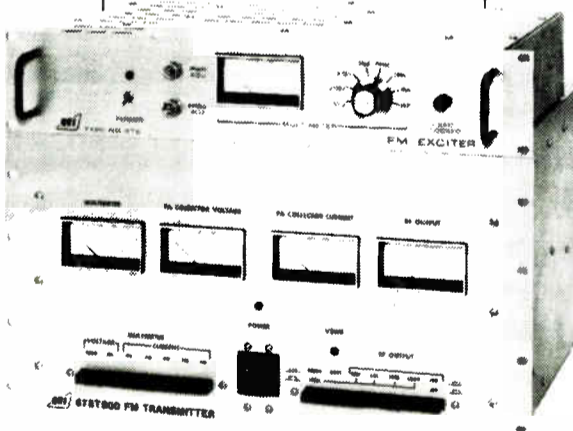
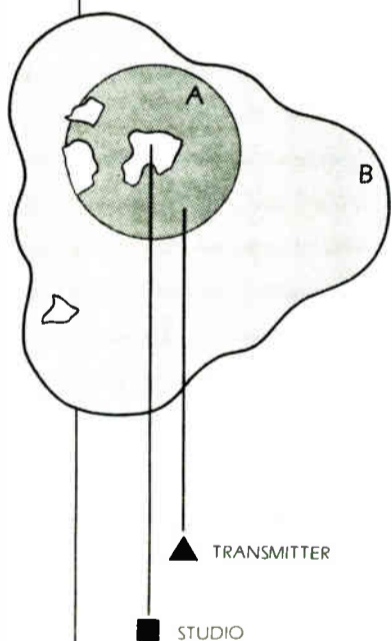
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Processing the Politics



by Charles Taylor

Atlanta GA ... Broadcast technicians covering the Democratic and Republican conventions had enough new technology available to make it an intrigue.

But in large part they reasoned that if methods of coverage worked in the past, why retune?

In all, 229 radio stations and 45 groups or networks were represented at the Democratic convention here, from 18 to 21 July. Eighty-five foreign interests also were present.

In less than a month from tear-down, they have to be set up for the Republican convention, 15 to 18 August, in New Orleans.

The buzz among broadcasters ranged from the debut of snazzy compact-as-possible equipment packages to complaints of leaner technical staffs than in past convention years.

Meanwhile, applications of an extensive 1,063 mile fiber optics network provided by local telephone carrier Southern Bell added vast improvements to the transmission of signals.

But in a sense, not all that much has changed in convention coverage for the major radio networks who have streamlined production to incorporate new technology into traditional methods of coverage.

"I have done conventions this way for more than 20 years without any major

For Some, Bringing Conventions to Air Means Making Most of a Tight Operation

changes," said Ray Weiss, manager of technical operations at NBC Radio, part of Westwood One. "We have fiber and the equipment is more modern with lower noise and solid state, but beyond that the logistics of this operation have not really changed for us"

Convention Coverage

What has changed, as a result of Westwood's purchase last year of NBC Radio and its previous ownership of Mutual Broadcasting is the number of people covering the convention between the three interests. "We have less people responsible for more things," Weiss said.

CBS also has cut personnel from its technical staff, according to Gary Scherer, a CBS technician at the convention. "We've had three people doing all the wiring, pulling the cables, hooking up all the equipment. It's been a chore," he said. "We just didn't have the manpower to get everything ready in time."

Scherer attributed the delays, in part, to cutbacks by the network. But he also said it is a result of hiring personnel to wear too many hats. "The trend is not having technical people do the work

anymore. They get a news person who can do it and get two jobs out of one person."

Technical cutbacks at ABC were attributed to decisions on where a dollar is better spent, according to Horace Easterling, the network's manager of technical operations in Washington.

"It's economically feasible to buy another (satellite) line from IDB (Communications) and feed some of the stuff directly to New York and utilize our people up there to cut the tape rather than cut it on scene," he said.

But while some networks may be cutting back, National Public Radio's (NPR) presence at the political conventions is expanding.

"We have more people down here this year, more reporters, more editors and they're expected to do more coverage," said Kevin Rice, technical director for NPR's election unit.

How they worked

The organization operated from a trailer at the convention with piecemeal equipment from its Washington headquarters. "We spend a lot more time on setting up than most people because we build it from scratch. It's almost like building a control room in a trailer," he said.

That is likely to change, however, according to Rice. "This is the last year I think we'll be able to do it this way. If it continues to grow, we're going to have

to get something semi-permanent, perhaps a trailer that is built specifically for large remote news operations."

Westwood One did something of that sort with a new custom-made equipment package, which debuted at the Democratic convention. The half-million dollar package consists of 10 stand-alone edit stations and two control room setups linked by a master control room.

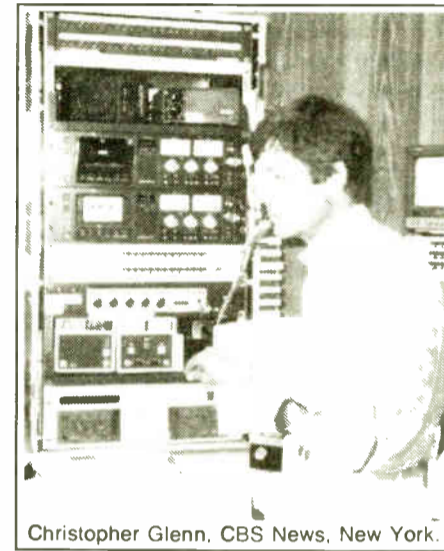
Edit stations, designed by Westwood engineering consultant Bob Demuth, are "basically mini radio studios" in 4½' by 2' by 3' cases, which set on top of tables, he said (see related story this issue).

"We were generic in the way we put it together," said Warren Vandever, director of operations and engineering for the NBC Radio Networks. "The editing station took into account the needs that anyone would have on the road doing any sort of production."

CBS Radio combined packaged equipment with some piecemeal, according to Scherer. "We brought down over 100 boxes of equipment racks, tape machines, cassette machines, amplifiers, cart machines, boards and telephone equipment," he said.

For the first time, the network also organized eight portable edit stations, consisting of a Shure M267 mixer, an IFB intercom, Studer tape recorder, monitoring speakers, and cart machines for recording and playback.

Each station weighs about 350 pounds and costs between \$25,000 and \$30,000, according to Rodney Olsen, the maintenance and construction department **(continued on page 24)**



Christopher Glenn, CBS News, New York.

Westwood One, On the Road

Atlanta GA ... "Have studio, will travel," may not be an active slogan for Westwood One.

But judging by the capabilities of its new portable broadcast facility, one could probably pretend it is and find no one to argue the point.

Like many broadcast entities, Westwood is transporting equipment from the Democratic convention here to its Republican counterpart in New Orleans.

Instead of wiping brows and pack-



Bob Demuth at the helm of one of Westwood's 10 editing stations.

ing up for home afterward, however, the network will then cover the summer Olympic games in Seoul, South Korea in September, followed by an October Amnesty International concert in Buenos Aires, Argentina.

To accomplish the task in an organized manner, company officials decided it would be sensible to design a portable mini-studio that not only could deliver every function generally utilized in remote broadcasting, but also one capable of being unpacked, plugged in and on the air in a whisp.

"This is the year when we need it," said Warren Vandever, director of

operations and engineering for the NBC Radio Networks, part of Westwood One. "We needed something that could easily be set up again because of the close coordination of the times. To get on the air, you can just take the cover off one of these edit stations, plug the power in and feed the line."

Included in the half-million dollar package are two control studios and 10 editing stations linked by a master control room, "basically a full radio station on wheels," according to Bob Demuth, the Westwood One consultant who designed the package, and project engineer for the company's convention coverage.

Equipment was assembled, in part, from newer pieces on hand in Westwood and NBC Radio studios, which Westwood bought out a year ago. Demuth began packaging the pieces in February—a challenge considering it was to debut five months later.

The facility is encompassed in a 4½' by 2' by 3' case, which is set on top of a table. Incorporated within 24" home-made racks is a three speaker assembly, an intercom station, an IFB station, a 50x25 Datatech master system routing switcher, a Pacific Recorders & Engineering Stereomixer and full patch field capability. Below the rack are Otari full-patch MX-5050 Mark IIIs.

Also included are an ITC triple-deck cart machine and Otari 50/50 reel-to-reel machine and processing equipment.

Each of the 10 editing stations can act as a standalone unit or they can **(continued on page 15)**

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Getting Along in Radio's Jungle

(continued from page 1)
the wires," Polish said.

The station, which has covered conventions in the past and also planned to be on-site in New Orleans for the Republican convention, aired five 90-second special political reports during the day and fed eight pieces for hourly newscasts each of the convention's four days.

Then there's "Radio Jungle," a narrow workspace nestled in the convention's World Congress Center between the auspicious quarters of *The New York Times* and National Public Radio (NPR). Within it are about 12 radio outlets, each assigned to unadorned, cement-floored 50- or 60-square-foot work stations.

What's in Radio Jungle

"Radio Jungle was for radio stations across the US that requested designated space but didn't buy into a larger facility and weren't in some other arrangement," said Jim Howard, news director of WDCB-FM in Glen Ellyn, IL, and one of a crew of five representing Illinois Public Radio at the convention.

"A lot of the commercial stations are covering the convention in cooperation with local TV stations, then working out of hotel rooms. The ones here plan to do some form of regular broadcasting that's a little more aggressive than a single reporter going back and filing once a night," Howard said.

Illinois Public Radio sent up to 25 feeds to its affiliates in the morning and afternoon for use throughout the day, and also did local reports when requested by affiliates.

"Some stations have asked us to call

in at times and localize material and talk back to them," Howard said.

The network also rented its equipment and a fiber uplink it arranged through convention floor neighbor NPR to four public radio entities: KQED-FM in San Francisco; KBSU-FM in Boise, ID; and KCRW in Santa Monica, CA; and Florida Public Radio. Each of the four had its

Convention Coverage

own personnel and broadcast coverage ranging from *Morning Edition* half hours to local delegate reports.

For its coverage, Illinois Public Radio assembled a three-deck cart machine, Technics tape recorder, a Revox reel-to-reel and a phone coupler, built into a Broadcast Electronics 4R50 board. It also brought a Shure FP 32 microphone mixer, "a great little mic mixer, a killer mixer," Howard said. Each of the stations using the equipment also brought microphones and field equipment.

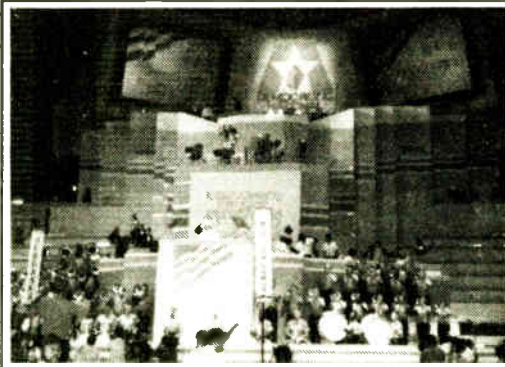
First-time coverage

WTAG-AM stereo in Worcester, MA, also assigned to the Radio Jungle, represented a station covering the national convention for the first time, primarily because presidential candidate Michael Dukakis is governor of their home state.

"It's an important story for us," said WTAG News Director Paul Tuthill. "People in Massachusetts tend to be very

serious about news. They're very serious about politics and we want to provide serious coverage because we are a serious news station."

Equipment included four cassette decks, a cable TV monitor, microphones and a two-line Comrex console with a built-in mixer. "It's the second time the console's been out the box," Tuthill said. "We also used it for the US Open Golf Tournament."



Pomp and pageantry at the Democratic convention

The station also is covering the Republican convention in New Orleans "out of fairness, balance," Tuthill said.

The same equipment, but ...

Washington, DC, independent station WHUR-FM brought a similar package of equipment: "The same things you'd find in an ordinary control room," said Chief Engineer Ted Sims, such as cart machines, turntables, microphones, rack-mounted tape machines and a console.

Abuse Inquiry Under Way

(continued from page 8)

struction permit at Illion, NY.

During the proceeding, the presiding judge added an issue to determine whether Paradise had misrepresented facts to the Commission concerning its financial qualifications.

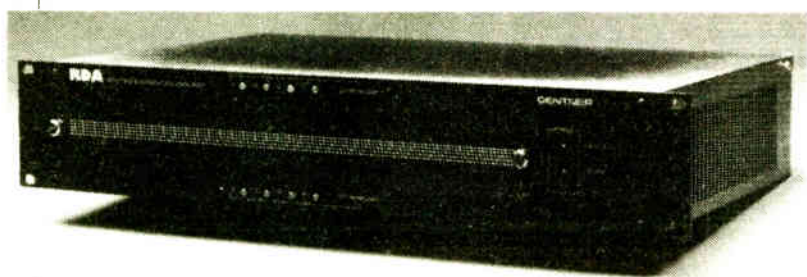
In his initial decision, the judge stated that, in seeking to demonstrate his financial qualifications, Boozer misrepresented the value of parcels of real property he owned and that one of Boozer's properties was mortgaged when he claimed it was not. In addition, Boozer did not have title to another of the properties which he claimed to own,

according to the FCC complaint.

The judge denied Boozer's application. The FCC charged that following this finding, Boozer appears to have begun filing applications using pseudonyms and the names of various friends and relatives.

The Commission directed the administrative law judge to complete the investigation by 1 November so the staff can provide the Commission with a final report within calendar year 1988.

For information on the case, contact Robert Zauner of the FCC's Mass Media Bureau enforcement division at 202-632-6402.



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NBC Radio Covers the Olympics

by Raphael Weiss

New York NY . . . In September 1984 I began putting together plans for studio space, equipment and manpower requirements for broadcasting the Games of the XXIVth Olympiad on the NBC Radio Networks from Seoul, South Korea, this September.

As radio plans were developed with the television network, mutual concerns came to light. Transmission of signals between Seoul and New York would require two satellite hops. Power in Seoul was not as sure and constant as it is in the US, and long-distance, direct-dial calls to New York would be expensive.

A new building was to be built in Seoul for use as an office building and theater when the Olympics were over. During the Olympics, the Korean Broadcasting System (KBS) would be the landlord providing broadcasters with space and interconnects with venues scattered throughout South Korea.

A new Olympic Park was to be built in Seoul that would house the venues for swimming, weightlifting, gymnastics, fencing and a velodrome for biking. Other events in Seoul would take place at the Seoul Sports Complex and at various university gymnasiums.

Most of the venues were to be tested during the 10th Asian Games scheduled for September 1986. I made my first trip to Korea during these Games.

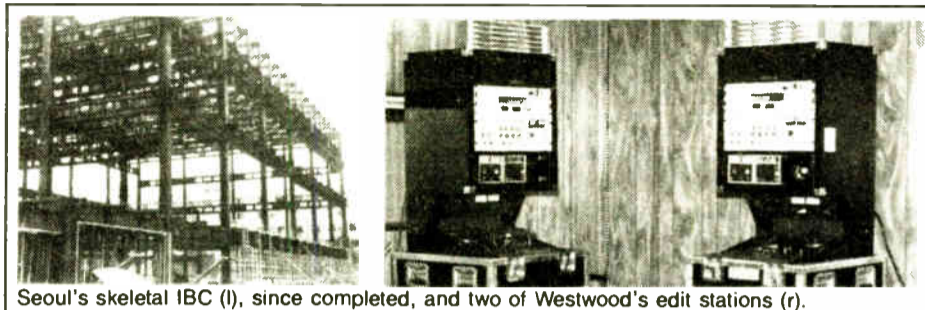
We found the International Broadcast Center (IBC) to be a steel skeleton. Security was tight. Our hosts were most anxious to hear of our needs and do what they could to accommodate us.

Fiber cable was being installed from

each venue to the IBC. As the holder of broadcast rights in the US, we requested that all of our audio circuits from commentator positions at the venues through to our transmission room be no less than 7.5 kHz.

This was not to be.

Working with the NBC-TV Olympic group, we have been able to have 6.4 kHz audio brought to our transmission room.



Seoul's skeletal IBC (l), since completed, and two of Westwood's edit stations (r).

Various scenarios were investigated to transmit audio from Seoul to New York and to bring US dial tone to Seoul.

One involved sharing three T-1s with television to provide their needs as well as ours. While these plans were undergoing many variations and changes, construction plans also were undergoing changes.

Along with the broadcast rights came space in the IBC. This had to be divided among the different NBC departments: Olympic Sports, TV News, TV O&O stations, Skypath, control rooms, studios, computers, maintenance shops, electronic journalism and the Radio Network.

After numerous floor plan changes, we settled on space on the second floor. There we have designed two broadcast studio/control complexes, three tape edit

rooms (one with announce booth for news) and a central work space with desks to hold the computer terminals supplying Olympic results.

Change in plans . . .

Planning included the Democratic convention in July; the Republican convention in August and the XXIVth Olympiad scheduled in September—all

in within months of each other.

But in August 1987, a totally new plan for the three events emerged. The NBC Radio Networks were purchased from GE/NBC by Westwood One.

Working together with Bob DeMuth for Westwood, Dick Owen for Mutual and Warren Vandever for NBC Radio, we were able to devise equipment packaging that would provide the broadcasting needs of the two political conventions and the summer Olympics.

Plans had been underway to interconnect all US based facilities with T-1s. But then, fiber links were ordered between the Staten Island Teleport, NBC Radio in NY and Mutual Radio in Arlington.

IDB Communications was called on to provide the T-1 Service from Atlanta for the Democratic convention, New Orleans for the Republican convention and Seoul for the Olympics to the Teleport, for the cleanest digital audio service available. The final packages to support this distribution system took shape.

All elements of the support system would be mounted in Anvil road cases for ease of shipping and set-up. Cabling was pre-measured and of varying lengths to accommodate the three summer '88 applications and any future use at concerts or news events.

The nuts and bolts

The heart of the operation is a Data-tek D-2000 50x25 Audio Routing Switcher. Mounted in its road case are input and output panels with XLR connectors and screw terminals, ADC mini-jack fields (48x4) with punch down blocks, 24 Telabs 4008 equalizers and appropriate power supplies.

Edit stations were designed to be stand-alone production studios. Each unit has built into it an ITC Delta R/P cartridge machine, a Pacific Recorders & Engineering Stereomixer, an Otari MX-5050III reel-to-reel tape machine, a Data-
(continued on page 16)

Radio Station On Wheels

(continued from page 13)

be interconnected.

"We were generic in the way we put it together," said Vandever. "The editing station took into account the needs that anyone would have on the road doing any sort of production. We have the ability to mix a number of sources together, to go from either cassette-to-cart or reel-to-cart or cart-to-reel. Whatever you want to do."

Power Hike

(continued from page 1)

In proposing Class C3 at 25,000 W, the Commission estimated that 200 to 300 Class A stations in Zone II would meet the Class C3 station-to-station separation distances and would be eligible to upgrade.

The Commission also said there may be a number of communities, particularly in the West, where the larger station allotment classifications (Classes C, C1 and C2) are precluded from use and where the Class C3 might make additional allotments possible.

Comments filed with the FCC on a petition from Petaz Communications generally supported the expanded service, although some questioned whether protection standards would provide sufficient interference relief.

For information on the power hike and Class C3 proposals, contact Jay Jackson or Bernard Gorden of the FCC's Mass Media Bureau at 202-632-9660.

For the two political conventions, Westwood also installed its own key telephone system, so that it not only is capable of audio production but also telecommunications.

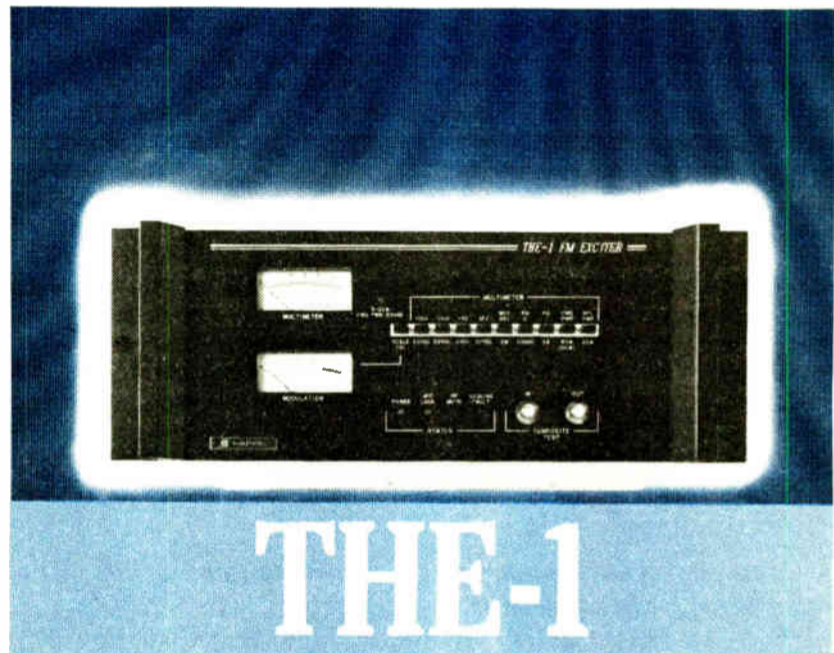
The packages for Seoul and Buenos Aires will differ slightly, Demuth said. For example, the telephone system won't be utilized in Seoul; the Koreans provide it for broadcasters. However, intercom capability is available and will be used in Seoul, but not in Atlanta or New Orleans.

Maintaining the facility in any setting apparently is relatively simplistic. For the conventions, Westwood's operations team consists of two maintenance technicians from Mutual; convention coordinators from NBC and Mutual; Vandever and Demuth.

And transporting the 8,000 pounds of equipment involved in making the studio operative is among the easiest tasks, according to Demuth. "It was made for roadwork, so it's all easily transportable with wheels and everything else on the roadcase."

That is fortunate, since Vandever said that the portable studio will see a lot of use within its lifetime between the Westwood companies: NBC Radio, Mutual Broadcasting and Westwood One.

"The whole key to the thing is just being able to deploy it so that you have the whole facility in roadcases," he said. "In order to meet the timetables and to get things shipped, everything's got to be able to be set up and broken down easily. That's the concept behind all of this."



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Covering The Games

(continued from page 15)

tek routing switcher selector panel, an RTS RM 300 intercom station, I/O panel, Crown D-75 amplifier, Auratone 5MC speaker and an ADC mini-jack field. Ten of these stations were built.

Plans for two on-air broadcast facilities include Pacific Recorders BMX-III consoles, ITC three-deck cartridge unit, RTS 416 DA's, ADC mini-jack fields, Crown D-75 amplifiers, Auratone speakers, Gentner telephone hybrid and road cases for shipping.

The intercom system is an RTS 865 central matrix with necessary power supplies, cabling, splitters and stations. The IFB requirements are built around an RTS 4010 central unit. This will be

capable of allowing four different audio feeds to be interrupted from any producers position.

At the conclusion of the Republican convention in New Orleans our equipment packages will be divided for shipping. Some will be returned to home base with the majority going by air to Seoul.

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Ray Weiss is Manager, Technical Operations NBC Radio Network and can be contacted at 212-237-2629.



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Circle Reader Service 39 on Page 24

Otari 2-Track Bound for Seoul

by Tom Burrows
Industrial Sales Engineer
Otari Corp.

Belmont CA . . . It would be a fair assessment to say that one of the goals any manufacturer of professional audio equipment strives to attain is to have its products recognized within the industry with respect to the quality of performance, reliability and value.

Otari has been fortunate to have the MX-5050 series of products perceived in such a favorable light since they were first introduced.

One of the more notable successes has been with the 2-track products. The first in the line was the MX-50502SH, which was introduced in 1975.

Next, in 1978 the MX-5050-B and MKII-2 were introduced as the "new workhorse." The "B" was a standard upright configuration while the MKII-2 was a console with overbridge version.

Over the next five years, some nine thousand of the "B" machines were sold.

The current edition of the "B" machine, now called the MX-5050BII, was introduced in 1983 with the MKIII-2 console version soon following.

With updated performance and features, users demanded them for their ease of use and the quality of material they produced while the engineers servicing the machine appreciated the high reliability and ease of service.

As a result, there have been over 17,000 of these recorders purchased to date.

These machines offer three speed operation (3.75, 7.5 and 15 ips), 10 1/2" reel size

capacity, active balanced inputs and outputs and front panel record adjustments.

Other features include elapsed tape time counter (in hours, minutes and seconds), switchable IEC/NAB equalization, switchable ± 4 dBm/-10 dBV operating levels, built-in test oscillator, vari-speed and headphone output among others.

These recorders have found popularity in mobile as well as fixed installations. A case in point is the utilization by Westwood One of twelve MX-5050 series two tracks for use at the Summer Olympics in Seoul, South Korea.

Separate production/editing facilities are set up and are used for the assembling of material for broadcast.

Program from a variety of sources, such as announcer microphones, satellite feeds and roving reporters, is edited on open reel recorders and then bounced down to carts for eventual playback over the air.

For such an event as the Olympics, the equipment is kept in constant use. It is not unusual to clock eighteen hours of use per day of an event.

In selecting Otari machines, Westwood specifically cited their high performance value and reliability, compact design and affordability.

The first trial Westwood One put the machines through was the Democratic National Convention, where seven of the machines went virtually straight from the box into use. They performed without a hitch.

To date, Westwood One has expressed nothing but a high level of satisfaction in its choice of tape machines.

Otari is glad to be part of the team.

The Aphex 10 \leftrightarrow 4 Audio Interface

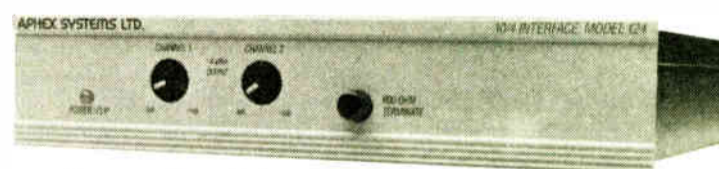
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Circle Reader Service 6 on Page 24

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Using the Function Generator

by Thomas L. Vernon

Harrisburg PA . . . Many stations continue to use a sine wave generator for all of their troubleshooting and testing. While "Old Faithful" continues to have a place on the workbench, a function generator has advantages over it in many applications.

In its most basic form a function generator puts out sine, square, and triangle waves, or functions. More elaborate models also include step, pulse and sawtooth waveforms, provisions for sweep, AM or FM modulation and a TTL level output. Bench and battery powered portable models are available.

Function generators have a much wider frequency range than audio oscillators, typically 1 Hz to 1 MHz, with an even wider range on the more expensive models. This expanded range gives the function generator applications in RF, digital and video in addition to audio.

But before you rush off to heave your old RC oscillator into the dumpster, you should realize that the function generator has its limitations as well as its strengths.

Because the function generator is more of a universal instrument, waveforms are not as clean as would be expected from an application-specific instrument.

This is especially true of the sine wave output. On most function generators the sine output is derived from the triangle function.

The result is distortion levels of 1% to 2%, sometimes worse. The distortion level also varies with frequency. Obviously such a device would not be a good choice for proof of performance measurements.

Because of the way function generators make waves, their stability and frequency accuracy is as good as you'd get from their RC counterparts.

Thus the dial of the function generator can only be used as a rough guide to frequency. Reach for the frequency counter if more precise measurements are needed.

The specifications of triangle and square waves are very good in the audio range. Performance begins to deteriorate at the higher frequencies, typically above 80 KHz. Symmetry may stray from 50%, square waves will be rounded off and triangle waveforms will have amplitude shifts.

One of the areas where function generators really shine is amplitude linearity. Typical outputs only vary by a few millivolts over the 1 Hz to 1

MHz range.

If a sweep function is available, the frequency response of a system can also be observed on an oscilloscope display.

Station Sketches

Applications of a function generator around the station are numerous so we'll only mention a couple of them here. Even an inexpensive generator can put

a transmitter through its paces.

The triangle function can be used to optimize the modulator bias in AM transmitters. This is done by observing the demodulated waveform of a 10 kHz signal on the scope.

Starting from zero bias is increased until all traces of crossover distortion disappear. On the scope, crossover distortion shows up as non-linearities in the triangle waveform.

The square wave function can be used to check bandwidth and phase shift of

a system, by comparing input and output waveforms in the areas of tilt and overshoot.

While the function generator will not replace the conventional oscillator in all applications, its versatility should make it a welcome addition to the engineer's test bench.

Tom Vernon, a regular RW columnist, divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-249-1230.

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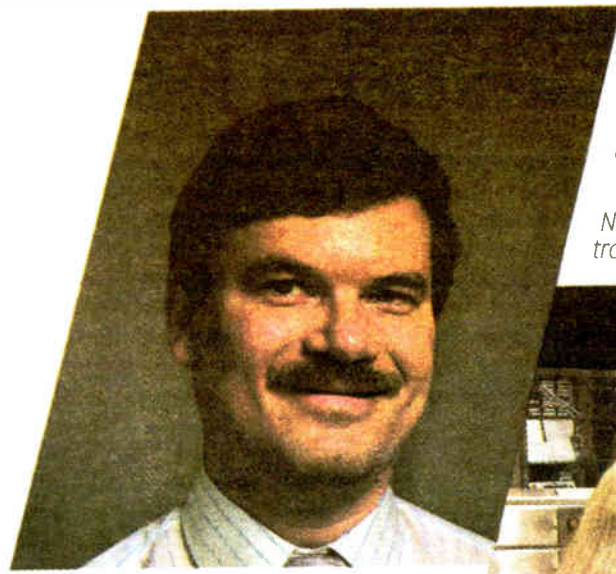
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Circle Reader Service 13 on Page 24



Ron Gaier, Chief Engineer,
WHIO-AM-FM-Dayton, Ohio,
Cox Broadcasting.

News caster Dawn Matthews on the Audi-
tronics 212 in WHIO-AM news studio.



**“Reliability
makes
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boards winners
with us”,**



Jim Jones on the Auditrionics 224 in WHIO
production.

says WHIO AM-FM chief engineer Ron Gaier. “Our job in engineering is to keep the station on the air, so our three Auditrionics consoles’ record of zero failures makes me very happy.”

“When we renovated three years ago, I insisted on enough input capacity so every signal source could have its own channel with no switching or patching. So we bought the 224 for production and on-air, and the 212 for news. This also gives us the flexibility to easily reconfigure the boards as our needs change.”

“We got everything we wanted from Auditrionics through our dealer Allied, including timely delivery which was critical to us then.”

“Based on our trouble-free experience with the Auditrionics 200 series thus far, I’d buy them again tomorrow.”

If you’d like to know more about why Ron Gaier specifies Auditrionics consoles, call toll-free 800-638-0977 or circle reader service number.

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Blueprinting Older Equipment

by Bill Higgs

Louisville KY . . . I regularly receive, as do most of you, a weighty pile of magazines, flyers and literature, each touting the latest in broadcast equipment.

These state-of-the-art boxes are beautiful to behold, have specs that look like an audiophile's dream, and can be yours for "Less than you think" (friendly terms available).

I must also confess to being like a kid in a candy store when in the display area at trade shows. Nothing like some new toys to brighten up things back home. Alas, they can also be yours for "Less than . . ."

Many of us are able to acquire a few such "toys" each year, even if the budget is restricted. Some of us, however, must be content to maintain older equipment and enjoy the pretty catalog pictures.

It is also by keeping the older stuff going that we stretch the budget enough to obtain the occasional new box.

Worn and outdated

There are three main problems with aging equipment. The first is plain old wear-and-tear deterioration. Like engines, certain parts age over time. The equipment no longer meets its original factory specs.

The second problem is obsolescence. The unit may perform exactly as designed and still be a turkey when compared to the newest equipment. Running digital audio through some old

tube boards is like hooking a Ferrari to a hay wagon.

The third problem is aesthetic. Older equipment looks like older equipment. To most DJs old means substandard. And if the equipment seems below par, chances are the jock's performance will be too.

BottomLine— Broadcaster

When deciding what to do with that ancient console or tape machine there are several important questions you can ask.

Are the design specs adequate? If so, does it simply need restoration? Can I still get the parts at a reasonable cost? Is the circuit design so old as to require a complete redesign?

Let's first consider a piece of equipment for which the basic design is sound. The major task is to restore it to the original specifications. Auto racing enthusiasts have a name for this—"blueprinting."

Begin blueprinting a unit by considering what components have likely deteriorated. Tubes are an obvious consideration, but in my humble opinion tube equipment is obsolete in the studio.

Either remodel or scrap it (I'll probably catch it over this one). If your opinion of "fire bottles" is higher than mine, test and replace any tube of dubious quality. Watch especially for excessive noise, poor emission and microphonics.

The second major component to consider is the lowly capacitor. Over time electrolytics become leaky, both electrically and physically. A leaky electrolytic looks to the circuit as a smaller value with a resistor in parallel.

Replace *all* electrolytics as a matter of principle! Use the next higher value for the filter if it will fit. If the cap is low voltage, replace it with a tantalum type. Discs and tubulars are less suspect but I prefer to replace anything that isn't mica or ceramic.

Resistors can, and do, fail—usually by going high in value. Look especially for anything that looks as though it has been hot.

Resistors in bias circuits are particularly critical as they set the operating point of the transistor or tube. Check the value of these even if they look OK.

Plate current

Extra current in the plate or emitter circuit translates into extra noise, loss of headroom and potential failure.

If the unit uses standard carbon resistors, replace them with carbon film low-noise types if possible. While you are at it, find out why it failed.

Several other things need to be considered when blueprinting. Replace anything which is obviously broken: stitches, meter glass, connectors, indicator lamps.

Install a 150V MOV across the line while you have the cabinet open and connect an appropriate value across the power supply output.

Clean out the chassis with a commercial spray product. Clean the faders, or if carbon pots are used, replace them. The rule here: if it looks suspicious, replace it!

Here are some less obvious suggestions. If the unit contains single-hole mount transformers, rotate them for minimum noise and hum.

Any transistor which has been subjected to excess current may lose some gain and pick up some noise. In a push-pull audio stage, check to see that DC voltages are equal.

Loose grounds are a frequent problem in older equipment, particularly when circuit boards are used. This problem can result in hum and/or RFI.

Clean edge connectors with a pencil eraser and burnish round push-on connectors with a small strip of crocus cloth.

If the board is grounded through an aluminum spacer the fix is slightly more involved. Remove the circuit board, tin the contact area with solder, use a new toothed lockwasher and reassemble.

After blueprinting the unit do a "proof" on it. Check to make sure that it meets the original factory specs. Make any internal adjustments necessary, according to the manufacturer's guidelines.

If the equipment is now adequate for your use, fine. Sit back and enjoy a cup of coffee. If not, however, the next step is upgrading.

Bill Higgs has been CE for WXLN/WFIA for six years and has also done station consulting work. He has a PhD. in Theology which helps explain his patience with small market radio. He can be reached at 502-583-4811.

Splatter matters.

Splatter is a form of radio interference that can drive listeners away from AM radio. It creates distortion in your signal, wastes transmitter power on undesired sidebands and interferes with other stations. Even with an NRSC audio filter, misadjustment of the transmitter or audio processing equipment can still produce an RF spectrum that can exceed NRSC or FCC limitations.

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To find out more about the new Delta Splatter Monitor, call (703) 354-3350, or write Delta Electronics, Inc., 5730 General Washington Drive, P.O. Box 11268, Alexandria, VA 22312.

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Odds and Ends for Producers

by Ty Ford

Baltimore MD ... This month's Producer's File breaks away from the guided tour of production music libraries. The tour will continue with a report on the AirCraft music library and others within a month or so.

Some of the people who own these libraries have told me they've found the explanation tables published as part of each article make handy quick reference sheets.

Some have been plastic-coated and wall mounted while others have been taped down on the inside cover of the manual which accompanies the library.

There is a file in my word processor ti-

tled "Odd & Ends." In this file are stored facts and figures which, while important, do not require a full column to discuss.

The most recent addition to the file is a product from Otari. It is the EC-201 Handheld Time Code Reader. Weighing in at 1.2 lbs. and relatively small (1.5" x 4.2" x 5"), the EC-201 is a compact time code reader which receives SMPTE/EBU longitudinal time code, reads it, reshapes it (if necessary), displays it and sends it out.

Otari has designed the unit to be powered by a plug-in power supply or

four enclosed "AA" cells. Included is a belt clip for portable use.

On the set

Ed Bannon is DE and one of owners of Taj Sound Works, a soundstage where they work on Foley and sync sound for feature films. Work is currently being done there on a Spielberg documentary about the making of *Roger Rabbit*.

With some humor, Bannon was impressed that any device with SMPTE could cost less than \$1,000, and considers it, "a pretty no-nonsense unit." In addition to its ability to read and reshape

time code he thinks the EC-201 acts as a good buffer if you're feeding more than one machine.

Grounding irregularities can cause machines to scramble or lose track of time code. Some time code synchronizers will lock to anything, but that doesn't mean a good lock.

If the time code is not stable the slave machine will create wow and flutter as it tries to make sense out of a scrambled time code. These problems are minimized because the inputs and outputs of the EC-201 are balanced.

Bannon uses a Nagra TC recorder for some of his work. The TC designation refers to the ability of the machine to record and playback time code. Even though the Nagra has a SMPTE LCD display, Bannon uses the EC-201 because of its light weight, small size and LED readout.

The EC-201 also comes in handy for troubleshooting. By working your way back up the SMPTE chain and checking the readings you can quickly find which piece of equipment or cable is causing time code problems.

Wayne Wagner of Sprocket Systems, the sound rerecording and editing part of Lucas Films, has put several EC-201's into service. His people use them in the field, in less technical areas where editors need to find and list takes on 1/4" magnetic tape and 35 mm magnetic striped film. Like Bannon, he keeps one in the toolbox to troubleshoot malfunctioning SMPTE systems.

Putting it to work

The EC-201 is capable of reading time code or user bits at 1/20 to 60 times normal play speed which allows the unit to stay locked during varispeed play, cueing, fast forward and rewind.

The unit we tested out of the box required a minor EQ adjustment to keep up with the 1" video machine to which it was connected when that machine was put into fast forward. This is a front panel adjustment and is well documented in the manual.

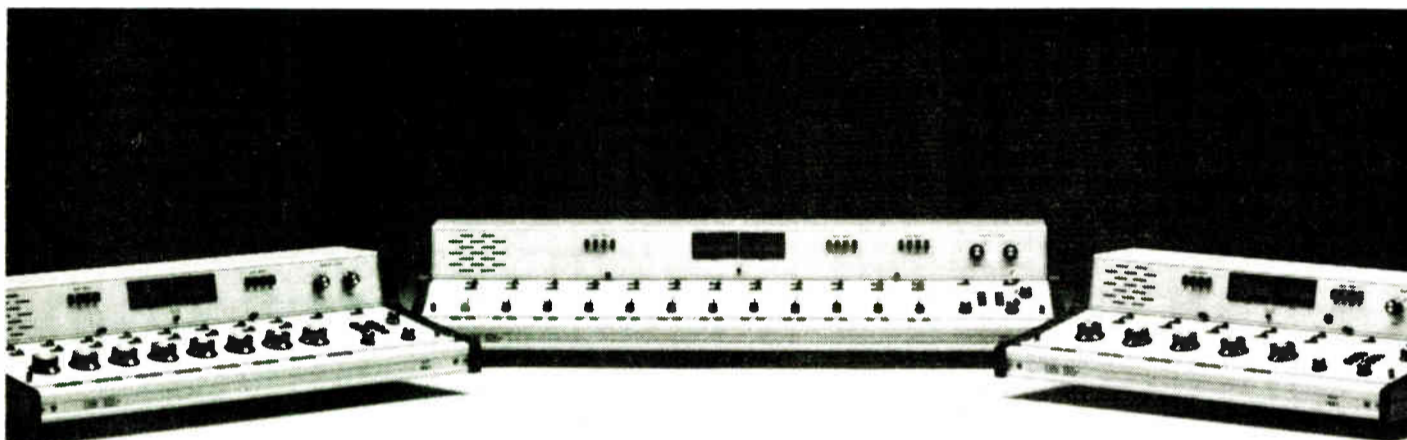
A drop frame indicator, run indicator and hold button are also on the front panel. The hold button freezes the last time code word or user bit until it is pressed again.

The rear panel contains the XLR input and output, the 9V power supply input jack and the off/auto off/on switch. In the auto off mode, the LED display on the front panel turns off anywhere from a user adjustable two to 12 seconds after the last time code is received.

This feature greatly lengthens the projected 40 hour continuous life of the four "AA" 1.5V alkaline batteries. If the external DC supply fails, the EC-201 automatically switches to battery operation.

The well thought out manual includes schematics and appendices for modifying the Otari MTR-901, MTR-901I, MTR-10/12 and MTR-200 tape machine by

(continued on page 24)



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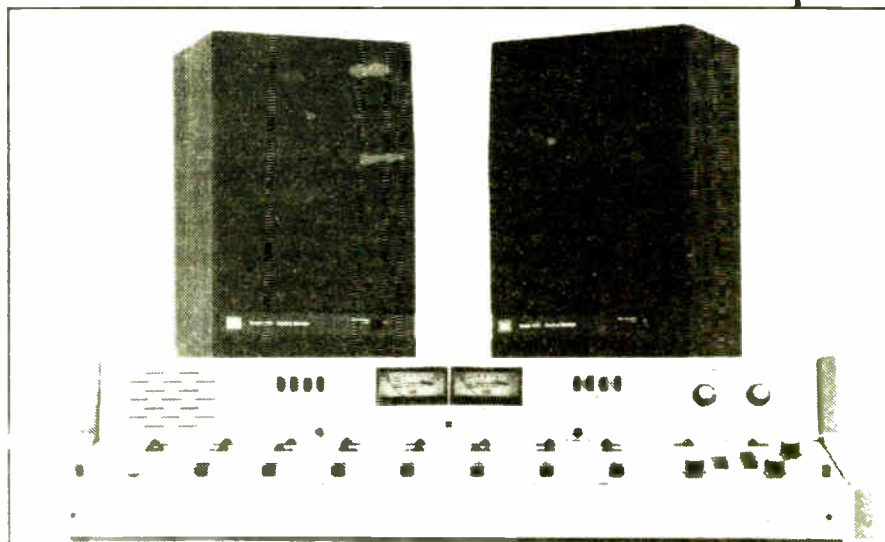
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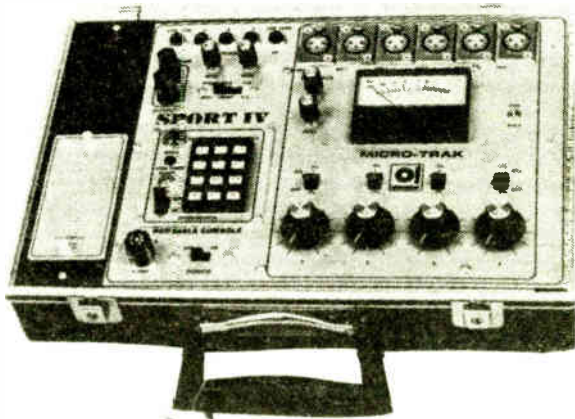


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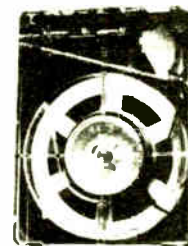
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AA-4

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100 Second		
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3.5 Minute	3.75	5.35
4.5 Minute		
5.5 Minute		
7.5 Minute	4.25	6.45
10.5 Minute		

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Notes on Time Code, Mic Repair

(continued from page 22)

converting an audio channel into a dedicated wideband time code channel.

Before considering this modification, remember that the tape lifters must be disengaged so that the time code can be read in the fast forward and rewind modes. This extra wear will shorten the life of your headstack.

The specs for the EC-201 are: input impedance 10 KΩ balanced; input sensitivity -10 dBV (not to exceed +10 dBV); output impedance 2 KΩ balanced; Level

+4dBV; rise time 25 μsec.

The suggested list price for the EC-201 is \$525, which means you can probably find one for \$450. For more information about the EC-201 contact Wende West at Otari at 415-341-5900.

Old mics, new life

During a recent session I had a client comment on the old RCA mics (44B and 77DX) sitting on the shelf. Because neither works as well as it should I seldom use them.

I rescued both at different times from different radio stations where they were headed for microphone purgatory, that box of old equipment kept in a dark corner of the transmitter room. I began thinking about where to send them for repair, made a few calls and came up with several names and numbers you might find useful.

Gordon Windam, Clarence Kane and Charles Gant, all of whom spent considerable years at RCA, left or retired about the time RCA was sold. Gordon

Windom, now deceased, was part of the New York operation.

According to Roger Boynton of Boynton Studio, Windom's widow contacted Boynton several years after his death and sold them all of the spare parts and supplies her husband had purchased from RCA before it changed hands. Pete Kertzman of Boynton has been rebuilding old RCAs ever since.

According to Boynton, they even have a limited supply of the original paint used on the mics. Rebuilds from Boynton cost an average of \$125 and take from two to six weeks. Contact them at 607-263-5695.

Charles Gant was part of the west coast RCA operation. Although now retired from RCA, he spent about 20 years supervising the manufacture and repair of RCA microphones and galvanometers and still repairs up to 300 microphones a year. The galvanometers are used to transfer audio impulses to the edge of the film in RCA's optical (movie film) recorders.

Like Gordon Windham, Gant bought the repair supplies and tooling gear from RCA. Because of the fragility of the ribbons Gant doesn't like to ship the mics over long distances. Most of his work now comes from studios in the West. Gant says a typical rebuild costs between \$65 and \$115. You can reach him at 213-867-1078.

Clarence Kane worked out of RCA New York for many years. Like the other two men, he acquired manufacturing and repair equipment and supplies upon leaving RCA. When I spoke to him several months ago his price range was \$125 to \$150 for rebuild and repair. Try reaching him in New Jersey at 609-589-6186.

Perhaps because the first mic I ever broadcast over was an RCA 77DX, I have a special affection for them. I haven't decided whether to put mine back into service when they return from being rebuilt or to retire them as objects of technological art. What would you do?

Ty Ford, audio production consultant and voice talent can be reached at 301-889-6201 or by MCI mail #347-6635.

FCC Shuts Down California Booster

(continued from page 3)

both stations it would arrange a field inspection to determine if the two facilities were operating according to their authorizations.

Ten days later, KKIS's formal response reached the FCC, again insisting that KALW's accusations of interference were unfounded.

On 28 September 1987, the FCC's completed field inspection report showed, first, that KALW was operating in accordance with the Commission's rules. But

regarding KKIS, it revealed the 1 mV/m contour of the primary station "may have been extended by the signal of the booster station" and it appeared "additional limiting may be required to prevent excessive bandwidth under all conditions of operation."

KKIS asserted in response that before the July 1987 modification of booster rules, no adherence to the 1 mV/m contour was required and that the station should be "grandfathered." The FCC said that this was incorrect.

The Commission then, on 28 June, insisted that the station suspend operation of its booster.

"As soon as the booster was cut off, we started getting phone calls from listeners in areas where we hadn't before been effective with our signal," said KSJO's Williams. "It sounds wonderful."

The next step for KKIS is a Petition for Reconsideration, which the station planned to file as press time approached. In its Petition, Green said KKIS will restate the original premise that there is not "a significant amount of energy out there to cause a major problem."

To deal with the interference confirmed by the FCC, Green is considering installation of an STL to solve the bandwidth problem and to eliminate overshoot.

KALW, meanwhile, hoped to protect what it said is again a clean signal, while co-existing with KKIS.

"We do not want them to not have the booster. We want them to have a booster that does not cause interference to either KALW or KSJO," said Evans.

Added KALW Station Manager Daniel del Solar, "These have been three agonizing and expensive years. We're not finished with these guys yet."

For more information, contact KALW-FM at 415-648-7530; and KKIS-FM at 415-682-2832.

Convention '88 Coverage

(continued from page 13)

engineer for CBS in New York.

ABC Radio carried to Atlanta the same package it had assembled by McCurdy for \$1 million in 1984.

"I think in 1984 we may have been a leap ahead of everyone else in the equipment we're using, but they've probably all caught up with us now," said Horace Easterling, manager of technical operation in the Washington news bureau for ABC.

He added, "I suspect now that the state-of-the-art has made it possible that we could do a lot of what we're doing in a much smaller package. But we have a package that we invested a lot of money in that's still working very well."

For the Republican convention, Easterling planned to take the same broadcast gear, though it probably won't be fully

utilized.

"We'll transport it all there because it's here and it all goes together," said Easterling, "but we may not use all of it. I don't see any reduction in manpower, except some peripheral folks, maybe daily hires and runners, things like that."

"It appears that everybody is cutting back in New Orleans," he said. "Most people don't see much of a story out there. It's a coronation."

CBS's already lean technical staff of three will duplicate its broadcast set-up for the Republicans, according to Scherer.

Westwood One also will use the same package of custom-designed equipment, which it will transfer from New Orleans to the September Summer Olympic games in Seoul, South Korea, and then to the Amnesty International concert in Buenos Aires, Argentina a month later.

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BUYERS GUIDE

Consoles

WRTI-FM Produces with SP-6

by Mark Humphrey, Asst GM/CE
WRTI-FM

Philadelphia PA ... We had some unusual requirements when we selected new equipment for the main production room at Temple University's public radio station, Jazz 90/WRTI.

Because our plans included production of live music from an adjacent performance studio we needed a multitrack console with plenty of mic inputs and "recording studio" features, such as equalizers on each input module, effect sends and returns and a solo buss.

However, our new board would also be used for typical radio production using cart machines, turntables, CD players, R-DAT and Beta PCM digital tape, and analog two-track recorders.

We wanted the console to include muting logic and machine control features like our on-air boards. And it had to be durable and fairly simple to understand to facilitate training the students who perform duties at our station.

WRTI has been using three Wheatstone A-500a on-air boards for nearly two years and I have been impressed with their audio quality, durability and reliability. Based on this experience we chose Wheatstone's SP-6 multitrack console for our new production studio.

Similar features

The SP-6 shares many features and circuit design with the company's other broadcast consoles. Mic inputs are transformer balanced; all other inputs and outputs are active balanced.

The signal path is simple with audio passing through conductive-plastic faders and switched by miniature long-life relays.

The modules are finished with reverse silk-screened Lexan film. The mainframe uses ribbon cable rather than a motherboard for its audio, logic and power busses.

Wheatstone offers numerous module options on the SP-6 series. Our console has 12 mono mic/line input modules which include a gain trimmer, 20 dB pad, polarity reversal switch, 125 Hz high pass filter, three-band semi-parametric equalizer and switchable phantom power.

The remaining 12 input modules on our board accept dual stereo line inputs. Each includes a mode selector, three-band equalizer and bal-

User Report

ance control.

Each input module can be assigned to any combination of the eight group busses, master stereo buss, four effect send busses or stereo solo/cue buss.

Like most on-air boards the SP-6 input modules have on/off pushbuttons which control audio, muting and timer logic and can start and stop external playback equipment.

There are four multitrack group modules on the console; each controls one send buss, one effect return input, two

group outputs and two multitrack tape inputs.

Track assignment

These modules are capable of assigning each tape track to send busses one and two to create a headphone mix for studio musicians and can also mix the eight tracks down to stereo or mono



WRTI's Mark Humphrey with the Wheatstone SP-6

without tying up input modules.

The monitor module controls studio and control room monitors, headphone and solo levels, and talkback. A four-frequency oscillator and timer are also included.

We purchased a 24-input mainframe, however the SP-6 is offered in standard versions up to 32 inputs. The design permits modules to be arranged in almost any configuration. The people at Wheatstone are able to provide custom modifications at reasonable cost.

Looking at the specs

Audio performance of the SP-6 exceeds most of the specifications of our test set, so it was not possible to obtain

valid distortion measurements.

However, Wheatstone claims better than .005% THD at 1 kHz, and .003% IMD on mic and line inputs. We measured SNR of nearly 90 dB on line inputs and 76 dB on mic inputs at normal operating levels (+4 dBu on line inputs/outputs, -5 dBm on mic inputs).

With all 24 input modules assigned to the master buss the residual noise was down 74 dB from normal output level.

Our frequency response tests indicated that both the mic and line inputs are within 0.1 dB from 20 Hz to 20 kHz. The line inputs are down 1 dB at 64 kHz, and mic inputs are down 3 dB at 36 kHz.

Console installation was straightforward. The power supply is in a separate package which takes up two units of rack space. All audio connections to the input modules are through XLR connectors, except for the insert points on the mic modules, which use 1/4" connectors.

The remaining audio connections are through 25-pin DB connectors and nine-pin DB connectors are used for logic. Wheatstone provides mating insulation-displacement DB connectors which accept Belden 8451 or West Penn 291 cable but may not work with larger conductor sizes.

Survived the ride

Unfortunately our console was damaged in shipment when a heavy object smashed through the top of the shipping crate and pushed down on several modules, causing the mainframe pan to bend in the middle.

However, due to the flexibility of the ribbon cable buss, the console still worked despite the physical damage. Of course Wheatstone made all of the repair arrangements and we had the console back to us in perfect condition within a month.

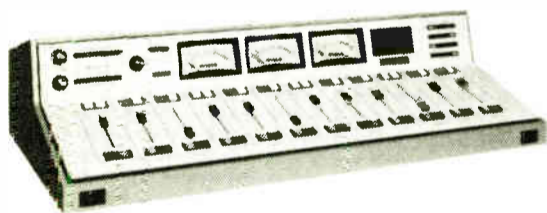
In general we are very pleased with the features and performance of the SP-6. Many of our students have been able to use the new board without special training because of its similarity to our on-air boards.

An improvement would be a separate cue buss for line inputs; the present design uses the solo buss for cueing. We needed to provide an outboard cue amplifier and speaker to avoid interrupting the monitor output when cueing records.

The Wheatstone SP-6 is worth considering if you require a sophisticated production console that can handle unusual tasks. We are confident that it will still provide excellent service at WRTI many years from now.

Editor's note: SBE-certified Mark Humphrey began his broadcasting career in high school, where he started an FM station. He may be reached at 215-787-8405.

For more information on the SP-6, contact Gary Snow at Wheatstone: 315-455-7740.



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BUYERS GUIDE INDEX

User Reports on Consoles:

Wheatstone SP-6 Multitrack by Mark Humphrey, WRTI	25
Broadcast Electronics Mix Trak 90 by Steve Samet, WZOE	27
Harrison PRO-790 and AIR-790 by Dick Byrd, WZGC	28
Radio Systems RS Series by Bob Turner, Bdcst Consultant ..	29
Ramsa WR-8428 by Paul Sanchez, WBL/WLIB ...	30
PR&E Stereomixer by Dan Steves, XTRA	33
Autogram R/TV-12 by Bill Ryan, KVIL	34
Auditronics 424 by Douglas Fearn, WKSZ	35
McCurdy Series S by Kenneth Stout, WPAT	36
Harris Medalist by Mark Jividen, WMNI/WMGG ..	36
Yamaha DMP-7 Digital by Rob Meuser Int'l Bdcst Support Services	37

Also, an article from Arrakis Systems.

Finding the Console Suited to Your Needs

by Barry Mishkind, VP and DE
KTZR-AM/KFXX-FM

Tucson AZ ... No doubt about it, the audio console is the heart of a radio station.

It is also the electronic funnel through which all our audio passes on its way to the transmitter. Therefore its smooth, clean operation is critical to the station's sound.

Yet over the years our needs and wants in the control room have changed quite a bit. So the console, like the control room, seems to be in a constant state of adaptation.

For instance, it wasn't so long ago that a couple of turntables, a couple of cart machines, a tape deck and a remote input provided the great bulk of audio in a station.

Nowadays the control room console may often have to handle five or six (or more) cart decks, CD players, turntables, additional microphones, news, telephone, EBS, booth and RPU—and at the same time have dedicated pots for some of these things that used to be on the remote selector.

Indeed, it often takes 12 to 14 pots or

more in a low profile frame to satisfy many "active" control rooms.

On the other hand, the requirements for production room consoles often call for even more complexity: equalizers, limiters, special effects units, etc. Even automated and semi-automated stations require a console to produce the commercials and other inserts.

Finding the right console to fit the needs of the station is not always straightforward. Among the various considerations are not just technical and ergonomic factors but also those dreaded budgetary limits that are decreed from above.

The differences

In surveying the range of consoles available one finds there are as many different philosophies of console construction as there are manufacturers.

Electronically the console manufacturing industry now routinely designs products with ruler flat response and virtually immeasurable noise and distortion. Typically, the basic console produced today far exceeds broadcast requirements.

Choices truly abound as one considers

Industry Roundup

needs of the station is not always straightforward. Among the various considerations are

BUYERS BRIEFS

LPB's Signature III series consoles include 6, 8 and 10 mixer duals, both mono and stereo, and a 12 mixer dual in stereo. All are identically functioning full dual consoles, i.e., the only difference between any two stereo (or mono) consoles in the line is the number of mixers and associated inputs.

Frequency response for all programs is within 1.0 dB, 20 Hz to 2 kHz; for monitoring it is within 1.5 dB, 20 Hz to 20 kHz. SNR for all program measures better than 75 dB below +8 dB output, -50 dBm input.

Remote start pushbuttons are standard and optional mono mixdown is available on all stereo models. A headphone amplifier has been added that can accommodate any impedance headset. Headphone jacks are located on both ends of the front panel.

Signature III consoles offer three inputs per mixer, rotary Shallco step or optional Penny & Giles faders, plug-in modules, LED peak indicators, switchable mic gain, all transformer inputs and outputs and demonstrated

RFI immunity.

Every fader has a cue position, and the consoles include an internal cue amplifier with a built-in 5" speaker and monitor amplifiers with outputs of 12 W per channel.

For more information, contact John Tiedeck at LPB: 215-644-1123, or circle Reader Service 66.

Audio Technologies Inc.'s BC12DSL Vanguard Series console features 12 mixers and 24 stereo inputs. A compact 32" wide, it is modular for easy serviceability.

The mixer contains four input headphone amplifiers, four input muted monitor drivers, two microphone preamps, a cue amplifier and speaker, VCA level controls and electronic audio switching.

Options include a 10-input expander for 32 total inputs, dual stereo fluorescent meters, start-stop switching and Penny & Giles faders.

For more information, contact Ed Mullin at ATI: 215-443-0330, or circle Reader Service 51.

the merits of VCA versus analog audio, rotary versus linear pots, the familiar key switches versus push button logic or modules versus larger motherboards.

Further, the addition of mix-minus busses seems a general trend in many consoles, as are optional modules for every conceivable need, from equalization to compression to machine control.

Another point of consideration is whether the console is to be used on air or for production. The answer can lead to quite different features to be specified.

The range of cost is just as wide. Consoles can run from under \$1,000 to, well, more than the asset value of some small stations!

Getting the best bang for the buck

So how is it possible to choose between the various units available? What does it take to be an informed buyer? What are the important criteria?

Obviously, it is important to end up with neither a console that is too limited to accomplish your needs nor a console that is overkill.

By way of example, one station I know had eight primary sources mixed on two pots! Another had in its control room a console with so many pots, EQ adjustments and other features that the weekend DJs often became confused, resulting in on-air errors.

A good place to start is to spend a few minutes with the program director. Try to find out what equipment is needed or desired for planned operations. Finding out what occasional needs might come up will go a long way towards preventing "pot jamming."

Next, a prospective budget for the console must be devised, either by suggestion from engineering or by fiat from above. The reason for starting with a

(continued on page 30)

MOST WANTED



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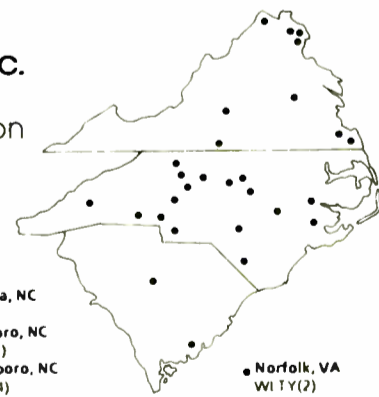


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Circle Reader Service 26 on Page 24

The numbers tell the story.

Audiotronics, inc. has delivered more consoles to this region than all others in its class combined.



- Arlington, VA
Gerald Lewis Recording
- Asheville, NC
WLOS-TV
- Black Mountain, NC
WFGW (2)
- Chapel Hill, NC
WCHL
- Charleston, SC
WCSC-TV
- Charlotte, NC
WLTK
WSOC(3)
WTVI-TV
WWMG(2)
- Columbia, SC
WDPN(2)
- Danville, VA
WDVA(2)
- Durham, NC
WDCG(2)
WDNC
WDXU(2)
WFXC
- Falls Church, VA
WFAZ
- Fayetteville, NC
WFSB
- Gastonia, NC
WZLX
- Goldsboro, NC
WGHR(2)
- Greensboro, NC
WCOG(4)
- Hendersonville, NC
WKIT(2)
- High Point, NC
WMAQ(2)
- Laurinburg, NC
WSIS
- Lynchburg, VA
Old Time Gospel Hour
- Monroe, NC
WDIX
- New Bern, NC
WCTI-TV
WSFL
WTHB(2)
- Norfolk, VA
WITY(2)
WTAR(2)
- Raleigh, NC
WKIX(2)
WYYD
WPIF-TV
WPTF
WQDR(2)
WRAL-TV(3)
WRAL(6)
WRDU(2)
WPII(2)
Capitol Broadcasting (10) (Group locations not shown)
- Richmond, VA
WRNL(3)
WRVA(3)
WRXL(3)
- Salisbury, NC
WSTP
WRDX(2)
- Tobaccoville, NC
MKB Recording
- Virginia Beach, VA
WCMS(3)
CBN
WNVZ(2)
- Washington, DC
USIA(3)
WETA
Westinghouse
- Washington, NC
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WTQH(3)
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Circle Reader Service 34 on Page 24

BUYERS GUIDE

Mix Trak 90 a Winner for WZOE

by Steve Samet, GM
WZOE-AM/FM

Princeton IL ... Buying a console is an emotional decision; it has to be.

I'd been looking at consoles for two years without a glimmer of inspiration. Intellectually I know that most consoles are built well and that most spec out

User Report

well, but it's difficult to get charged up about a console that lacks flexibility.

And most do lack flexibility, you know—that's the tradeoff to keep the price down.

Uninspired or not, I headed for the SBE convention last fall with the firm intention of replacing our faithful but aging AM console.

As it happened John Burtle and the crew from Broadcast Electronics were in attendance with prototypes of the then-unannounced Mix Trak 90 console.

I spent a half hour with the Mix Trak 90 and, a month later, placed a firm order for the unit.

BE has a winner here. Let me tell you why.

The Mix Trak 90 is a modular board and is available in two models: a 12-channel and an 18-channel. The 18-channel offers more metering options but otherwise the features and options are identical on both models.

Out of phase detection

Three mix-minus busses are available for telephone configurations or for driving other equipment. Monaural program output is available through a module which selects the program or audition bus while it monitors phase.

An out-of-phase condition causes a

warning light to turn from green to red. The operator can correct the condition by simply pressing a button on the module.

Other operator conveniences include headphone split, speaker dimming and almost unlimited remote start and sequencing options. An FSK decoder board is available if you'd like to do remote logging of commercials.

One of the nice features of this console is that you can configure it the way you want it for your operation. We run a news/talk operation most of the day and we need a lot of inputs.

By purchasing four expander cards we have over 50 inputs on a 12-channel Mix Trak 90 with virtually limitless routing of those inputs. Believe it or not, we no longer have a patch panel in this control room. Happy day!

When you consider the Mix Trak 90, you'll have to consider size. The console is somewhat larger than other modular



BE's Mix Trak 90 console

boards, but not dramatically so.

Modules are 2" wide. It's a little early to tell for sure, but I believe that the slightly larger modules will make the board easier to operate than it would be if they were smaller.

All controls are easily reached and are logically placed. The backlit meters and the clocks (time of day and elapsed time) are large and easily read.

In short, the console has been designed with the operator in mind.

The Mix Trak 90 should please the station engineer, too. As you might expect, all output modules are redundant and interchangeable.

All modules can be removed and inserted with the power applied and the board on the air. Changes take only seconds. Should a board need to be in circuit for repairs, ribbon cables with appropriate plugs are supplied, thus ending the need for the ever-unusable extender card.

PD appeal

I've asked BE to consider writing a short operating guide for the Mix Trak 90 directed at program directors. The idea is to give PDs some insight into the incredible flexibility of the system.

For example, patch points are available on the mixer cards for external signal processing. Many PDs may not be aware that this important feature is readily available even though it is amply documented in the tech manual.

It would be a real shame for an option to go to waste simply because a PD was unaware of its existence.

The Mix Trak 90 is slightly more expensive than some other control room boards, but when you do the math you'll find that the difference between the Mix Trak 90 and an economy board is insignificant when taken over the life of the console.

If the model fits the need why put up with years of engineering headaches just to save a few dollars up front?

We have had our Mix Trak 90 in service for about three months now. It has performed up to expectations and both the operators and the engineering staff give it high marks.

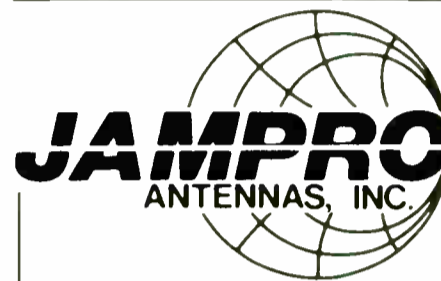
The people at Broadcast Electronics, as

always, are eager to answer questions and provide technical assistance.

If you're even thinking about a new board for a control room, get the literature on the Mix Trak 90. Better yet, get your hands on one at the next convention. But be forewarned: your cool, intellectual business sense might be influenced just a little by your emotions. This is one nice piece of equipment.

Editor's note: Steve Samet has been with WZOE since 1975. He is a graduate of the University of Illinois and was a US Army officer during the Viet Nam conflict. He may be reached at 815-875-8014.

For more information on the Mix Trak 90, contact Tim Bealor at BE: 217-224-9600.



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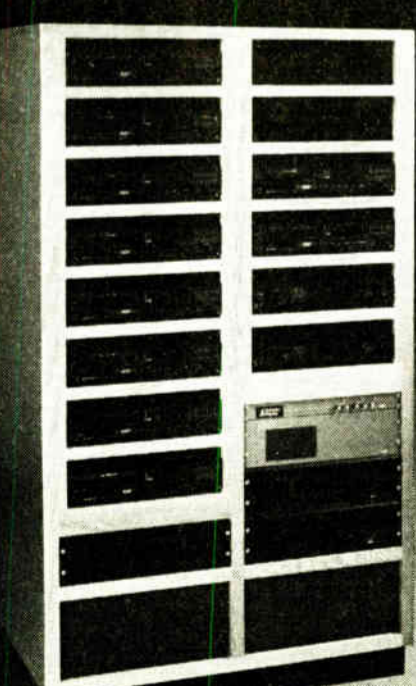
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BUYERS GUIDE

Z-93's Harrison Board Shines

Dick Byrd, CE
WZGC-FM

Atlanta GA . . . When we began to finalize plans last year to move the Z-93 studio facilities from midtown Atlanta to the suburbs engineering attention focused on the more expensive items that would be installed.

Since most of the tape machines, CD players, turntables and the like were to be reused it was obvious that consoles and cabinets would comprise most of the equipment budget.

After seriously considering three manufacturers to build our consoles we chose Harrison. I became aware of Harrison's dedication to build a "broadcast console" through the efforts of Kandy

User Report

Shute of Broadcast General Store.

Harrison's reputation throughout the recording industry has been impeccable for many years but broadcast applica-

tions present different hurdles to jump.

To familiarize myself with Harrison I spent a day at its Nashville plant finalizing the configurations of the three consoles we were to purchase. We saved a great deal of money in the process because each application was discussed and the most appropriate resolution for each was implemented.

To save money on shipping costs we sent our station promotions van on the four-hour trip to the factory to pick up the consoles.

Since Harrison had the consoles ready

weeks ahead of schedule we were able to physically take them to the cabinet shop for custom fitting.

Harrison has a policy of sending the purchaser a pre-install kit soon after the order is placed. The kit includes the manual, a Molex tool (which doesn't work) and a few thousand crimp pins.

I personally like Molex connectors, so it suited me just fine that Harrison consoles utilize them for all the "goes-ins" and "goes-outtas." It makes installation and future changes a breeze.

The success of a Molex crimp, however, depends on the crimp tool used. The one shipped by Harrison is made by Waldom and is recognizable by its yellow grips. It doesn't crimp properly.

A previous Waldom model which looks the same except for its red grips works great. I've also had moderate success with a rather expensive ratchet-type tool made by Paladin.

External start and stop

Z-93 bought one model PRO-790 and two AIR-790 units—all three utilizing the same mainframe layout. The difference lies in the plug-in modules. We outfitted the PRO-790 mainframe primarily with modules that sport a few more knobs, switches and lights.

For the control room we chose the less expensive and less cluttered input modules.

One of the first amenities that drew my attention to the Harrison was a little red switch on each module labeled "Next."

Proper utilization of this little fellow allows us to sequence our ITC model 99 playback cart decks without additional hardware. (Our old studio had a bank of switches external to the console that allowed the operator to select which machines should sequence.) A start pulse is provided when the channel is switched on for external equipment.

We hooked it directly to the cart machines, CD players and reel-to-reel machines. The old model SP-IO turntables required an interface adapter to provide a stronger tug on the line.

Designers also allow an external pulse to turn off the channel when the attached cart machine finishes. Yet another TTL connection prevents the channel from being turned on unless a cart is ready to go.

Jumper versatility

Personality programming of individual modules is accomplished with those little jumper connectors you see on a computer circuit board.

With jumpers you can elect to start the built-in digital timer at channel turn-on, activate any or all three mute and tally busses, vary the gain significantly, assign auxiliary buss feeds to either pre- or post-fader connection points and even cause the channel to turn on when the fader goes up.

Monitor modules include independent control of earphone and speaker level with line-level audio sufficient to drive external power amps. A companion module provides monitor audio and intercom for two other studios in the station.

The external power supply for the console is among the heaviest I've seen. The standard 30' cable allows installation in a rack where ventilation is adequate. I've
(continued on page 36)

RADIO Classics

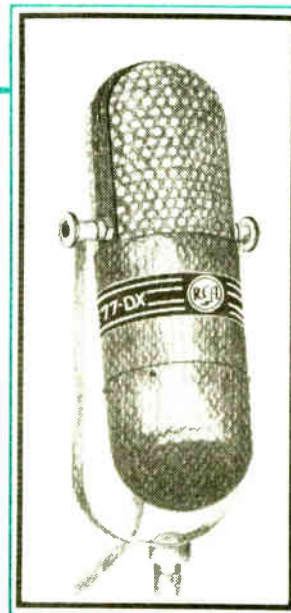
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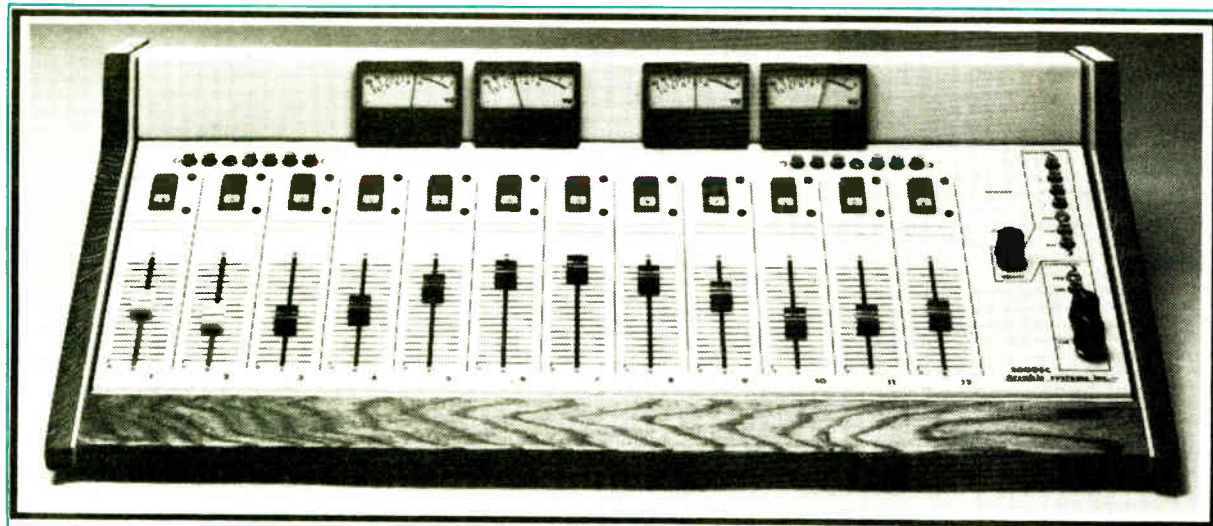


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Circle Reader Service 30 on Page 24

BUYERS GUIDE

RS Series: Low Cost Quality

by Bob Turner
Broadcast Consultant

Bakersfield CA ... Recommending a console to a client, be it new or a replacement, can be an interesting dilemma. If the client is predisposed to make the purchase the budget allocation is generally not enough to support one of the high-powered, "name" brand consoles which run anywhere from \$10,000 to \$20,000.

So in the name of economy, you begin to look at the lower end consoles and find they either are "toys" in terms of construction or are remarkably similar to the 30-year-old relic which is destined to be replaced.

Radio Systems, among other heads-up manufacturers, has developed a new series of consoles known as the RS Series. The consoles come in 6-, 12- or 18-channel versions.

User Report

I first saw a full color ad for the product and subsequently saw the box at NAB. It met most of my expectations for what a good, well-priced console should be.

I am reluctant to be the laboratory rat for manufacturers, but in this instance I chose to make an exception, and recommended the console to my client. I have been pleased with the results to date.

The console has a clean, neat layout which is impressive to the eye (an element which many manufacturers overlook: if you're spending a lot of money on a product, it had better look like a lot of money).

Radio Systems has used the de facto standard of channel on/off and starts below the P&G fader, with the buss selectors and input selectors above the fader.

Internally the console is built around six-channel motherboards which handle the input switching, dbx VCA mixing and buss routing. The third major circuit card takes care of the mixing, outputs and monitoring functions.

The in and out connections are made at the rear of the console on the six-channel motherboards; inputs are very simple to move around and to prewire. The inputs are differentially balanced instrumentation amplifiers and the outputs are all active-balanced.

Each input is universal in nature and may be mic, line or unbalanced consumer level. With appropriate resistors on a DIP header the nature of the input may be quickly changed.

Logic functions may be assigned or not assigned via Berg jumpers and follow the input selector switches.

Editor's note: Bob Turner is a consulting broadcast engineer with more than 20 years' experience. A former station owner, he is based in Bakersfield and serves clients throughout California. He can be reached at 805-835-8869.

For more information on the RS Series, contact Dan Braverman at Radio Systems: 215-356-4700.

The facilities for remoting machines are quite simple and easy to interface to many of the newer tape and cart machines. Radio Systems does, however, supply optional interface boards which convert the logic level outputs to dry contacts for the older style machines.

The monitor section is very good in scope and layout. Monitors and headphones are independently selectable and, as a nice touch, the monitor inputs accept unbalanced sources. So if you're using a consumer receiver for an air

monitor, the levels will come out right.

The console has program, audition and mono busses standard and full VU metering with peak indicators for all busses. As a bonus, a resettable timer is also included.

Radio Systems has a two year warranty on the product for parts and labor and will ship overnight to meet the warranty.

The true advantage of this console is the combination of the aesthetics of the package and the price. The 12-channel



The full-featured RS Series from Radio Systems

version is just under \$6,000, or about \$500 per channel. The RS-18 runs just under \$8,000, or about \$440 per channel. The six-channel version is about \$4,000.

If you are in the market for a well-priced, full-featured console, the RS Series from Radio Systems deserves a thoughtful look.

BSW

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By Henry Engineering

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BUYERS GUIDE

Selecting a Console

(continued from page 26)

budget guideline is underlined by conversations I have had with several console manufacturers.

As Garrett Conover of Radio Systems said, "Many manufacturers see only two ways to build a console: either making cost the prime objective or making cost of no consequence. The wise engineer must search to find the middle ground of cost versus performance that fits the station."

Radio Systems has tried to fill this middle ground with its RS-12 console. It is already proving popular, with some 50 units sold since the Las Vegas NAB convention.

In presentations to local engineering groups, Jack Williams, president of Pacific Recorders & Engineering, makes the point that it is important to clearly set priorities for the design criteria.

"Equipment should be judged by considering and balancing not only price, but unit reliability, needed features, serviceability and overall performance," says Williams.

He feels that PR&E's BMX and AMX consoles were designed to provide just such a balance for many stations.

Howe Technologies' VP of marketing and sales Terry Sweeney agrees and says options are important.

"The blend of price to features to performance varies by how the manufacturer perceives what you really want and need. A manufacturer that offers numerous options effectively allows the engineer to create a custom console at a modest cost," says Sweeney.

Arrakis is another maker that fairly challenges you to design your own console with 50 optional modules.

User input important

Manufacturers' perceptions of what is needed have been based at least in part on input from the actual users—DJs and

production personnel.

Broadcast Electronics' Mix Trak 90 and Logitek's Perfectionist consoles feature wider pot spacing.

"Many disk jockeys were looking for a less cluttered console; our response was to spread the pots out," says BE's Tim Bealor, manager of audio products.

David Harrison, president of Harrison Systems, took a similar tack: "We asked a number of disk jockeys what features they felt were necessary to make their jobs easier," he says.

The Harrison Air 790 is the result. Some major stations have found it to be exactly what they wanted.

Customer support after purchase, warranty services and replacement parts costs all should be considered at the time a new console is ordered. Nothing lasts forever without some repair.

As you look through the reviews here, notice how each writer lists the features he feels are most important.

Remember that his agenda may be different than yours. Make a list for yourself and even call users for further opinions. And watch **Radio World** for an upcoming series of tips right from the manufacturers to find exactly the right console for your station's needs.

Editor's note: Barry Mishkind is RW's eclectic engineer who's always writing about something. He can be reached at 602-296-3797.

TUNED IN

New Directions ... The L.J. Scully Manufacturing Corp. recently announced the formation of a **service and parts subsidiary** dubbed the **ATR Service Center**, geared toward professional reel-to-reel audio tape recorders of all makes. The company will expand its present tape equipment manufacturing operation in order to provide replacement parts for the large base of ATRs now in use.

According to company president **Jerry Scully**, the facility has already been re-tooled for the manufacture of pinch rollers for Scully, Ampex and MCI machines of all vintages and will expand its line of parts from there. For more information, contact the ATR Service Center at 203-366-1700.

People ... Long-time broadcast console manufacturer **Auditronics** has gained **Murray Shields** as its new director of sales. Shields boasts an extensive background in the broadcast and production industries.

Prior to his most recent appointment Shields was VP of sales for ADM Technology in Troy, MI, and before that was VP of Eastern Sound in Toronto ...

Speaking of appointments **Gentner Electronics** just named **Curtis Carroll** as a new member of its **Broadcast Audio Division** sales team. Carroll had been the general sales manager for KKIX-FM in Fayetteville, AR.

Also in the news is **Alphonse Cris-**

cuolo, who has been promoted to the position of **sales and marketing manager for Cablewave Systems**. Crisculo will be responsible for overseeing all advertising, sales and marketing activities for Cablewave's product line. He was formerly Cablewave's market manager.

Of Special Note ... It looks like the broadcast industry has gained a new service. **Broadcast Intelligence, Inc.**, an investigative research firm in **Tucson, AZ**, says it will assist broadcast licensees, applicants and their communications attorneys to "read between the lines of FCC filings of competing applications and petitions."

Company principals include **Arthur Ginsburg** who is past chief of the Complaints Branch and past chief of the Complaints and Compliance Division for the FCC.

For more information, contact **Jay Zucker** at 602-293-6818.

Westfield, NJ-based **Statistical Research, Inc.** recently announced its introduction of a new form of electronic reporting for its **RADAR** service. **PC//SCAN** is an electronic form of the current printed reports provided to clients, which include **ABC, CBS, NBN, SBN** and **WVO** networks.

If you have industry/equipment news to report, send it to **Radio World Buyers Guide**, PO Box 1214, Falls Church, VA 22041.

Ramsa Sounds Sweet to WBLS

by **Paul Sanchez, CE**
WBLS-FM/WLIB-AM

New York NY ... There are three reasons I chose the **RAMSA WR-8428**. The number one reason is the sound. The console is wonderful to listen to—very

sweet sounding.

The second reason is the fact that the board offers a stereo line module which is not available in all production boards. Building in a stereo line module makes the console much more usable for a broadcaster.

Thirdly, I can configure the way I want, easily and for about a quarter of the cost for a broadcast production console.

At the station the console is used primarily for production of commercials, station promos, contests, IDs and station drops and on the air.

Because of its versatility it has also been used for live on-air performances.

In the studio my equipment consists of the **WR-8428**, two **Otari MTR-12-4s**, two **Otari MTR-10s**, two **ITC Series 99**

cart recorders, two **CD** players, two turntables, two cassette decks, four microphone inputs and a variety of network and other outside lines.

Some of the commercials I've produced on the console have been for such companies as **CBS Records**, **Atlantic Records**, the **Apollo Theater**, **Budweiser** and **Pepsi**.

The **RAMSA WR-8428** answers all my studio production needs. In short, it's a great console.

Editor's note: Paul Sanchez has been CE of WBLS and WLIB for five years, and is also assistant director of engineering for Inner-City Broadcasting.

For more information about the **WR-8428**, contact **Steve Woolley** at **Panasonic**: 714-895-7278.

User Report

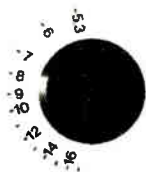
AM BROADCASTING - HIGH FIDELITY

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YES NO DON'T KNOW

Surprisingly, many broadcasters may not know that the correct answer to this question is no. Large sums of money are spent each year to purchase new transmitters, new studio equipment, new audio processing equipment and to modify antenna systems for improved AM sound. Unfortunately, until now, there has been no such thing as a professional quality AM monitor receiver. As a result, the perceived fidelity of an AM signal has been severely restricted by receiver performance.

Potomac has developed the **SMR-11 Synthesized Monitor Receiver** which will let you hear and measure the quality of your transmitted AM signal ... perhaps for the first time. Features include: Crystal Stability; 60 dB Signal to Noise Ratio; Audio Frequency Response ± 0.5 dB, 20 Hz to 8 kHz; Total Harmonic Distortion less than 0.2% (95% Modulation) at audio frequencies above 40 Hz ... please write for complete descriptive brochure.



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Circle Reader Service 47 on Page 24

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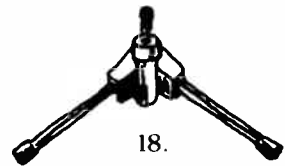
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Circle Reader Service 14 on Page 24

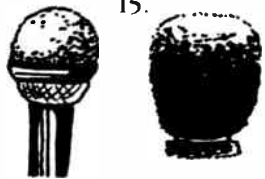
Microphone

ac-cés-so-ries

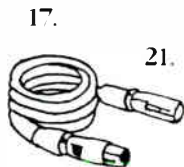
- 15. **Windscreens** for all microphones. Reduce wind and handling noise as well as the breath sounds of the talent. We stock the windscreen for your mic.
- 16. **Shock Mount.** You can eliminate mic stand and mic arm noise with a shock mount designed for your microphone. We have available, for immediate delivery, the correct shock mount for your mic.
- 17. **Mic adapter cord.** Our mic cords allow you to connect any mic to any portable cassette deck. Coiled cable, straight cable, long or short cable, mini-jacks, 1/4" plugs, XLR's; whatever your recorder and mic need.
- 18. **Table stand.** Collapsible (fits in your pocket), by AKG; Atlas offers an adjustable model (8" to 16") or with built in shock mount.
- 19. **Mic arms,** by Luxo and ProBoom. Available with 4 different bases (C-clamp, riser, screw-down, wall mount). Heavy-duty or standard, long or short reach, grey, tan or black.
- 20. **Mic Mount Kits.** Mount your mic anywhere. The clamp and goose-neck fit conveniently into your pocket or brief case and will mount any mic almost anywhere.



18.

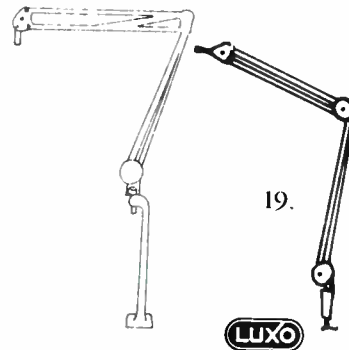


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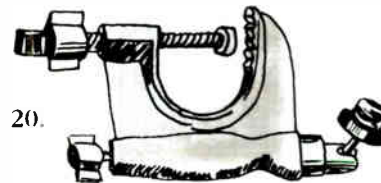


17.

21.



19.



20.

Microphone

ac-cés-so-ries

- 21. **Canare mic cable** is the most reliable, lowest noise cable. Available in 5 colors, cut to the length you need, with or without connectors.
- 22. **Scotch Cart II**, the broadcast cartridge with reel-to-reel performance. Revolutionary design maximizes cart performance and insures extra long life.
- 23. **Audiopak Cartridges**, premium performance with three cart designs. A-2 for standard AM and mono FM; A-3 for stereo AM and FM; A-4 for the best quality audio.



Audiopak

3M

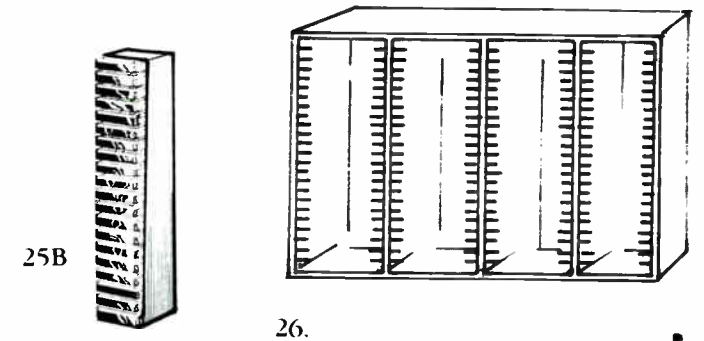
22.

23.

Cart Cart Rack CD

ac-cés-so-ries

- 24. **Bulk Tape Erasers** by Audiolab and Geneva. The table-top eraser that completely erases your carts and reels: the TD-1B by Audiolab. The Geneva hand-held is great for the news room cassettes and carts.
- 25A **Lazy Susan Racks**, from ABCO, come in 50 unit wall displays or may be used in the Lazy Susan Rack system of 300 or 500 cartridges.
- 25B **20-Slot Cart Rack**, by Aristocart, is a clean vertical building block system of side-by-side or stacked rows. Tailor make your own customized storage area.
- 26. **CD Racks** designed for the broadcaster. Wall mount for 60 or 30 CD's and will hold single or double albums.
- 27. **CD Test Disc**, converts your CD player to a high quality audio test generator and lets you check your CD players' performance. The CBS CD is the best test CD on the market.

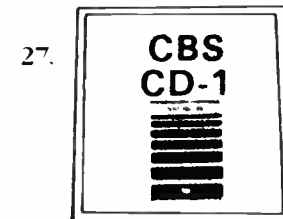


25B

26.



25A



27.



29.

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Long Wood Swabs

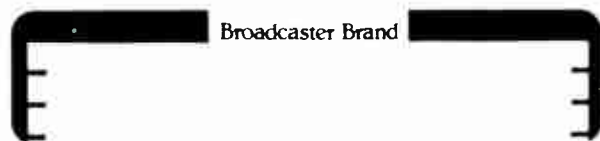
The longest, toughest, recording head swab made. 100% U.S. cotton tip cleans those hard-to-reach tape heads. Never get caught short again.



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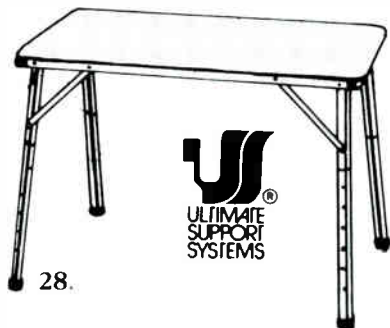
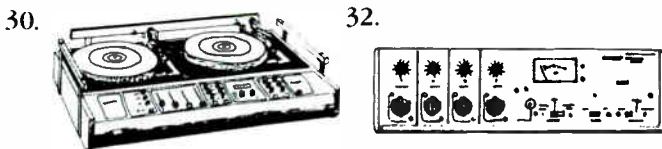
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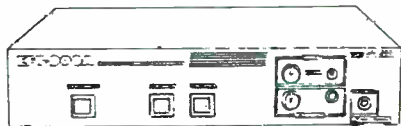
Those hard-to-find necessities for your broadcast station.

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28. **Ultimate Table**, by Ultimate Support Systems. Perfect for remote broadcast systems which require a light weight and yet can support up to 250 lbs. of equipment. Its fully adjustable legs compensate for uneven surfaces. Spring buttons and ball-lock pins make breakdown and set-up a snap. Designed to take years of on-the-road abuse. 22" x 44" x 2½', weight 15 lbs. with case.
29. **Ultimate Tripod**, the TS-33A lifts speakers or antennas from 5' to over 9', putting the sound or signal at the right height. The articulating leg allows the unit to sit on stairs or in the stands. Load capacity 100 lbs., weight 9 pounds, with tote bag.
30. **Portable Console** by Lantek is the sound choice for portable use. Two turntables with cue and variable speed, a mixer with separate EQ for the mic and room acoustics, auxiliary inputs for CD or cassette decks, all in a case. The complete system weighs less than 50 lbs (39x21x7).

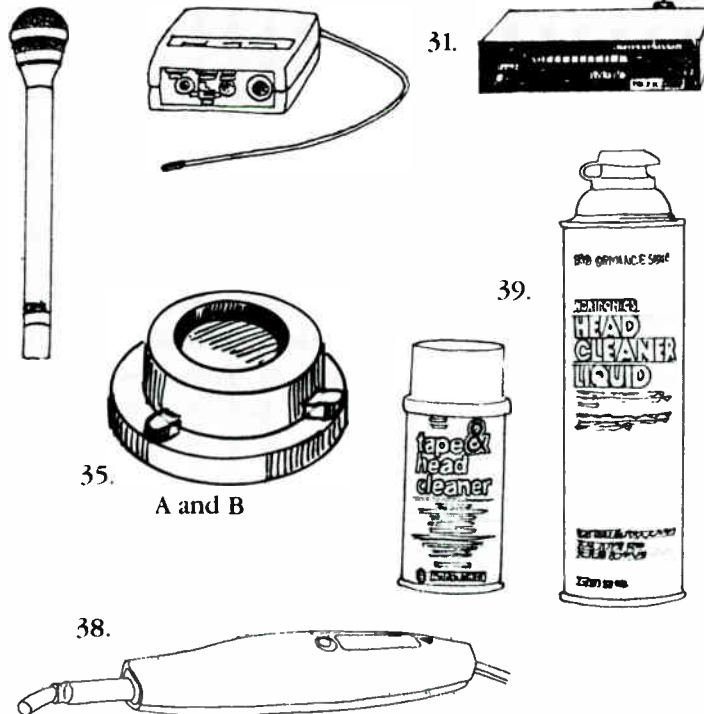


28.



33.

31. **Wireless Mics** by Telex. FM quality sound, with coverage from 400 to 1000 ft. The Telex system will work in tandem with your Marti or other RPU system. Available with hand held transmitter/mic or a belt-pac transmitter that allows you to use your favorite mic.
32. **Remote Broadcast Transmitters/Receivers** by Marti. Don't let the phone company limit your remotes. With Marti gear you can have FM quality sound, a range of up to 25 miles and never have to wait for "30 days of installation".
33. **Telephone Frequency Extenders** by Gentner. Gentner single line frequency extenders (Comrex compatible) will make your phone remotes sound better than a standard phone line. In addition to better audio, you will be able to talk with and hear the studio on one phone line. Also, available, the new 3 line extender with 50Hz-7.5 kHz audio.



35.

A and B

38.

34. **Empty Reels & Boxes**, by Broadcaster Brand, are quality items manufactured to exacting tolerances for the professional broadcaster. Large-size reel hubs prevent wow and flutter created at the tape's end by a lower angle of tape feed. Larger hubs will reduce reel capacity by one half.
- 35A. **Hub Adaptor**, from Tascam, fits Revox and Tascam reel-to-reels. ¼" NAB hub adaptors come in quick lock type pairs. Specify TZ-612-B.
- 35B. **VIF Hub Adapters** fit Ampex, Scully and Otari reel-to-reel tape decks. Available for ¼", ½" and 1" decks.
36. **406 Mastering Tape**, from Ampex, features flawless studio performance, a 1.5 mil durable oxide binder system, high S/N ratio, plus high headroom with reduced distortion. Count on 406 Mastering Tape for excellent reel-to-reel uniformity plus bias compatibility with all HOLN tapes.
37. **Recording Tape**, from 3M, in Scotch 806/807 high output, low print magnetic tape configurations provide the recording properties HOLN, high bias, sought by professionals who take their tape seriously.
38. **Head Demagnetizers** for reel-to-reel, cassette and cart decks. Geneva offers a rubber tipped probe for use on all tape decks and an eraser that looks like a cart and fits into any cart machine.
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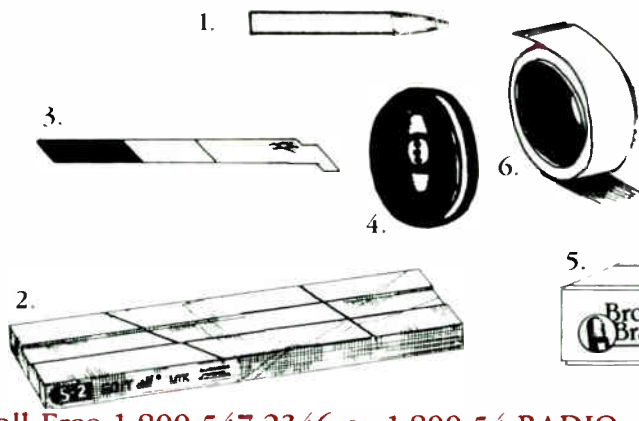
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Editing

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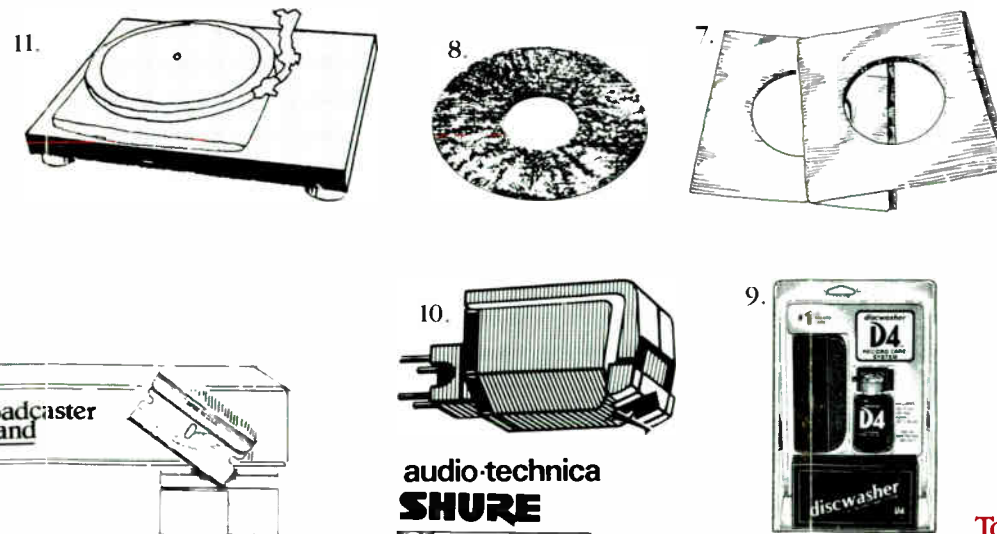
1. **Edit Marker**, the pencil developed specifically for the production room. Writes on all recording tape surfaces. Specially formulated wax slashes clearly in white to mark edit positions. Made in U.S.A.
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5. **Editing Blades**, are honed to an industrial-quality, single edge for sure editing cuts with any recording tape. Broadcaster Brand can cut it.
6. **Splicing Tape**, in the traditional roll form. High quality with low cost for 1/4" tape (7/32" x 66').



Record Care

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7. **Shucks**, for 45 RPM records — buy Broadcaster Brand, which keep your 45's in good condition and come in four colors: red, blue, gold and green. Broadcaster Brand are made of the best quality paper to handle roughest treatment.
8. **Felts**, are the premium 12-inch type with convenient peel-off self-stick on the back side. Comes in Green, Blue, Red, Gray and Burgundy colors.
9. **D4 + Discwasher**, the record care system. Hi-tech D4 fluid lifts and suspends contaminants for easy removal with the D4 pad. Cleans without changing the chemical integrity of your records.
10. **Stylus**, from the top manufacturers of professional quality equipment. Choose from Stanton, Shure, or Audio-Technica.
11. **Turntable Bases** for Technics turntables. These heavy duty bases are cut for your turntable and will reduce vibrations, and prevent feedback. Complete with special shock-absorber feet.

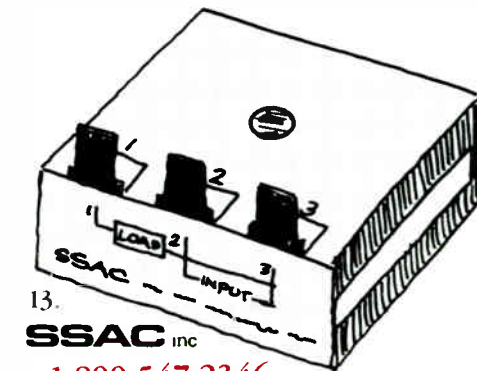
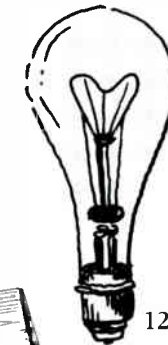


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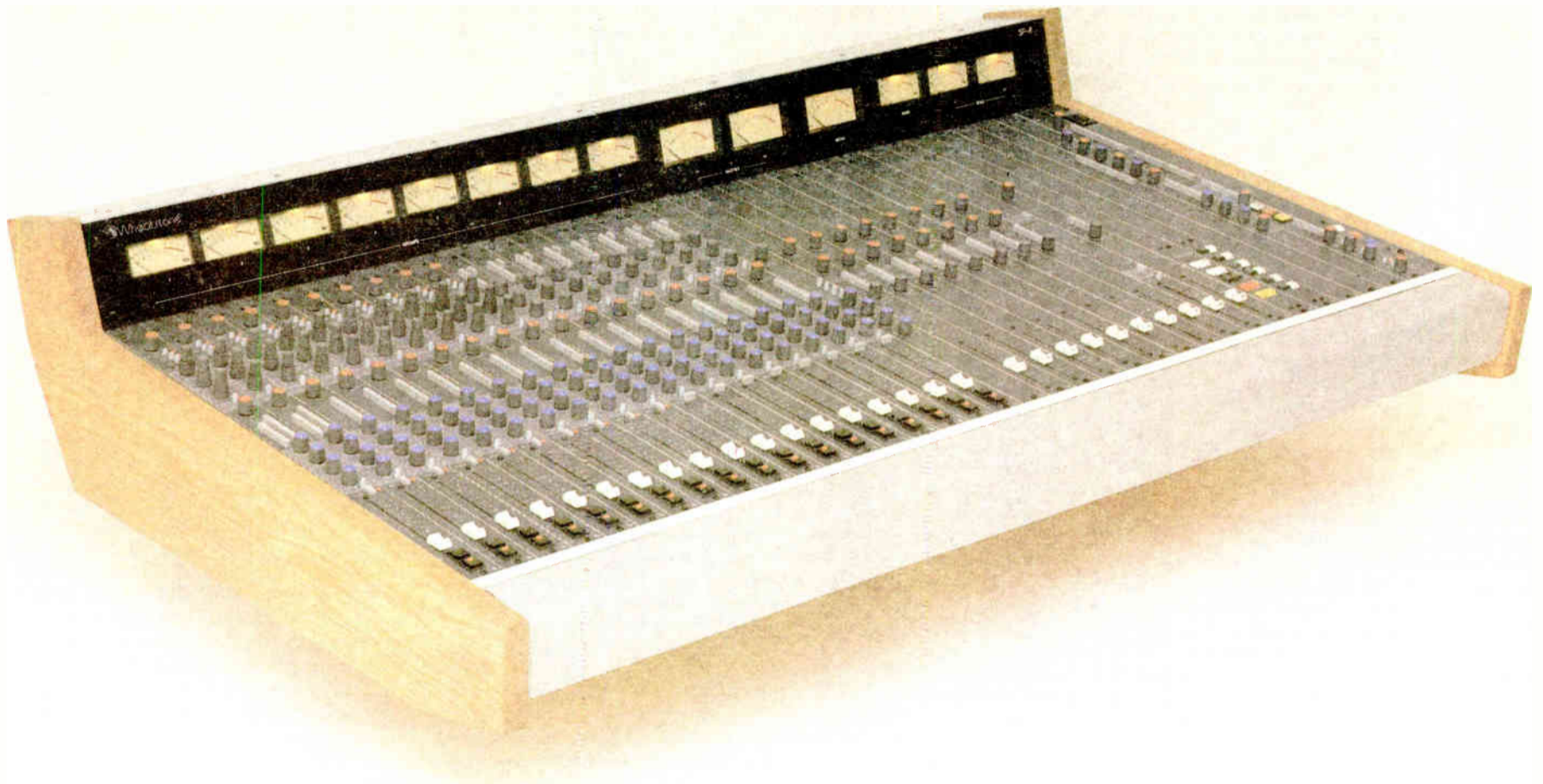
Tower

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12. **Tower Lamps and Bulbs** by G.E. Beacons are rated at 620 watts/4500 hours. The side lamps are 120 watts/7500 hours. Better lamps mean fewer calls to the FAA and the tower rigger.
13. **Tower Flasher**, by B-Kon, features total solid state construction for proven reliability in years of radio tower use. B-Kon Tower Flashers feature zero voltage switching, a built in fail-safe, encapsulation and extra long life. Definitely the superior flasher.
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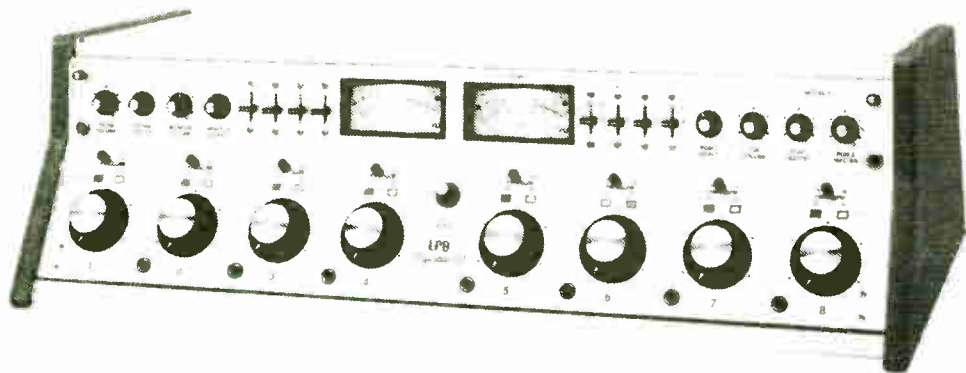
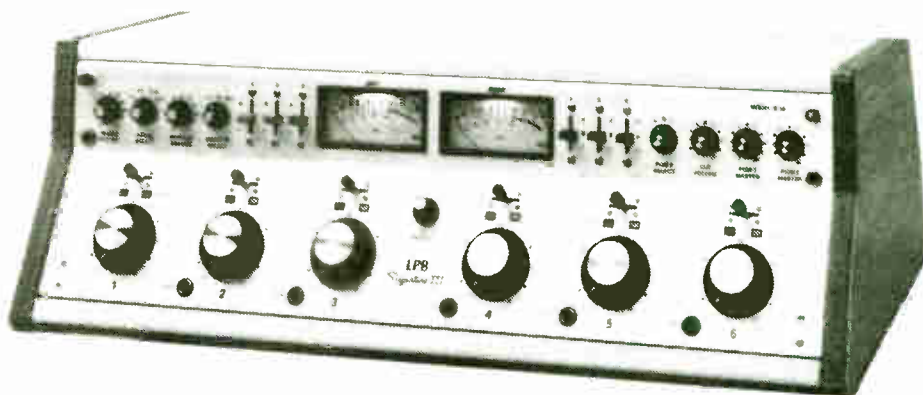
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6 Mixer

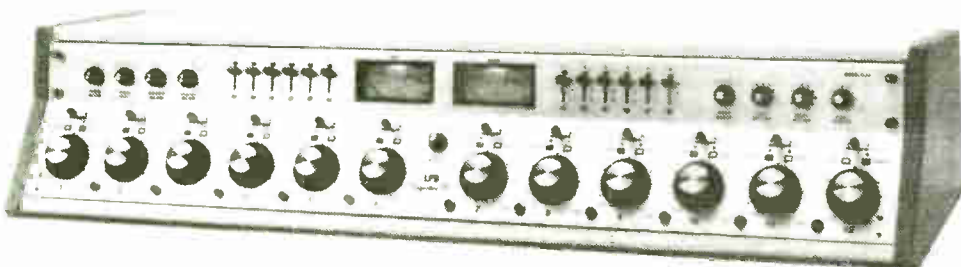
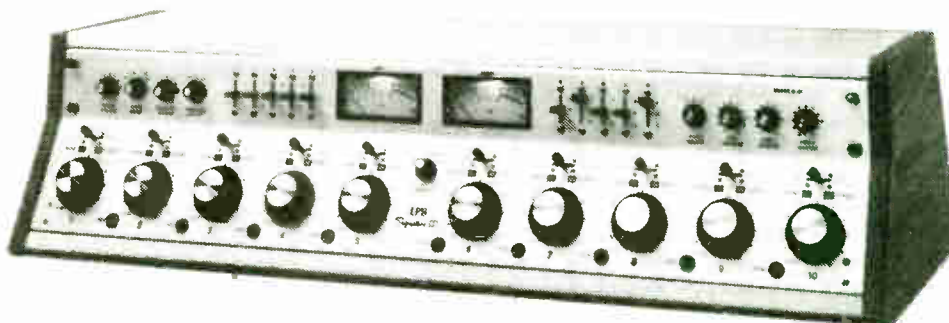


S-13 Dual Stereo
8 Mixer

S-15 Dual Mono
8 Mixer

S-20 Dual Stereo
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10 Mixer



S-24 Dual Stereo
12 Mixer

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BUYERS GUIDE

XTRA Sports the Stereomixer

by Dan Steves, Eng Mgr
XTRA-AM/FM

San Diego CA ... Maybe you've found yourself in the same position: you need to put together a small studio, with the emphasis on "small."

A standard mono mic mixer won't do and you want a real mixer as opposed to a multiple line selector switchbox. Even some of the small consoles are just too big. If you could only find a board that was about rack width, you'd be all set.

Well, that is exactly what happened here at XTRA. The sports director needed a small studio and space was

User Report

tight. The ideal mixer needed to be small and stereo.

It turned out that Pacific Recorders & Engineering had just started to market its Stereomixer. It sounded like just what we needed.

News Mixer's sister product

The Stereomixer, a sister product development of PR&E's Newsmixer, is available in either a rack mount or a ta-

ble top version. The Stereomixer has one stereo buss while the Newsmixer has two mono busses.

Both have slots for up to eight input modules with five different types of modules available: mic input, line input, telephone I/O, remote line selector and tape I/O.

The remote line selector can handle six stereo inputs (or eight mono inputs for the Newsmixer). And like PR&E's full size consoles the Stereomixer has patch points and logic connections that will handle just about anything that might be required.

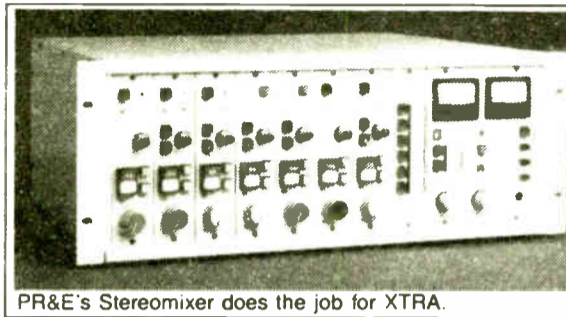
I ordered a Stereomixer with six line inputs and two remote line selectors. Mic inputs weren't ordered because all the mics in the studio are running through an outboard mic preamp, and then the line level outputs are bridged to feed two different studios.

Installation was pretty straightforward. The only problem encountered was in getting the monitors to mute when the mics were on.

Remember, my unit doesn't have any mic modules, just line inputs, and line input modules don't include muting logic. So, monitor muting had to be ac-

complished some other way.

Line modules do have logic connections for remote on/off and tally lights but what was needed was a connection that would be switched to logic common



PR&E's Stereomixer does the job for XTRA.

while the module was on.

The addition of a transistor tacked onto the line input modules resulted in getting the logic connection that was required to appear at the back Molex connector.

From there jumpers were installed from the separate mic controlling modules to the master system modules.

The Stereomixer has worked out well. The sports director finds the board easy to use and has even remarked that he's very impressed with it (and he doesn't like anything!).

I have to say that I'm impressed as well. The mixer has about everything an

engineer or operator could want.

Input modules have panning and pushbutton switches allow the user to punch up mono inputs from separate input channels or both channels can be summed together. And each of the mic, line and telephone input modules handles two inputs.

Another plus is the two external monitor inputs and the extra studio monitor outputs in addition to the control room monitor outputs.

Minor drawback

On the minus side, there is no way to hook up a separate cue speaker. When a source is put in cue the monitors are automatically switched and neither the solo nor the PFL busses appear as separate outputs.

It hasn't been a problem with our installation yet but I can see where it might be in other settings.

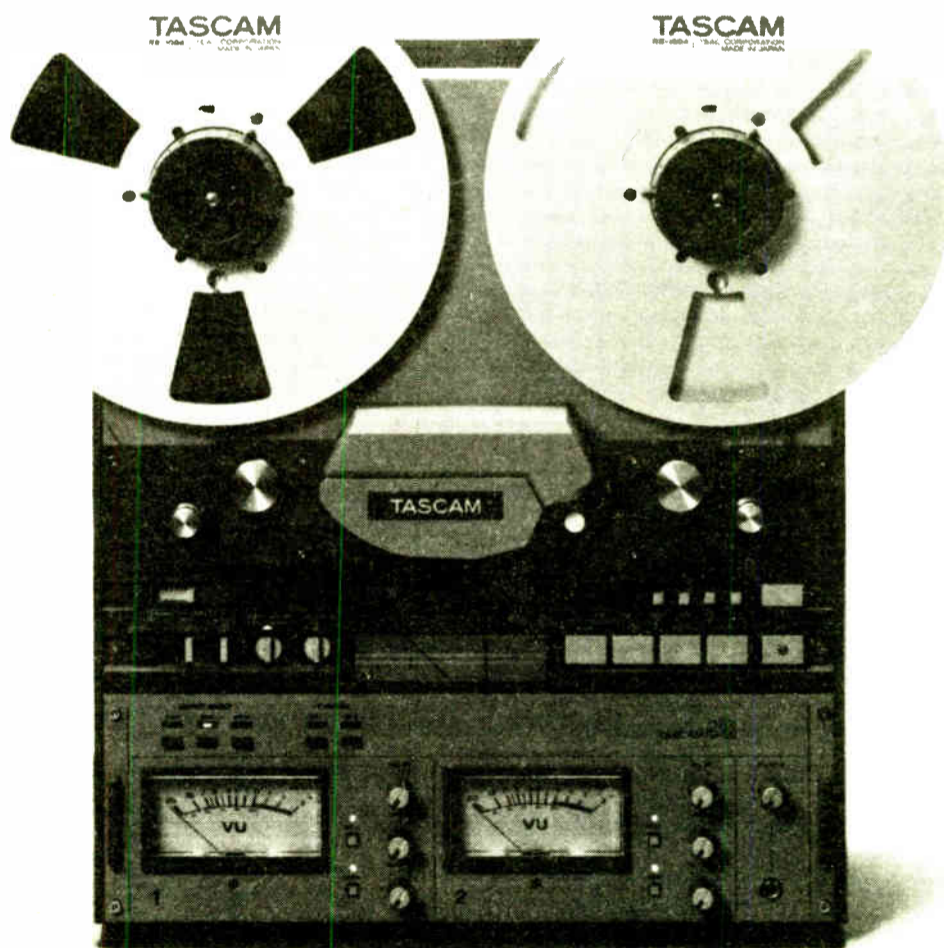
There's no clock or timer included, although Pacific Recorders did build in a timer reset buss. But that's understandable. Things are pretty tight and even the meters are small, yet very readable.

Some of the functions included may be overkill for some applications. For instance, there are two talkback circuits and a slate feature. These are nice but not necessary.

Some people may have the same feeling about the tape I/O modules which include program outputs to the tape ma-

(continued on page 34)

On time. On budget. On air.



The Tascam 42B makes other 2-track recorders seem downright slow.

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TASCAM

BUYERS GUIDE

KVIL Hits the Road With the R/TV-12

by Bill Ryan, CE
KVIL-AM/FM

Dallas TX ... Selecting an audio console for the new 31' KVIL mobile stereo studio was one of the most important design elements of the project.

We chose to install an Autogram R/TV-12 in our mobile unit for a number of reasons. It's easy to operate, very flexible, carries an assortment of design features, is well built and is backed by a history of factory support for two older Autograms at the main studio.

The design flexibility of the console became apparent as our experience with it began. The KVIL mobile studio is housed in the rear section of a converted RV trailer—an 8'x12' area with large studio windows and all the equipment you would expect in a "normal" main studio.

A full kitchen, lounge and restroom occupy the rest of the unit. Two generators on the tow truck and cellular telephones in the studio make this a complete, self-contained broadcast site which we are able to move around the Dallas-Fort Worth area and set up to broadcast in stereo quickly.

The heart of the operation is the console. It handles cart machines, reel tape, telephones, two-way radio, CD player, microphones (stereo and mono) and anything else needed by programming,

with ease.

As the concept of this studio was developed, a check list was made for each piece of equipment to be installed to determine our basic requirements.

Check, check, check

The audio console check list included 12 channels of stereo, two output busses, a mix-minus buss, easily patchable input

User Report

and output connections, processing insert points, line/mic level on each channel, VCA and electronic switching, remote start and external control capability for each channel.

We also wanted solid operation to cut training time in the field and reduce costly mistakes, and a hot line to the factory—just in case.

Some features on our "it would be nice" list included stereo mic preamps, panel-mounted clock and timer, connectors on every external wire and complete RFI protection.

The R/TV-12 met and exceeded everything on our lists. It is a 12-channel stereo console with two output busses and mono out. Inputs are dedicated to the first eight channels, while the other four

channels can pick up any of four different sources each, selectable by front panel pushbuttons, for a total of 24 inputs.

Ins and outs

All ins and outs are made via small screw-type, plug-in connectors inserted into jacks on top of each PC board. All external control points are on the same type of plugs, so any changes can be made easily with a screwdriver—no solder anywhere.

Each channel will accept levels between -15 dBm and +15 dBm. Board levels are set by small plug-in jumpers followed by left and right trimmers.

The same type of jumpers are also used to set input impedance for 10 kHz or 600 Ω , to delegate the channel to either pre- or post-fader mix-minus, select either of two mute busses, direct control

eight preamps are mounted in two separate cards and may be patched to any channel or directly to outboard processing equipment and then to the console.

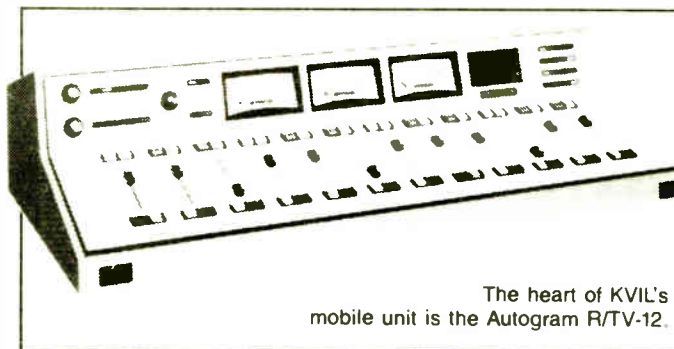
This allows stereo mic operation for our outside audience and interview mics while our inside mics are mono. Thus we have the flexibility of operation usually found only in a chassis or rack frame of external preamps.

Four stereo 4x1 switching cards with front panel pushbutton selectors are provided, intended primarily for selecting inputs to four of the console channels.

However, the design of the system again allows you to do a number of things internally that might normally require a case of small boxes and a fabricating shop on site.

These switchers all operate as stand alone boards which are normally patched to channels to provide multiple inputs. But, they are fully buffered modules and will take any four stereo sources anywhere you need them.

We use these selectors for feeding audio to the PA system, kitchen monitors and an outside panel



The heart of KVIL's mobile unit is the Autogram R/TV-12.

logic to the front panel up/down counter and to select a unique preset level function for remote channel control.

Using this jumper, a channel may be set up so that whenever a remote button turns the channel on, it will come up at the standard level regardless of the front panel fader setting.

This feature has proven to be a lifesaver in our operation—the jock can leave the room while a sportscast is running from the guest mic without presetting the channel level.

When the carts are fired, they go on the air at the correct level every time. Every channel has this feature—even microphones.

Independent preamps

The mic preamps in the R/TV-12 are independent of any specific channels. The

to provide clean audio for "mini-can" pickups. By feeding a mix-minus buss to the PA system (minus the outside mic) the usual remote broadcast PA feedback doesn't happen.

During setup or maintenance on the facility, the two-way radio is fed to outside monitors so a call from the main studio is never missed.

Clocks and temperature probes

The optional Autoclock for the R/TV-12 includes the time-of-day clock, count up/down timer and indoor/outdoor temperature read-out with a probe that will extend however far away the outdoor temp needs to be read.

The outside temperature unit contains a memory. At the push of a button, you will see the highest and lowest temper-

(continued on page 39)



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PR&E Fits Bill at XTRA

(continued from page 33)

chine and logic circuits to prevent an operator from punching up a tape deck that is receiving a program feed and possibly creating feedback.

Again, these are nice features—you don't need extra DAs and mistakes are avoided—but they're not necessary in all applications.

The tape I/O modules will only handle one stereo source instead of two, and they cost a little more besides. Per-

sonally, I preferred to go with the standard line input modules instead.

One other nice thing about the Stereomixer is that it can accommodate equalizer and voice processor modules from PR&E's AMX/ABX Series consoles, which should allow configurations that will do just about anything.

With those little extras its only limitations seem to be its single stereo buss and its limited number of slots.

All in all Pacific Recorders ends up stuffing a lot of things into the Stereomixer. And for those studios where a small mixer is needed this little mixer will do the job admirably, adding credence to the old saying, "Good things come in small packages."

Editor's note: Dan Steves has been in broadcasting for more than eight years, and is a graduate of SUNY at Fredonia. He may be reached at 619-291-8510.

For more information on the Stereomixer, contact Anders Madsen at PR&E: 619-438-3911.

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BUYERS GUIDE

WKSZ Upgrades to Auditronics

by Douglas W. Fearn, CE
WKSZ-FM

Media PA ... Early in 1987, WKSZ decided to rebuild the existing air and production studios and add a second, more sophisticated, production studio.

After the general specifications for the studios were determined, I began researching the available equipment. For the big production studio, we wanted a console that would conveniently handle eight-track production, with complete signal processing and routing capability.

After the 1987 NAB convention, I decided on the Auditronics 424 console for the eight-track production studio and Auditronics 224 consoles for the air and routine production studios.

I chose Auditronics for a number of reasons. The company has been around for a long time and I owned one of its recording studio consoles and had excellent results with it.

I also had been through the factory in Memphis and was impressed by it; I felt that its design philosophy always kept the operator in mind.

Early delivery

The 424 was a new product at that time and I was concerned about delivery. Auditronics delivered all three of our consoles early—up to a month ahead of the

promised 90 days. They were drop shipped to Radio Systems in Edgemont, PA, which built the furniture and did our installation.

The 424 as we specified it has 24 inputs; eight outputs to a multitrack machine plus stereo and mono; two auxiliary sends for echo, effects or headphone feeds and a digital timer and clock.

Other features include talk-back and slating; multifrequency test oscillator; VCA faders; cue and solo facilities; three-band equalization on

User Report

each input; low-pass and high-pass filters; eight-track monitor mixing and monitor controls for a control room and two studios.

Radio Systems installed the eight-track facility in one weekend. Except for a few minor problems, the room was ready for operation on Monday morning.

Our biggest initial problem was not the fault of the manufacturer. Somehow the test oscillator module and the telephone interface module were transposed during installation. This caused some con-

fusing logic problems.

Auditronics was very helpful in tracking down the cause. It only took a couple of phone calls to fix that one.

We also had a problem with the start

right. (I wish the 200 series consoles had these more expensive connectors—especially for an on-air console the ability to swap modules while powered up is valuable.)

We had another chronic problem which I believe we have now solved—a ground loop buzz in the monitor circuit. The console outputs were perfectly clean but the control room monitor always had a low level buzz and occasional pops and other noises.

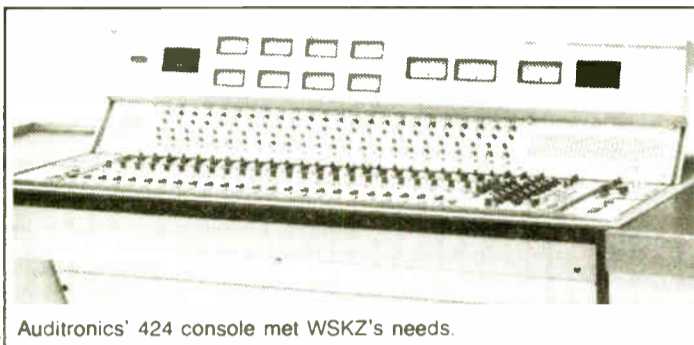
In talking with the Auditronics engineers at the 1988 NAB show I learned that

they have changed the location of the console ground terminal from a point on the power supply chassis to a new point on the console ground plane. Changing our ground point similarly seems to have solved about 90% of the problem.

We also had trouble during the winter, when the humidity was low, with modules turning off or on from static electricity. Now that summer is here and the humidity is higher, we're not sure if the revised grounding has this problem completely solved or not.

Minor problems aside, the console has been perfectly reliable and readily ac-

(continued on page 39)



Auditronics' 424 console met WKSZ's needs.

logic pulses being too short to reliably start some of our equipment. A change in capacitor value solved that problem. I understand the newer 424s have the larger value capacitors which stretch the start pulse enough to start just about anything.

"Zero insertion force"

The console features "zero insertion force" connectors for all the modules to be removed and inserted while the power is on.

I was reluctant to do this but by phone the factory assured me that nothing unpleasant would happen. They were

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BUYERS GUIDE

Series S Takes No Short Cuts

by Kenneth W. Stout, CE
WPAT-AM/FM

Clifton NJ . . . At a recent NAB convention while visiting the RAM booth I was shown the all-new McCurdy Series S consoles by Doc Masoomian. The layout and appearance of these consoles were excellent.

This high quality console was one half the price of other consoles in its category.

The price caused me to do a very thorough evaluation of all aspects of the Series S.

I do not believe in audio transformers; I feel they can only create distortion in some manner. I was heartened to learn that the McCurdy S console has all active inputs and output stages.

Next I thought they would use a short-cut on the main faders. Once again Doc proved my suspicions to be wrong. The faders are the best in the business—Penny & Giles slide faders.

Power supply investigation led me to a well-built toroid transformer and a highly regulated supply with plenty of headroom. Speaking of headroom, the console proved by test to have more reserved power in its audio channels than the specs called for.

The console is well laid out and very user friendly. There are no bells and whistles that a normal station operator would be confused by.

The noise and distortion, including intermodulation distortion was well below

McCurdy specifications. The distortion was so low in some cases that I could not read the figure on my Sound Technology 1710A analyzer.

User Report

The channel control and designation switches are all analog. Because the actual switch does not carry audio, there are no clicks or switch pops. I believe

these switches will give extra long life.

Audio VU meters are plentiful and also well laid out. For example, there are left and right VUs for program channel and a separate mono VU meter plus separate VUs for the audition channels.

Remote start and stop buttons are conveniently placed at the bottom of the slider pots. Remote start will also turn on an audio channel.

I have learned that RAM is designing other modules for the Series S console.

Thus users will be able to create consoles that will specifically suit their needs.

I have purchased one S line console from RAM Broadcast Systems; in the future I intend to purchase another for our main production room.

Editor's note: Kenny Stout has been WPAT's CE for 14 years and attended RCA Institute, Dumont Labs and Ohio University. When he's not designing high quality amps, he may be found piloting a small plane or judging in model aviation contests. He may be reached at 201-345-9300.

For more information on the Series S console, contact Steve Gordoni at RAM: 312-358-3330.

Medalist Scores Points at WMNI

by Mark Jividen, VP and GM
WMNI-AM/WMGG-FM

Columbus OH . . . When selecting an audio console, it is important to choose a board that combines flexibility and versatility without being overly complicated and confusing to the operating staff.

Since December 1984, WMNI and WMGG have been using Harris Medalist-12, 12-channel audio consoles in our identical AM and FM control studios. We also have two Medalist-8 consoles in production studios.

Our announcers have been thoroughly pleased with the consoles. In fact, we have not had a single complaint from an announcer, and our engineering staff has been reasonably well pleased with

the consoles as well.

Even our initial concerns that an accidental liquid spill would damage the Penny & Giles slide faders on our consoles have proved to be unfounded.

User Report

Medalist consoles are available with linear or rotary attenuators or a combination of each. While this was our first experience with slide faders, they're one of the things we've liked the most.

Best bidder

WMNI-AM signed on full-time at 920 kHz in 1958. Four years later, WMNI-FM—now WMGG—also began broadcasting as a 50,000 W Class B station. In the 1970s we upgraded to Harris Executive Audio Consoles.

In 1984, we decided to move the entire operation from our original facilities in the Southern Hotel. Our new facilities would include identical control rooms for our AM and FM stations and four

production studios—one to be equipped with a multi-track production system.

In our request for bids, we specified possible consoles that would be acceptable. We chose the Harris Medalist Consoles because, quite frankly, Harris submitted the best overall bid.

Our experience with the Medalist consoles has been very good—although not 100% trouble-free. Early on we had a mechanical problem with the pots and another with the headphone amplifier circuits.

Both problems have been corrected, and I understand that Harris has now incorporated these improvements into the Medalist design.

Fewer mistakes

With the Medalist series, Harris has produced a line of very good consoles which are designed to accommodate up to three sources for each input channel. As a result the Medalists can reduce the need for patch panels and external switching panels.

In our operation, most audio sources *(continued on page 39)*

Z-93's Harrison Shines

(continued from page 28)

heard folks say that the older model Harrison consoles and power supplies run pretty warm, but this model seems well within accepted temperature ranges.

A quick study

The learning curve for the DJs was very short. We first went on the air on a Saturday night and on Sunday required each jock to work an abbreviated shift. By Monday morning the only obvious difference on the radio was a better quality sound.

I burned up several ICs while installing the consoles because I frequently popped modules in and out while the

power was on. I still remove and reinsert modules in the control room because it's too cumbersome to switch the show to another room, but I don't recommend doing it unless you are prepared to repair the module.

Insertion with the power on usually works, but not always. Luckily, one wayward module does not affect the rest.

The manual that Harrison provided was very confusing. I'd hate to see a novice try to install a console using only the information in those many pages.

While there are lots and lots of schematics and diagrams in the manual, it contains few words. Each time I called the factory, however, a knowledgeable technician answered my questions.

All of us here are extremely pleased with the performance, reliability and ease of operation of the consoles.

Editor's note: Dick Byrd was formerly a systems engineer with ROH Corp. During his tenure there he was involved in the development of a communications system for ABC's coverage of the Winter Olympics. He may be reached at 404-851-9393.

For more information on the PRO-790 and AIR-790 consoles, contact Martin Burns at Harrison: 615-834-1184.

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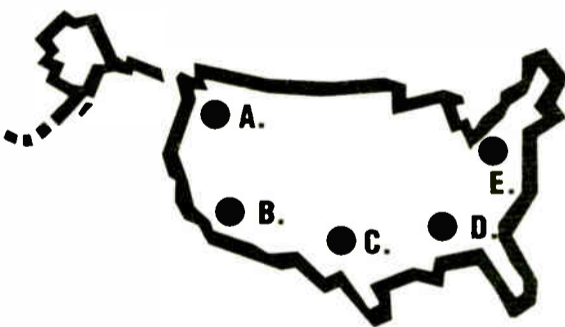
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BUYERS GUIDE

Digital Temptation: The DMP-7

by Rob Meuser, Pres
Int'l Bdcst Support Services

Hamilton Ontario . . . Like other technologies before it, digital is taking its time to become fully established in the conservative world of broadcast audio.

But unlike technologies before it, digital promises to cause a marketing/manufacturing revolution. Broadcast equipment has always been specially built, as compared to "non-professional" versions of similar equipment.

With digital equipment custom LSI chips offer state of the art technology to equipment at all market levels. The gap between consumer and professional equipment is closing.

An early example of this is the Yamaha DMP-7 digital mixing console. This unit is targeted primarily to musicians and portable applications. However, at a price of \$5,000 this unit is tempting to the broadcaster, too.

The DMP-7 has eight inputs and one main stereo output, as well as a solo output. Each input is actually converted into digital format at the input.

The unit is also capable of receiving a digital input at 44.1 kHz. Why go to this trouble just to mix eight channels? That answer comes when one evaluates the other features of the DMP-7.

Those features include a full set of

electronic effects, including reverbs of all sorts, flanging, phasing, chorusing and much more.

These effects, while not any different from other digital effects systems, are built in and included in the base price of the unit.

User Report

These effects are possible on two of the three effects busses in the DMP-7. The third buss is for external units.

The DMP-7 also offers fully digital EQ on each of its input channels. Digital EQ is one of the obvious benefits of digital, as curves closer to the theoretical are possible.

Like other DMP-7 features, digital EQ is remotely controlled via MIDI port.

The DMP-7 offers all this power in a 19" wide rack mountable package. If eight inputs are not enough, the digital input allows for digital chaining of additional units.

While having a digital mixer with some sound effects toys is nice, the real potential of the DMP-7 comes with its ability to work on a MIDI interface.

While MIDI is not exactly alive and well in your average radio production studio, it has become quite common in

the music industry. And while many might argue that MIDI is not the ultimate professional approach to digital studio control, it is an excellent starting point.

In brief, MIDI is a serial digital protocol that is usually used to either record or command a series of events. MIDI can also be synchronized to time code so that these events occur at a certain time. In the case of the DMP-7, MIDI can be used to establish an automatic mix down.

The DMP-7 has eight inputs and one main stereo output, as well as a solo output.

The pots on the DMP-7 are actually motorized and remotely controlled via MIDI. The levels, and all the other functions and sound effects can be MIDI controlled.

Other tracks, sound effects, extra voices, etc. will be triggered either directly by the time code or as a MIDI event. The DMP-7 will just sit there in line and mix as well as change effects just as you pre-programmed it to do.

Technically the DMP-7 is still semi-pro.

Most obvious is the unbalanced inputs, as well as the requirement of an external microphone pre-amp.

More subtle are the actual audio specs. In the original version of the DMP-7, the noise floor spec was at an unacceptable -78 dB. In practice that floor was measured on a spectrum analyzer at 10 dB better than that, or equal to a good analog console.

The -78 dB was above 20 kHz, and probably a submultiple of the sampling frequency. In any event, this noise is solely attributable to the D/A converter and has been improved. I have not received another unit in order to remeasure this noise yet.

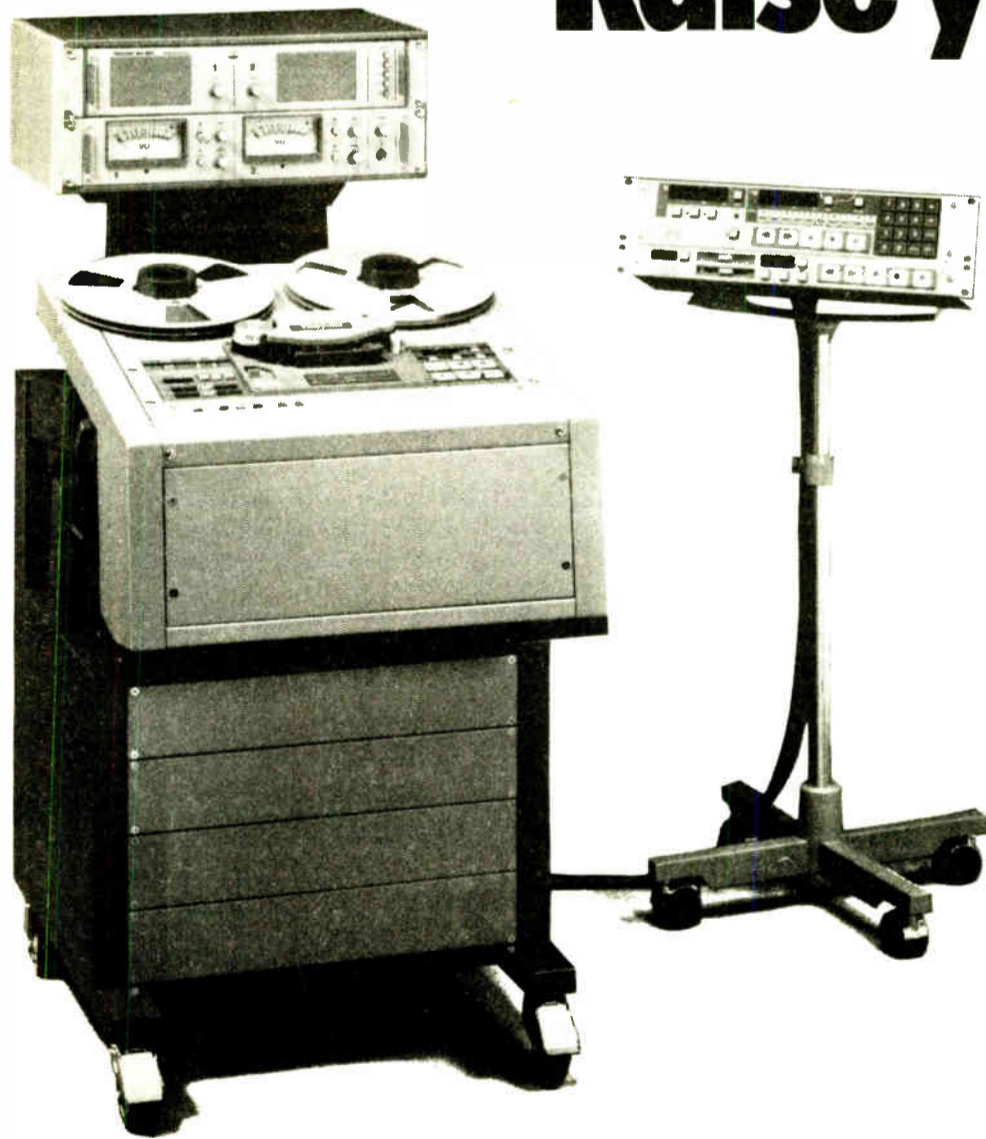
In all, the DMP-7 is an exciting introduction to the digital console. At \$5,000 it beats out many analog units with fewer features.

The price is especially exciting when you think of it in comparison to an experimental digital console I saw at the Television Symposium in Montreux, Switzerland last June. It cost almost \$25,000 . . . per channel!

Editor's note: Rob Meuser is a frequent contributor to Radio World. He may be reached at 416-526-8200 or MCI Mail: 325-3672.

For more information on the DMP-7, contact Bob Davis at Yamaha: 714-522-9011.

Raise your standards.



To understand the superiority of the Tascam ATR-60/2N, begin with the heads: no other 2-track production recorder has heads that can provide sync response fully equal to repro response—an advantage that allows you to save time by making critical audio decisions without rewinding.

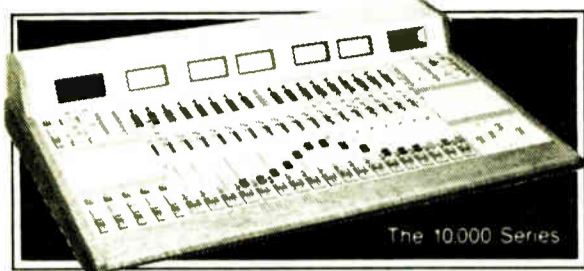
Next, look at its direct-drive reel motors, its PLL servo capstan, and its 3-motor servo controlled tape handling system—all factors that lead to the ultimate in fast, accurate, and stress-free tape handling.

Finally, consider that the ATR-60/2N gives you all this and more, hour after hour, year after year.

Then call or write today about the Tascam ATR-60/2N. And take your broadcasting to a higher level.

TASCAM

BUYERS GUIDE



A Console For Every Market

by Michael C. Palmer, Pres
Arrakis Systems Inc.

Ft. Collins CO ... When most radio people think of Arrakis Systems they think of the cost effective SC Series audio consoles that have been in manufacture since 1979.

In the under \$5,000 console market, which represents nearly 80% of domestic stations, Arrakis research shows the SC Series is the number one seller with

total unit sales exceeding the sum total of all other competitors combined. The reason for the success of the SC series lies in its price and quality.

The SC is fully DC-controlled with no audio on the faders or switches in the main signal chain. Even the monitor, cue and earphone amps use VCA technology.

To complement the high tech design Arrakis uses large motherboards for the electronics to reduce interconnections and simplify installation and repair.

A result of careful design and the application of high volume production techniques is that the SC series lists for

10-30% less than competitive consoles while having standard features (such as mono mixdown, telephone mix-minus, remote starting, etc.) that are options on other boards.

Mid-priced market

In 1986 Arrakis Systems introduced its first mid-priced console—the 5000 Series 16-channel modular board. It has become our best selling console. The key to its success is also quality, features, reliability and price through innovative design.

Technology Update

The console shares the VCA fader technology with our other console lines. However, it adds expanded remote control features found on the high end boards and the advantages of modularity for service and repair.

Cover the market

The introduction of the 10,000 Series console gives Arrakis Systems a product for every size station market. As with our other series, the 10,000 combines high tech engineering and production techniques to build a console with more features, greater reliability and the lowest price.

The key to the 10,000 is flexibility. The main frame fully supports on-air, stereo production and multitrack production applications. Despite this flexibility the 10,000 represents a leap forward in ergonomic console layout.

The console's modules evolve from a simple on-air format by steps into a sophisticated multitrack production board. What was once a difficult-to-operate production console is now sim-

ply an evolved but familiar on-air board. The console is perfect for all studio environments.

As in the SC and 5000 Series consoles, the 10,000 brings DC control with its attendant reliability, to the market. The 10,000 is almost entirely DC controlled through the use of VCAs and electronic switching. Even such audio sidepaths as the auxiliary sends are VCA controlled.

Engineer-friendly

In the real world of broadcasting a console must be flexible and friendly to the engineer as well as to the operator. It must be easy to install, modify and service. Therefore, like the SC and 5000 Se-

**(The 10,000's)
appearance
could accent the
decor of the
Space Shuttle.**

ries, the 10,000 swings out of the table on air springs with no more than 20 lbs. of lifting force no matter what size the main frame is.

The use of DC-controlled switching and VCA control afford high levels of function and reliability to the 10,000.

The 10,000 console (like the SC and 5000 series) is a uniquely qualified console for its class and not simply a reshuffling of old ideas and technologies. The 10,000 strikes out into new areas with the flexibility of its multifunction design.

The use of DC controlled switching and VCA control brings previously unknown levels of function and reliability to the 10,000. Its rugged design and use of premium grade components makes it ideal for the rigorous professional broadcast environment, yet its appearance could accent the decor of the Space Shuttle.

Timeless grace, classic engineering and an unfailing commitment to excellence should place the 10,000 series console alongside its predecessors as number one in its class.

Editor's note: For more information on the 10,000, contact the author at Arrakis Systems: 303-224-2248.

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BUYERS GUIDE

WKSZ Moves Up to Auditronics

(continued from page 35)
cepted by all those who use it. It sounds terrific.

Many of our operators have never used a console as complicated as the 424 but all have found it to be easy to learn and logical in its layout and operation.

Special mention for EQ

The equalizers deserve special mention. Most modern equalizers use state-variable type circuitry which I find to be very harsh, heavy-handed and non-musical.

The Auditronics equalizer, however, has none of these drawbacks despite being a version of the state-variable design. It has three bands in which the frequency of each band is continuously adjustable as is the amount of boost or cut.

On the midrange band two different bandwidths can be selected with a push-button. In use the equalizer outperforms many rack-mounted multiband parameters of recent design, in my opinion.

In brightening a voice for example, the

Editor's note: Doug Fearn is a regular contributor to RW. He may be reached at 215-565-8900.

For more information on the 424 console, contact Neal Davis at Broadcast Services: 919-934-6869.

EQ can be set to do so without many of the artifacts often heard with equalization.

Auditronics has obviously researched this design (as it did in its early recording console equalizer designs) and come up with a truly useful module.

After a year of operation, we are very pleased with the performance of the

console. Operation is relatively simple for a sophisticated board and required maintenance has been virtually nonexistent.

The sound of the console is clean and transparent. Auditronics obviously knows what broadcast production requires and has built a console to fulfill these needs.

R/TV-12 Goes Mobile

(continued from page 34)

ature recorded in the previous 24-hour period.

Countdown readout may be accessed automatically from any channel to begin on cue from the tertiary tone on a cart. Another board jumper will cause the timer to restart when a cart is started.

An optional microprocessor board is available for the R/TV-12 console which will provide an incredible array of automatic operation/logging functions including live-assist and semi-automated switching of the entire console. Applications for this console are extensive.

After nine months of use in the field environment travelling the countryside, the only failures have been on/off push-button lamps. We operate them at full brightness but there is a dimmer pot on

the power supply to turn them down for normal ambient light situations.

The R/TV-12 has met all of our original requirements and easily given us the tools to do some things we hadn't planned.

The jocks love it because it is easy to operate without training—it's logical. It allows us to make quick changes in the field and, most importantly, it just keeps working.

Editor's note: Bill Ryan has been CE of KVIL for the past five years. He spent the previous seven years in Chicago with Westinghouse and NBC, at WIND and WMAQ. He may be reached at 214-826-7900.

For more information on the R/TV-12, contact Ernie Ankele at Autogram: 214-424-8585.

Harris Scores with Medalist

(continued from page 36)

are on separate inputs. External and remote studio sources are handled by a crosspoint switcher.

While our staff can easily understand the board, we've found that it can do some pretty fancy things. But the uncomplicated, straightforward design means that fewer mistakes are made, unlike many similar or multi-channel consoles with so many knobs and buttons to remember that it's easy to get in trouble.

Our CE, David Mathews, agrees that the Medalist consoles provide high quality performance. They require very little maintenance other than keeping them clean and replacing lamps in the meters.

Harris' Medalist consoles are meeting our expectations, and we're not disappointed with our choice. They're very good boards—especially in terms of price, design and flexibility.

Editor's note: Mark Jividen joined WMNI/WMGG engineering staff on a part-time basis in 1971 while majoring in broadcasting at Ohio State University. Before being appointed GM manager, he served as CE and station manager. He can be reached at 614-481-7800.

For more information on the Medalist console, contact Martha Rapp at Harris: 217-222-8200.

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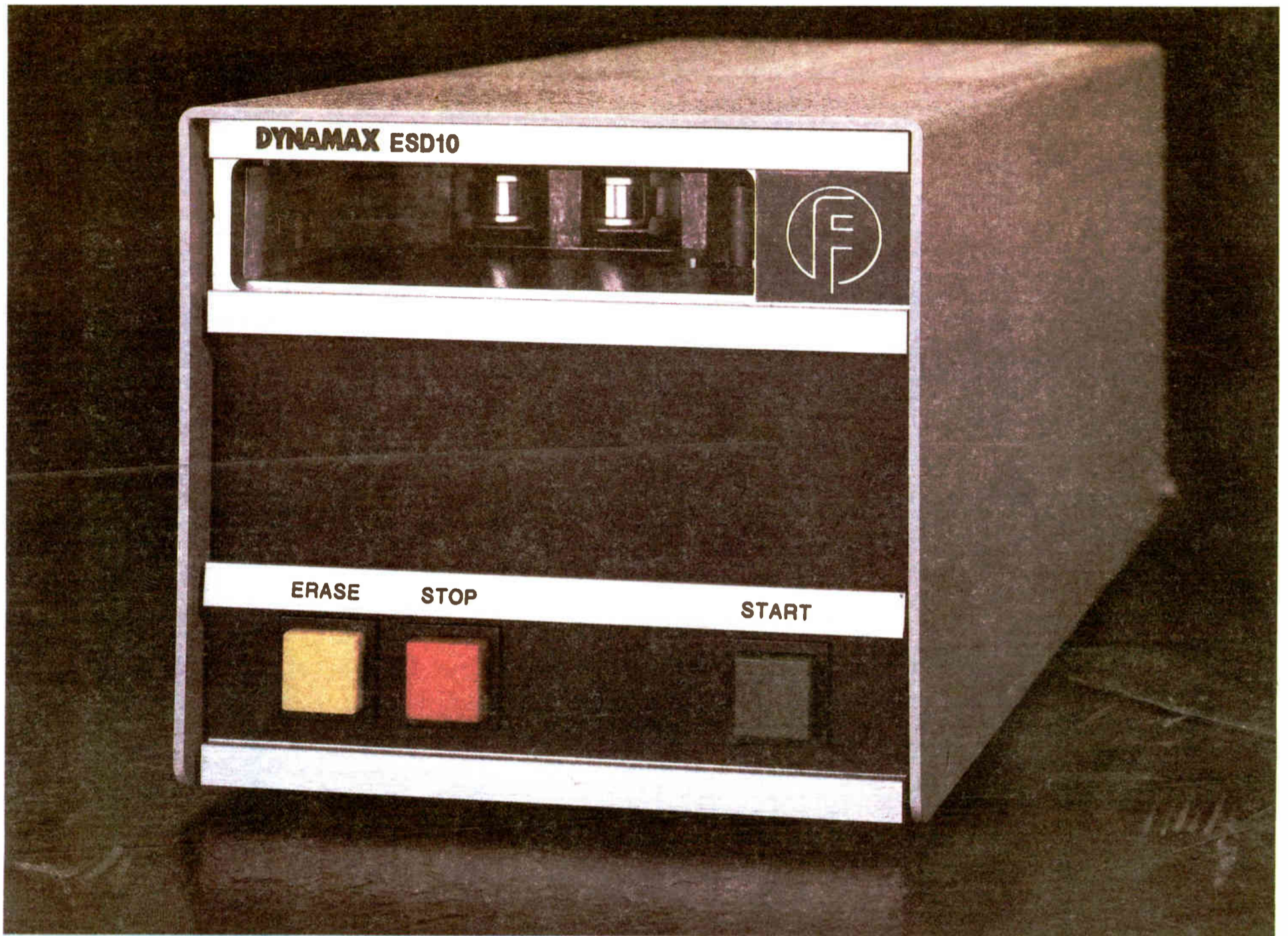
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TASCAM



Circle Reader Service 43 on Page 24



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Circle Reader Service 9 on Page 24

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