

RADIO GUIDE

CHIEF ENGINEER
KELP
5300 EL PASO DRIVE
EL PASO TX 79905

BULK RATE
U.S. POSTAGE
PAID
ROCHESTER, MN
PERMIT 445

Address Correction Requested

A Forum for Radio Engineers
Ray Topp Editor/Publisher (507) 280-9668

April 1989

Volume 2 - Issue 4

Copyright 1989 - Rochester Radio

511 18th Street SE

Rochester, MN 55904

Radio Broadcast BBS

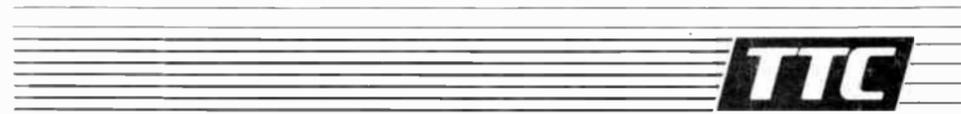
I'd always had good intentions. Every so often I would sit down to work on an article for publication in a trade magazine. Of course, after working on this project, or that transmitter, I usually just wanted to re-discover my family. Contributing technical articles to trade publications just never seemed to get off the bottom of my list - - there was always a reason (or an excuse). So, for all of you with good intentions, but no time (believe me - I know), Radio Guide will establish a computer bulletin board. This BBS will enable (or at least make it easier for) you to up-load your articles, tech-tips and comments, directly to Radio Guide.

I don't envision this BBS as a repository of technical engineering computer programs - - there are quite a few of those out there now. The guiding principles of the Radio Guide are that of an open forum, accepting any and all technical information for publication - - the direction and content determined by the readers, as well as the writers. This bulletin board will be established along those lines, serving more as an adjunct to the Radio Guide, rather than as a separate service.

The BBS will be used primarily to up-load your technical tips, articles and suggestions to the Radio Guide. As time goes on, and we receive and publish a substantial variety of tech tips, the bulletin board will also serve as a complete library of all tips received. As distinct categories become apparent, various user interest areas will be developed within the BBS, to allow you to access the info you need, right away.

I need your suggestions and comments. How should we proceed? What would you like to see and how should it be developed? As with the Guide, you will determine the final product . . . Editor

See The Used Equipment Guide Section



TELEVISION TECHNOLOGY CORPORATION

Who makes the World's
Best FM Transmitter?

To find the world's best FM transmitter,
please turn to the back page.

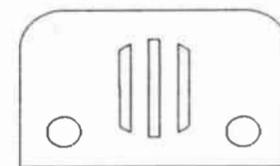
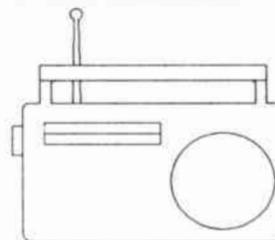
Please - Send Articles & Tips

The computer bulletin board is not here yet, so here's my monthly pitch for articles. Did you fix something this month? Of course you did. There's not an engineer alive who didn't.

Radio stations usually have quite a few pieces of equipment. And (surprise) many of those stations take a lot of technical talent, if not sheer willpower, to keep them running. What may seem second nature, and not very important to you, can be invaluable to another engineer.

It doesn't matter whether that person has two, or twenty years experience. What about the day that he is called upon to help another station out - - it will happen. Wouldn't it be helpful to know about some of the unique equipment quirks that lie in wait "over there". That's where you come in. There's a lot of common equipment at many stations. If you had a problem, you can be sure that some else will too. Send the solution to Radio Guide - - to all of us.

. . . Editor



In This Issue . . .

- Page 2 Mistakes & Corrections
- Page 3 Continental 816R Gate Drive Card Tips
- Page 4 A Little Dust - A Lot of Money
EBS Receiver Conversion
- Page 6 RCA BTF-40E Fire Danger
Fuse Tips
- Page 7 Mass Calling System - On The Level ?
- Page 8 CSI Transmitter Problems
- Page 9 Mix-Minus: No Big Deal
Bauer 707 Low Power Modification
- Page 10 Thermostat Remote
MCI JH-110 Tape Deck Tips
- Page 11 ITC & SMC Cart Deck EQ Tips
Satellite Dish Interference
- Page 12/13 Tips From The Field
- Page 14 Contract Engineer Listing

Phone Coupler Queries

In the January-89 issue of Radio Guide, on page 3, there was an article and schematic for a remote telephone coupler box. A couple of people have written to inquire how relay K2 will drop out when you are through using the device.

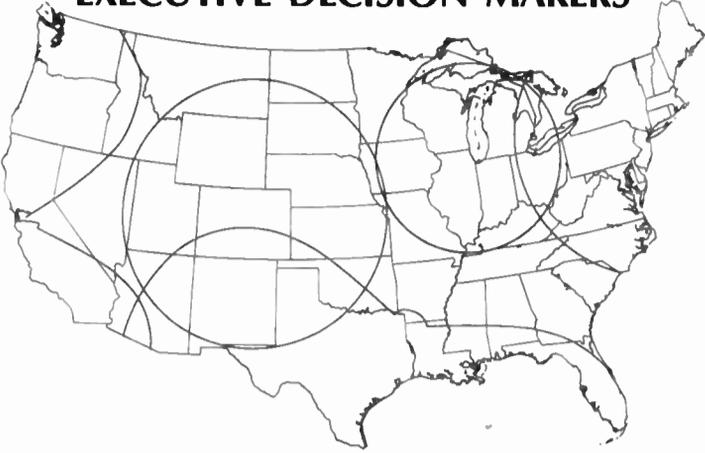
The relay is held in by the phone line voltage, during use. When you disconnect the studio end of the phone line, the telco company provides a momentary battery disconnect at the coupler end of the line. This is a normal function of the telephone system, and allows the relay K2 to drop out.

FCC Rules and Regs Info - - Again

A number of people have called to inform me that the info regarding the loose-leaf style, FCC rules and regs in the January-89 issue of Radio Guide, had listed incorrect stock numbers for the publications. Here is the "right stuff."

Publication	Stock Number	Price
Volume I (parts 0,1,19)	004-000-00460-4	9.00
Volume II (parts 2,5,15,18)	004-000-00459-1	11.00
Volume III (parts 73 & 74)	004-000-00471-0	17.00
Volume IV (parts 90 & 94)	004-000-00474-4	11.00
Volume V (parts 21,22,23,25)	004-000-00462-1	10.00
Volume VI-B (parts 41,42,43)	004-000-00463-9	2.25
Volume VII (parts 61-69)	004-000-00462-1	10.00
Volume VIII (parts 76 & 78)	004-000-00473-6	4.00
Part 13	004-000-00458-2	1.00
Part 17	004-000-00461-2	1.50
Part 80	004-000-00475-2	6.00
Part 87	004-000-00466-3	3.25
Part 95	004-000-00467-1	2.00
Part 97	004-000-00468-0	3.00
Part 99	004-000-00469-8	1.25
Part 100	004-000-00470-1	1.00

EXECUTIVE DECISION MAKERS



**DO YOU KNOW YOUR MARKET?
YOUR COMPETITION DOES!**

Are Your Contours Really Where You Think They Are?
Are Your Sales/Marketing People Market Oriented?
Can You Target Your Ethnic/Demographic Markets?
Do You Know Where Your Signal May Be Marginal?
Do You Have A Special Mapping Requirement?

DATAWORLD MAPS CAN WORK FOR YOU

MAP OPTIONS

- SHADOWING (TERRAIN SHIELDING)
- POPULATION DENSITY
- CONTOUR COVERAGE
- POWER DENSITY
- COMPOSITES
- SPECIALS

NAB
Booth 1374

DATAWORLD HAS BEEN SERVING THE
BROADCAST INDUSTRY FOR 18 YEARS

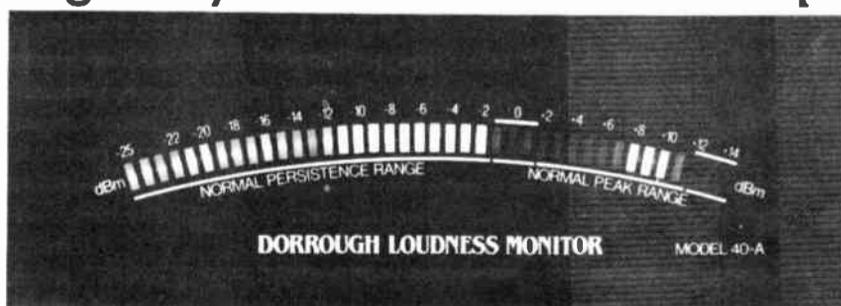


dataworld[®]
A Service of DW, Inc.

P.O. Box 30730, Bethesda, Maryland 20814

(301) 652-8822 Fax (301) 656-5341 (800) 368-5754

**50 year old ballistics are incapable of
monitoring today's state-of-the-art audio equipment.**



Dimensions: 8 1/4" x 2 7/8" x 6 1/2"

Model 40-A

Simultaneous display of peak and average on a single scale.

Never before has a gain riding display been able to show what is taking place acoustically and electronically. Through its unique electronics, the 40-A allows the eye to see a one-half cycle excursion at 15kHz, thus helping to keep the audio peaks within the headroom of the equipment.

This meter correlates all types of program material and has led the way to open and clean programming throughout the system.

Specifications
Scale: 40 units in 1dB steps
Input Level: -30 to +20dBm
Input Impedance: 20k bal, 10k unbal.
Power: 120V/220-240V/50-60Hz

dorrough

Dorrough Electronics • 5221 Collier Place • Woodland Hills, CA 91364 • (818) 999-1132 • Telex: 3791292

Jim Nelson of Greenville North Carolina informed me of the stock numbers of the smaller, book style, bound volumes. Each 6 x 9 volume is bound and contains a range of FCC parts.

Volume	Stock Number	Price
Parts 0-19	869-001-00164-0	17.00
Parts 20-39	869-001-00165-8	21.00
Parts 40-69	869-004-00174-6	9.00
Parts 70-79	869-001-00176-4	17.00
Parts 80-100	869-004-00176-2	19.00

All of these FCC rules and regs may be ordered from the GPO in Washington, DC. The phone number is (202) 783-3238. If you have any questions regarding these publications, please give me a call at (507) 280-9668. I'll be glad to help . . . editor

Continental Drive Card Tips

By Jerry Mathis - WSCI/WKKG
Columbus, Ohio

The tip from Mark Goff of Tulsa Oklahoma, in the December 1988 issue of Radio Guide, reminded me of a similar problem I had with my Collins 831G2C transmitter, back in Tennessee. I believe that this was the last version of the 25 kW FM transmitter Collins made, before they were purchased by Continental.

My problem wasn't caused by lightning, or any sudden catastrophe. It's just that the transmitter wouldn't stay on the air a great length of time, without tripping the PA plate circuit breaker. This would often happen three or four times a day, for no apparent reason - - and it was a 25 mile trip (one way) to the transmitter each time! This drove me buggy for nearly a year. As I recall, I called Continental about this once or twice, but apparently got hold of someone who didn't know the cure, so I blamed the utility company for transients on the power line.

Well, I finally found the source of the problem, which was the same as Mr. Goff's - - the gating card. Now, as Paul Harvey would say, "here's the rest of the story." I found that the only thing wrong with the card was an open electrolytic capacitor. I don't remember what the component number was, but it was a 10 μ f/50 VDC capacitor. There were two of them on the card. If one opened, it would apparently cause an imbalance in the circuit, causing the gate drive card to trigger the SCR improperly. Replacing the open capacitor made the card work as well as before.

This may not solve your particular gate card problem, especially if you took a lightning hit like Mr. Goff - - but hey, it's worth a shot. It may even save you an un-necessary re-build job.

Over several years, I had at least three of these same capacitors (on other cards) go bad. In each case, replacing the electrolytics made the card work OK. Be suspicious of bad electrolytics, if the transmitter starts tripping the PA plate breaker for no apparent reason. This often occurs when the transmitter is being turned on, or during an over-load re-cycle.

More Continental 816R Gate Card Tips

By John A. Bredesen
Director of Engineering - KLCC
Eugene, Oregon
503-726-2224

We were having occasional trouble with the plate circuit breaker tripping at sign-on. Re-setting the breaker would get us back on the air without any sign of troubles.

Dave Chenowitz of Continental suggested that quite often the problem is caused by a faulty electrolytic capacitor on one of the three gating cards. His suggestion was to replace, shotgun style, both of the 200 mFdc capacitors (C9 & C10) and both of the 10 mFdc capacitors (C5 & C6).

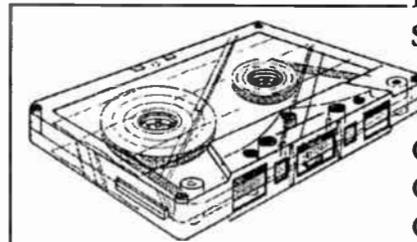
By using the technique of trying one card at a time (detailed in an earlier issue of Radio Guide), it's possible to determine the bad card. However, my feeling is that if one cap has gone bad on a given card, can others be far behind? Consequently, I changed all four caps on each of the three gating cards. It cleared the problem and at a very moderate cost.

Your Help is Needed ...

If we're doing alright, let us know. If we're not serving your needs, let us know that too - - and at the same time be sure and tell us what you think needs correction, modification or expansion.

Remember, Radio Guide depends upon your suggestions for its content, direction and its very existence. You've said you've wanted it, so here it is. Please, help to create a useful technical publication. Call (507) 280-9668.

Blank Cassettes... Perfect for Demo Spots



BASF Pure Chrome
Shape Precision see-thru shell
in quantities of:
50 100
C-5's \$.53 ea. \$.46 ea.
C-10's \$.58 ea. \$.50 ea.
C-15's \$.63 ea. \$.54 ea.

Custom lengths are also available

BASF LHD Normal Bias
Michelex German made shells
in quantities of:

50 100
C-5's \$.49 ea. \$.42 ea.
C-10's \$.53 ea. \$.46 ea.
C-15's \$.58 ea. \$.50 ea.



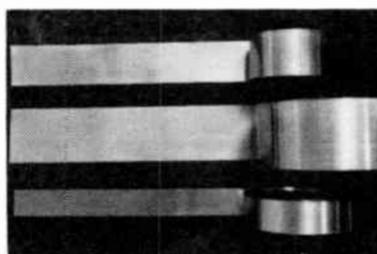
PHONE: (507) 288-7711

FAX: (507) 288-4531

Tom Jones Recording Studios

220 South Broadway

Rochester, Minnesota 55904



MENTION THIS AD AND SAVE

10%

ON ALL COPPER PRODUCTS FOR
RF CONSTRUCTION



It's construction time. We want to help! Now thru May 5, 1989, enjoy 10% savings on 2, 3, 4, 6 and 8 inch strap, counterpoise mesh, flyscreen and #10 soft drawn wire.

HARRIS 800-622-0022 **ALLIED**

THE "NFR" STORY

NFR is Noise Free Radio

Over the past year, I have been working on the simultaneous transmission of frequency and amplitude modulation on a standard AM Broadcast Band transmitter. This dual transmission is completely compatible with existing AM radios. And, when received on a new type of "Noise Free Radio," provides high fidelity, clean audio -- typical of FM.

I have prepared a 26-page booklet describing these experiments, and suggesting ways of implementing this new medium in the near future.

To cover the cost of further experiments and demonstrations of NFR at conventions and meetings around the country, I am offering the booklet for sale at \$12.00. If, after reading it, you feel it was not worth the investment, just return it within 30 days for a \$10.00 refund. Thanks!

George W. Yazell PE (retired)

Make your check or money order payable to "Noise Free Radio" and mail to:

Noise Free Radio
P.O. Box 8086
Lakeland, FL 33802

Be sure to include your name and mailing address!



THINK MLW-1

- Three stereo inputs, one stereo output
- Automatic switch to secondary or tertiary inputs on primary *loss of channel*
- Automatic switch to secondary or tertiary inputs on primary *loss of audio*
- Automatic loss of channel correction
- Automatic audio polarity correction
- User programmed sequence and time delays
- On-line audio monitoring and switching
- Microprocessor based
- Audio error alarms and level matching

**AND MORE... CALL OR WRITE
FOR COMPLETE DETAILS**

**TITUS
TECHNOLOGICAL
LABORATORIES**

**1134 Neipsic Rd., Glastonbury, CT 06033
(203) 633-5472**

A Little Dust - A Lot of Money

*By Michael E. Slocum
Topeka Broadcomm Inc.
Topeka, Kansas
913-234-2627*

Our FM station, KTPK, and another FM station here in Topeka, each bought a Harris FM 25-K transmitter, circa 1985. This model uses five IPA amplifier modules, each containing two amplifiers each. The first module amplifies the exciter output up to fifty watts. This power is then split and fed to the four other modules, amplified, and then recombined through an eight port combiner for a nominal power of 350 watts to drive the PA.

The IPA section was designed with the idea that each module would be isolated from the others to prevent a damaged module from affecting another. The problem arose when, out of the blue, the other station's transmitter blew out random amplifiers, two on one module, and one on each of two other modules. Harris shipped out new modules, and also suggested a modification to the voltage line feeding the IPA section. Some time went by, but the same thing happened again -- the transmitter blew out more transistors at random. Harris shipped out new modules, and said to look for an arc somewhere in the transmitter; none was found.

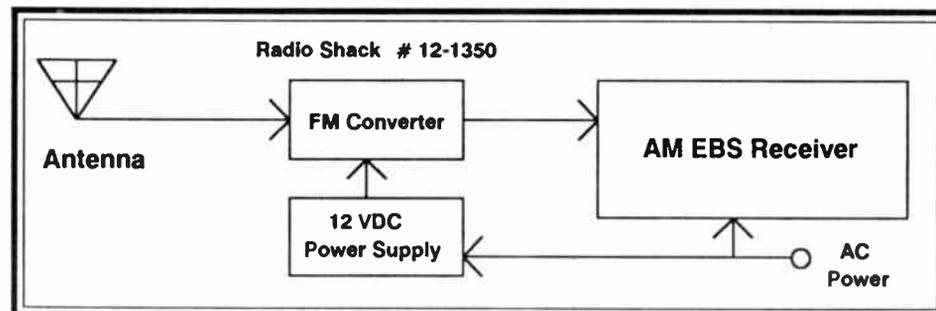
Next, it was my turn. My transmitter, just like the other station's, blew out random transistors for no apparent reason. After questioning Harris' customer service dept., one of the technicians said that this had been a major problem for them, and that they didn't know exactly what was causing the problem. They studied some transmitters that had experienced this problem and found that each unit contained some bad solder connections inside the eight port combiner. They theorized that, as the dust collects in the eight port combiner, it has a tendency to work its way into the cracks in some of the bad solder connections. When this happens, the impedance is thrown out of tolerance, causing transistors to randomly blow out. The transmitter needs to be kept extremely clean to help prevent the problem. In addition, to thoroughly clean the eight port combiner, it must be disassembled, at which time it would be a good idea to re-solder all of the connections inside the combiner.

Since not too many radio stations keep their transmitter in a clean-room environment, Harris apparently has decided that the best way to alleviate the problem was to completely re-design the IPA section so that it would be a little more forgiving of dust. The transmitter does seem to give one bit of warning, though. Before the costly happenstance occurs, the transmitter tends to display a greater number of PA overloads than usual (provided you call PA overloads something usual).

EBS Receiver Tip

*By A.B. Parker - KSAU
Nacogdoches, Texas*

Recently, the EBS station in our area went off the air. The new EBS designate was an FM station, which rendered our old AM EBS receiver useless. Upon shopping for a new receiver (on a non-existent budget), the realization was soon upon me that an alternate solution would be necessary. In lieu of an expensive solution, an under thirty dollar innovation was found.



An under-dash FM to AM converter was purchased from Radio Shack (part# 12-350). A 12-volt power supply was assembled to power the converter, using a filament transformer and a bridge rectifier. The result was a low cost FM EBS system that has performed flawlessly since installed.

4, 6 & 8 MIXER, SINGLE AND DUAL CHANNEL STEREO, \$1395 TO \$2950!!

The incredible, new
xL SERIES audio consoles.



xL82S shown

FIELD PROVEN

The new xL SERIES consoles utilize much of the same high performance technology that has made our audio switchers, DA's, preamps & mixers famous the world over. And, as you are reading this, these new consoles are proving themselves in numerous installations across the country. "No RF problems of any kind"... "Our sound has noticeably improved since installing your boards"... "Our people really enjoy the ease of operation"... "Would recommend your consoles to anyone that asks"... "Your console actually tested out better than your spec's".

NEW TECHNOLOGY LOWERS COSTS

Dramatic new developments in IC technology have enabled us to design these consoles with fewer components and naturally less labor. The end results are not only a significant price reduction and higher performance than previously possible but, in addition, higher reliability.

MORE BANG FOR THE BUCK

Huge expanded scale, -40dB to +3dB, multi-colored LED VU meters (4" & readable in bright light across the room); Four individual meters on dual channel units; Switch programmable muting on each mixer and input; Nine input selects on the last channel; Mono sum output; Plug-in modules for ease of service; Optional switch programmable remote control start/stop; Remote start/stops use front panel input and output selects or input select and pot up start/ pot down stop; Double shielding for total RFI protection...and as you'll see in the rest of this ad ...much, much more.

FOR THE SKEPTICS

Anyone can write an ad touting the virtues of their product. Well, we have always felt that we haven't passed muster until you say so. That's why all RAMKO products are shipped on a two week trial basis. You're the final judge. No ifs, ands, or buts! Simply put, if at any time within two weeks of receiving your equipment you are not entirely satisfied, or have just changed your mind, return it in like new condition. Upon verification of condition an immediate refund (less shipping charges) will be issued, for prepayment or C.O.D.s, or your account will be credited if purchased open account. What more could anyone ask? Pricing that will save you hundreds of dollars...Unsurpassed quality & performance...A no risk opportunity to prove to yourself that you get exactly what you want and everything we claim is true. And, everything we manufacture is backed by a 2 year warranty.

DON'T DELAY

Call RAMKO RESEARCH direct or your RAMKO dealer for further information or to place your order. You have nothing to lose except perhaps some preconceived notions about how much quality *really* costs.

TOLL FREE (800)678-1357

FAX (916)635-0907

RAMKO RESEARCH

3501 #4 SUNRISE BLVD.
RANCHO CORDOVA, CA 95742
(916)635-3600

FEATURES OVERVIEW:

1. EXPANDED SCALE VU METERS (-40dB to +3dB) multi-colored LED.
2. PLUG-IN SHIELDED INPUT MODULES.
3. MIC/LINE SELECT JUMPERS ON EACH CHANNEL.
4. MONO/STEREO FEED SELECT ON EACH CHANNEL.
5. GAIN SELECT PATCH PANEL ON EACH INPUT.
6. PROGRAMMABLE MUTING SWITCHES ON EACH INPUT.
7. NINE INPUTS ON LAST CHANNEL.
8. 2 WATT CUE AMP.
9. ROCK SOLID, SHORT CIRCUIT PROOF SUPPLY WITH LED INDICATORS.
10. MONITOR SELECT/GAIN CONTROL. Prog1/Prog2/External.
11. PHONES SELECT/GAIN CONTROL. Prog1/Prog2/External/Cue.
12. INTERNAL CUE SPEAKER.
13. VCA CONTROLLED MIXERS.
14. PADDED ARM REST.
15. MONO SUM OUTPUT.
16. PLUG-IN IC'S THROUGHOUT.
17. FOUR INDIVIDUAL PWR. SUPPLIES. Meters. Cue amp., Power amp., Main audio
18. INSTANT ACCESS. Two,

quarter turn fasteners.

19. ILLUMUNATED 5 MILLION OPERATION IN/OUT SELECT SWITCHES.

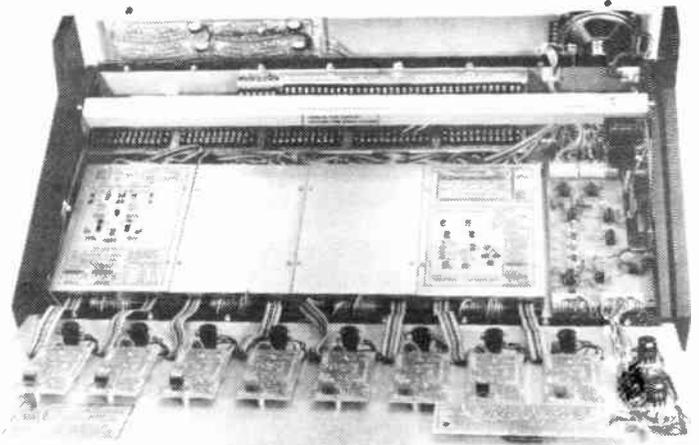
20. HIGH VOLTAGE SOLID STATE AUDIO SWITCHES. Cannot be overdriven nor damaged by overvoltage.

21. EXTERNAL 20 WATT POWER AMP.

22. ON AIR LIGHTS RELAY.

23. REMOTE START/STOP OPTION. Programmable for operation from in/out select switches or mixer pot-up start & mixer pot-down stop.

24. COMPLETE INTERNAL LABELING. All labeling for in's & out's, gain adjusts, programming, levels, etc., is provided internally for easy installation.



PARTIAL SPECIFICATIONS

INPUTS: Two per channel except the last channel which has nine. Balanced bridging 1k ohms in mic mode & 150k ohms high level. Input #1 of each channel programmable mic thru high level. Input #1 of each channel may be strapped for mono or stereo feed.
OUTPUTS: Balanced low impedance, +25dBm max into 600 ohms. May be used balanced or unbalanced. Stereo sum balanced out. Program outputs factory set for +8dBm but may be recalibrated for

any other level.

METERING: Expanded scale, 4" solid state tri-color with VU ballistics. 2 each on single channel units & 4 each on dual channel models.

MONITOR: Stereo, muted monitor outputs @ +4dBm. External 20 watt stereo amp included. Three position selector for PRO1, PROG2 & EXTERNAL in.

CUE: Mono-sum to 2 watt internal amp & speaker and phones. Switch programmable speaker muting.
S/N: Mic level in @ -50dBm & +8dBm

out; -68db. High level @0dBm in & +8dBm out; -75dB (typically -78dB).
DIST: Below noise floor. Typically .009%.

RESP: 10Hz-20kHz; ±1dB
CROSSTALK: PROG1 to PROG2; -70DB.

SIZE: xL4..19"W x 8.5"H x 17"D.
xL6..25"W x 8.5"H x 17"D
xL8..30"W x 8.5"H x 17"D

POWER: 115VAC, 50/60HZ, 40W. 230VAC available at additional charge.

FINISH: Polyurethane Carbide black, Linear white, Ramko Grey.

MODELS & LIST PRICES:

xL41S \$1395
4 mixer single channel stereo
xL42S \$1650
4 mixer dual channel stereo
xL 61S \$1975
6 mixer single channel stereo
xL62S \$2375
6 mixer dual channel stereo

xL81S \$2650
8 mixer single channel stereo
xL82S \$2950
8 mixer dual channel stereo
RSS4 \$225
Remote start/stop (xL4)
RSS6/8 \$325
Remote start/stop (xL6 & xL8)

LF6 Contact factory
Linear faders; Available 6/89
LF8 Contact factory
Linear faders; Available 6/89
PS230B \$50
230VAC power source

RCA BTF-40E Fire Danger

By Steve Johnson - WGH Radio
Virginia Beach, Virginia
(804) 497-1310

Here at WGH, we run a pair of RCA BTF-20E1 transmitters in the BTF-40E1 combined system. These boxes have been difficult at times, causing Engineering Department stress and worry. After several years of steady work and improvement, these units are now running nicely.

Early in my relationship with the 20E1s, I witnessed something that strikes fear in an engineer's heart - - a transmitter fire. While attempting to test a newly installed antenna system, we found that neither transmitter in the combined system would come up. Morning drive was approaching, and we were beginning to fret. Finally, transmitter #2 managed to struggle to the air. After congratulating ourselves and sitting back to consider all the possible reasons for the difficulties, we smelled smoke!

Our first instinct was to shut down #2, and visual inspection revealed that it was not on fire. We restarted the transmitter and looked around the building for other likely candidates. Finally, I opened the cavity door on transmitter #1 and saw the tube, socket, and shelf - - flaming! I shut off the filaments and pulled all the breakers, but the fire would not go out. At last we realized that RF from the number two transmitter was getting into the PA of number one, setting it on fire. We shut down number two and the fire went out.

Whew! The RF from transmitter #2 was arcing across the plate blocker of transmitter #1, flaming it. To make things even peachier, the blower was on, feeding oxygen to the fire. When the RF and air sources were cut off, the fire died immediately.

We found that the combiner was out of balance, thanks to a failure in the reject dummy load. We were running the original dual Bird dummy loads, mounted in the center combining cabinet. In our experience, these loads fail routinely, even if they have hardly been used. We found one of the loads had opened, making the combined reject load system look like something other than 50 ohms. This odd reject port load put the combiner out of balance, sending a sizeable amount of the RF out from transmitter #2 into #1, as well as some to the reject and antenna ports.

The immediate solution was to repair the failed load and repair the major damage to transmitter #1's cavity-mounted components. The latter was not cheap! The long term solution was to replace the entire reject load with an air-cooled unit mounted externally. This has performed perfectly, with no further problems of this sort.

Fuse Tips

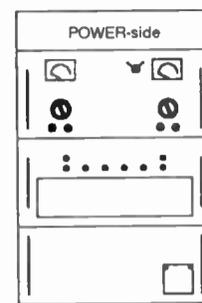
By Joel Belik - KIKX
Colorado Springs, Colorado
(719) 632-5800

If you should suspect an open fuse in a three-phase disconnect, don't try to measure the voltage on the output lines to ground, to determine which fuse is blown. The problem is, with a load on the circuit, the lines will still show a voltage on the output. To save some time, you will be better off looking for a voltage potential across the fuse. The one that shows voltage, is the bad one.

For some time, I was having trouble with a 200 Amp disconnect fuse blowing, for no apparent reason. The disconnect fed a BE-30 transmitter and the transmitter showed no damage. No breakers on the transmitter were tripped and the unit would come up with no problems, after the fuse was replaced. The measured current on each phase was within an amp or two of 100 Amps. What was blowing the fuse? After a number of blown fuses (at \$20 a pop), we finally discovered the leaf switch in the disconnect was shorting between phases. The unit looked good and the problem was found to be a short through the plastic that holds the switch.

POWER - side™

The solution to many of AM radio's most serious technical problems



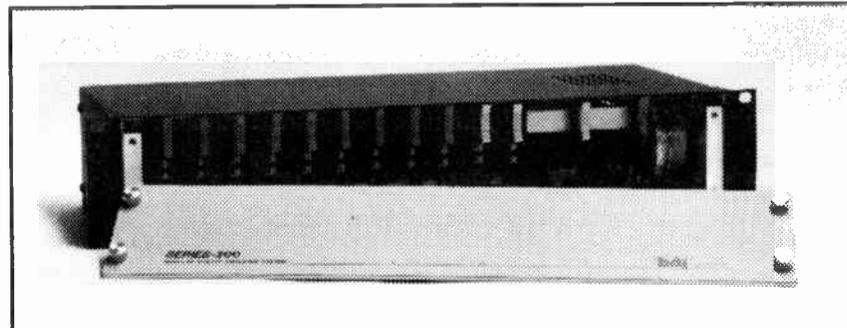
From the developers of the
AM STEREO system
"that isn't afraid of the dark"



425 Merrick Avenue
Westbury, NY 11590
(516) 222-2221

Audio Interfacing Solutions

Whether you need consumer to pro interfacing, line amplifiers or distribution amplifiers, the Series-200 Utility Amplifier System is the solution. Up to 11 input or output modules can be arranged in one 3.5-inch rack chassis to provide the interface you need. We offer a wide variety of standard stock configurations at affordable prices. They include a 1 x 10 stereo DA, two 1 x four stereo DAs, five stereo line amps and 11 consumer-to-pro interfaces. Because each output has individual active balanced amplifiers you get separate gain controls for each. Levels can be easily matched to your exact requirements -- a feature only found on very costly distribution systems. Rear panel connections to the Series 200 are via simple screw clamp connectors for all balanced connections and standard phono jacks for unbalanced consumer interfacing. Contact your local distributor or Broadcast Devices today for more details.



Complete systems start at under \$1400.
Custom configurations are also available.

COME SEE US AT NAB BOOTH 1765
(DSI COMMUNICATIONS)

Affordable solutions for the broadcaster ...
5 Crestview Avenue Peekskill, NY 10566 (914) 737-5032

bdi Broadcast
Devices, Inc.

Mass Calling System On The Level?

By *Ed Jurich - WMIX*
Baltimore, Maryland
(301) 825-5400

A few months back, I replaced a cheap speaker-phone in our air studio with a Gentner SPH4 telephone interface. Programming wanted to be able to have caller and announcer talk simultaneously without one cutting the other off. The SPH4 seemed to do the job with problems on some calls that were low level.

As time went on, low level calls became more of a problem, until last Fall - - most of the calls were low level. The problem with low level calls is that increasing gain creates a hybrid feedback problem by also increasing the amount of announcer feedback level.

What really drove me crazy was the fact that I could make a call using any request line, adjusting levels for soft levels, and the system would work great. But as soon as calls came in, the levels were so low the VU meters barely moved.

It never occurred to me that the phone lines were a problem because, after all, every time I called out on any request line, levels were just fine.

A Secret Number

Now Baltimore, as in most larger markets, has a mass calling system for radio station request lines or any location where there may be a high volume of calls. In a mass calling system, the number you give out over the air is not the actual number, but rather an under-number, or secret number, is the real number.

Quite by accident, I had occasion to call the under-number to test something and behold, levels were loud. So I made several test calls using the under-number and the request line number and found that every time that I called the under-number, levels were just fine. Every time that I called the request line number, levels were low. I called another station in town and had their engineer try the same test and he had the same problem. It was the entire mass calling system causing a loss in level.

The reason why every time I called out on the request line, levels were just fine, is that outgoing calls do not use the mass calling system. Only incoming calls use the mass calling system. As it turned out, the problem occurred as different exchanges were changed over to electronic switching. This is why the problem kept getting worse over a period of time.

Added Loss

The electronic switching looks at the line each time a call comes in. For local calls, electronic switching inserts some loss into the circuit so local calls are about the same level as long distance calls. The mass calling system already causes loss because, in effect, the call to the request line is patched into the under-number so the call is going through a patch and two more exchanges. The electronic switching then added more loss because it was a local call. The cure was to re-program the electronic switching not to insert loss into the mass calling system. The SPH4 works fine now.

The quickest way to check a mass calling system is to call the under-number and the on-air number, and compare the levels. If there is a big difference in levels, there may be a problem. There will be about a 6 dB loss in the mass calling system, so a slight loss in level is to be expected.

My hat goes off to C&P Telephone for solving the problem in a few days. After battling the problem for months and discovering it was not my problem was both good and bad. It was good that I found the problem. It was bad that it was the entire mass calling system, as I had visions of weeks or months of re-design work by the telephone company. The fact that they identified the problem fast and did a fast fix makes you heart warm over to Ma Bell.

For Your Information . . .

The reader-service "coupon" is located on page 15. Fill in all the information asked for, and circle any advertiser's number from which you wish to obtain more information.

You may also want to jot down your name and address if your not getting the Radio Guide at the location you wish.

ECONCO

Now in our 20th year
providing quality rebuilt tubes.

These are a few of
the tubes we rebuild:

3CX2500F3

3CX3000A7

3CX3000F7

4CX5000A

4CX15,000A

4CX3000A

WE BUY DUDS.

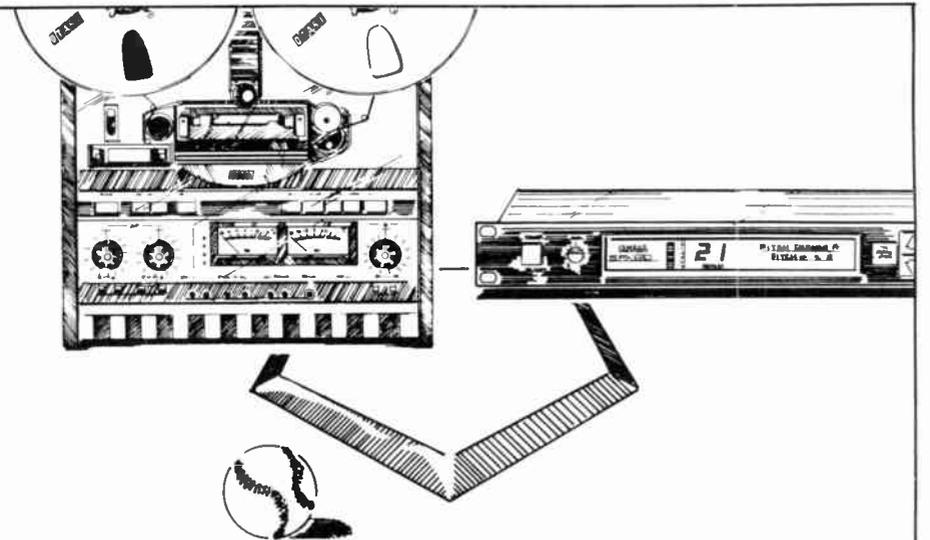
WE ALSO REBUILD REFLEX KLYSTRONS.

VISIT US AT THE NAB BOOTH 1675



ECONCO
1318 COMMERCE AVENUE
WOODLAND, CA 95695
TELEPHONE 916-666-7553

OUTSIDE CA 800-532-6626 EXT. 30
FROM CANADA 800-848-8841
TELEX 176756
FAX 916-666-7760



Combo Savings Team! Great Double Play!

Improve your ERA (Excellent Recording Average) with an Otari 5050B Mark II and a Yamaha SPX 90 II. Get both at a special low combo package price for a limited time. Think of the sound possibilities! Think of the savings! It's two on and nobody out. Bring this great team home!

Call for details NOW!
1-800-798-2342

The
AUDIO
broadcast group inc.

2342 S. Division Avenue • Grand Rapids, MI 49507

© 1989

Broadcast Computer Bulletin Boards

Broadcast Computer Database

7 days a week, 24 hours a day
All Baud rates (8 data, no parity, 1 stop)
Specializes in on-line engineering programs
David Armstrong (sysop)
(713) 937-9097

Network Communication System Broadcast BBS

300/1200 Baud rate
Specializes in technical tips and schematic graphics
(601) 373-0160

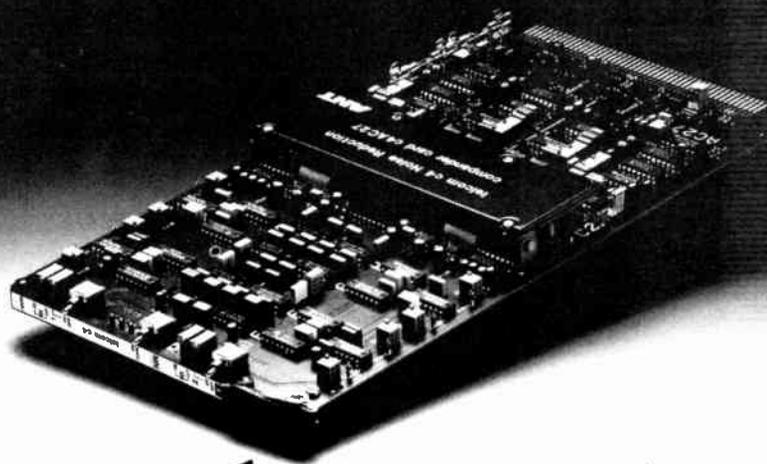
Flamethrower Broadcast Resource Center BBS

300 - 2400 Baud rate (8 data, no parity, 1 stop)
7 days a week, 24 hours per day
60 megs on-line, broadcast engineering and ham radio
(804) 730-1291

Allied Broadcast BBS

300 - 1200 Baud (8 data, no parity, 1 stop)
Over 220 Basic programs and ASCII files
(317) 935-0531

SILENCE BY DESIGN.



telcomc4

AC27 Componder
Card for the Sony
BVH-2000 Series
Video Tape Machines.

Features:

- A product of ANT Telecommunications, Inc.
- Plugs directly into the AU-27 slot of the BVH-2000/2500 Series 1-inch video tape recorders.

- Improves dynamic range and cross-talk performance offering a recording quality comparable to 16-bit digital.
- Corrects frequency response errors with head bump effects.
- Improves frequency response of the VTR.
- 24dB of noise reduction (telcomc4).
- NR system alignment not necessary.
- Automatically follows record/play-back operation of the VTR.
- Remotely controllable.
- On/off switch located on the front.

Distributed by:

RAM BROADCAST SYSTEMS INC.
346 W. Colfax Street, Palatine, IL 60067 • (312) 358-3330 • FAX (312) 358-3577

CSI Transmitter Problems

By Sydney Marshall - WDME

We had excessive AM hum on the modulation of our CSI FM-3000 ever since it was installed. This transmitter is similar to (some say copied from) the CCA. A 20 watt solid state exciter drives a grounded-grid triode IPA, which drives a grounded-grid triode PA. Tuning is via strip-line sliders, except for the IPA input, which is a pi-net with tuning caps. Our power is single phase.

Several consultants and I had gone all through the power supply, looking for the hum (it wasn't coming from the exciter). The only unusual meter reading was a small amount of IPA cathode current - - with the plate off! Since this was my first experience with an FM transmitter, I would keep asking about this current. Mostly, I would get a shrug or a suggestion to replace the tube (I had).

An Odd Situation

Finally, after three years of hum, one very good consultant named Howard Soule and I decided to spend the night and do or die. I showed him the cathode current. He looked thoughtful and said, "that's odd." We tore into the PA cabinet to take voltage readings at the socket. The old Simpson 260 showed 24 volts AC on the cathode! "What the ...," came out of our mouths.

I spent hours crawling around inside the transmitter, tracing out the control wiring. With the "control" circuit breaker off, there was no 24 VAC on the cathode. It took Howie reading off wire numbers and me crawling behind the panel, to discover - - 2 wires transposed on the IPA overload relay socket! The 24 VAC bus that was supposed to switch to the next relay (one of those "three strikes, you're out" circuits) on IPA overload, was connected to the coil instead. That side of the coil was a direct line to the IPA cathode. We were cathode modulating with a 60 Hz sine wave directly from that oversized 24 volt control transformer! No wonder the indicator bulbs seemed to burn out so often. They were getting RF off of the cathode. Un-soldering and reversing the two wires took about three minutes and ended three years of frustration. Also, the IPA overload circuit was finally functional - - we weren't aware it wasn't.

"Momentary" Frustration

Another frustrating problem on the CSI unit is the push-on/push-off combination indicator light/switches. You can't tell by sight what position you're in, if the bulb is burned out. Even worse, they fail and "go momentary." The schematic didn't bother to say they were supposed to be "holding." You can't tell by feel, and the control ladder is complex enough that it's really not self-evident.

This really confused me on the tune/operate switch, which had gone "momentary." The circuit employs its own time-delay, like a step-start circuit. When you're in "operate," the transmitter keys up first at reduced power, then (after the time-delay runs out), goes to full power. In "tune," it keys up the same reduced power and stays there. Nothing seems to happen if you switch back and forth, because of the time-delay. The only way you'd know the tune/operate switch had gone bad, would be to hold it for five seconds, and watch the power. The time-delay relay makes a barely audible "tick." We ran in "tune" for two years, unknowingly.

Unexpected Plates

I enjoyed Bob Ladd's interlock safety tip (Feb-89). There is a similar situation in the CSI, and I suspect in other transmitters with a non-momentary switch for the plate. If you open a door with the plate on, then self-defeat the interlock, the plate will come back on - - in this case after the filament time-delay. Just enough time to get you into real trouble.

Never count on an interlock to protect yourself. If you've got one bypassed, count on high voltage being able to energize unexpectedly.

I personally feel that transmitters controls should be big old aircraft bat-handle toggles that will work at minus 40° F, by a mit-tened hand. And don't think that a transmitter can't have an original wiring error - - sometimes it happens. Our transmitter had two other errors in the RF tuners.

Mix-Minus - - No Big Deal

By Marv Olson - KAUS
Austin, Minnesota
(507) 437-7666

How many of you have created nothing but confusion, searching for a way to create mix-minus for your telephone applications? Here are two simple and semi-quick ways to create the necessary mix-minus that I've used.

The obvious way is to create another buss inside the console. This can be done by checking the schematic and finding the location of the buss build-out resistors. You'll notice equal value resistors coming from the same electrical point just off each mixer output. These resistors will be in the neighborhood of 2K to 10K. In most cases, there will be two such resistors; one for the program buss and one for the audition buss. To create a third buss, simply solder another resistor of equal value to this point. Do this to each channel EXCEPT the channel with the telephone call on it. Join the other ends of all the new resistors and feed this to a small amplifier. I used a 1-Watt Raymer and it did the job very well for about \$15.00. Your created channel will include the mix, minus the telephone caller, therefore - - mix-minus.

Another method that I recently used simply involved a stereo console. With all of our updates over the years, we have built in redundancy whenever possible. Even though the AM station is mono, we installed a stereo console to have a back-up ability to feed the FM station from AM control. It also made AM control ready for conversion to stereo if needed. The mono output was feeding the AM transmitter. To create the mix-minus buss, I removed the right side on the telephone input and fed only the left channel. The transmitter was switched to the left output of the console and the right output was then the mix-minus. It was that simple.

It should be noted that any stereo material will be missing the right channel in this application. However, by switching the output of the console to left-only during the ball game or the telephone talk show (instead of the normal mono (L+R) output), you have accomplished the task of creating mix-minus for the price of that switch. We have eight-channel audio switchers in place to feed the AM and the FM audio chains, so the switch is just the push of a button.

In the case of FM stereo, the same procedure can be used. The left console output is bridged to feed both the left and right channels of the audio chain. The right channel remains mix-minus for the telephone. Again, if your applications include any real stereo sources coming in, out, or within the telephone material, this method has some limitations.

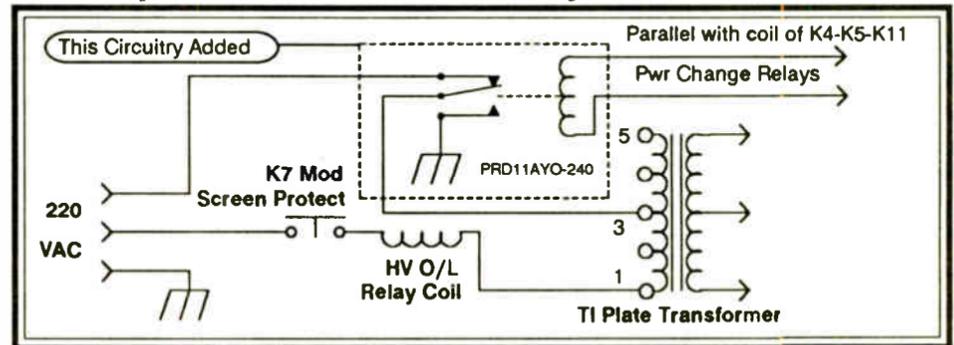
Bauer 707 Low Power Mod.

By Robin O'Kelly - KORE-FM
Springfield, Oregon
(503) 747-5673

Our station, KORE-FM, operates at 5 kW daytime, with a cut-back to 161 watts at night. Our daytime transmitter is a Gates (Harris) BC5P. The transmitter available for nighttime operation was a Bauer 707, 1 kW, that previously had been the station's main transmitter, prior to 5 kW authorization.

The Bauer 707 was designed to have either a 600 watt or 250 watt cutback; not low enough for our situation.

With a 220 VAC supply, the plate voltage runs about 3 kV for the 1 kW power level, while the plate current is around 0.45 A. If the supply to the primary of the plate transformer is reduced to 110 VAC, the plate voltage is halved (about 1.5 kV). When the transmitter is tuned, adjusted and loaded for proper antenna current, the plate voltage is 1.4 kV, and the plate current is 0.19 A (for 161 watts output, that means 60.5% efficiency).



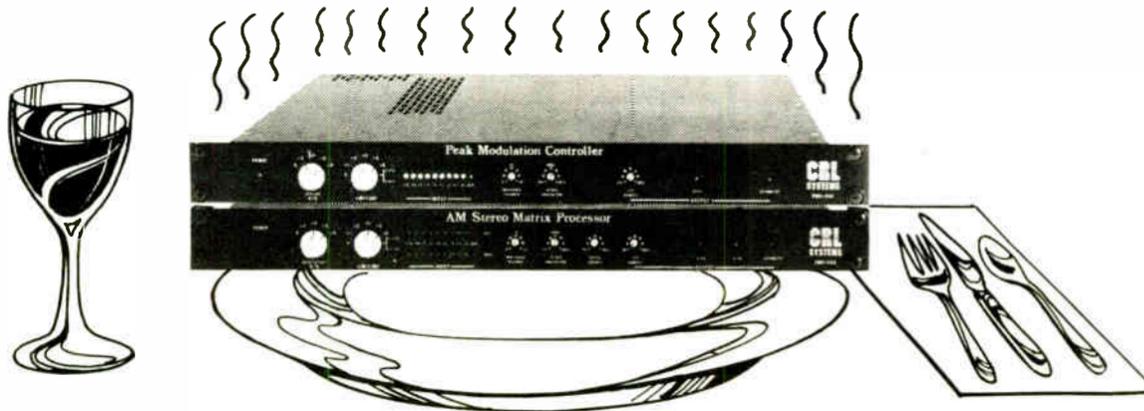
A Potter & Brumfield PRD11AYO-240V relay has been mounted on top of the plate transformer to switch the primary input from 220 VAC to 110 VAC, to allow operation at both 1 kW and 161 watts. The contacts of the relay are paralleled for greater reliability. The coil of the relay is paralleled with the coil of K4 so that the switching is controlled by the high/low power switch. The plate voltage must be interrupted when switching power levels to prevent arcing the relay contacts and welding them together. This is recommended anyway to keep from burning K4's contacts.

Carrier shift is -4.5% maximum, using this method, with THD under 5% at 85% modulation from 50 to 10,000 Hz. Audio quality is good. An added benefit from this modification, is having a 1 kW backup transmitter available when the main transmitter needs servicing.

I hope this information is of help to anyone needing a low-power transmitter on a budget. Thanks go to Ted Hicks of KUGN radio, for the original idea.

This is what's been cooking at CRL!

Just out of the oven are our two latest AM limiters, the PMC-450 and the SMP-950. We have upgraded the performance of our limiters by adding a tri-band limiter section to them. The result is unequalled vocal clarity and punch, either in mono or C-Quam[®] AM stereo. Converting to the NRSC standard? Both of these NRSC compliant units are easy and cost effective ways to convert. Plus in many cases our NRSC compliant processing will improve your coverage area. Want to try one out? Our two week trial program is available. Call us for details.



SEE US AT BOOTH 1009 NAB

C-Quam[®] is a Registered Trademark of Motorola

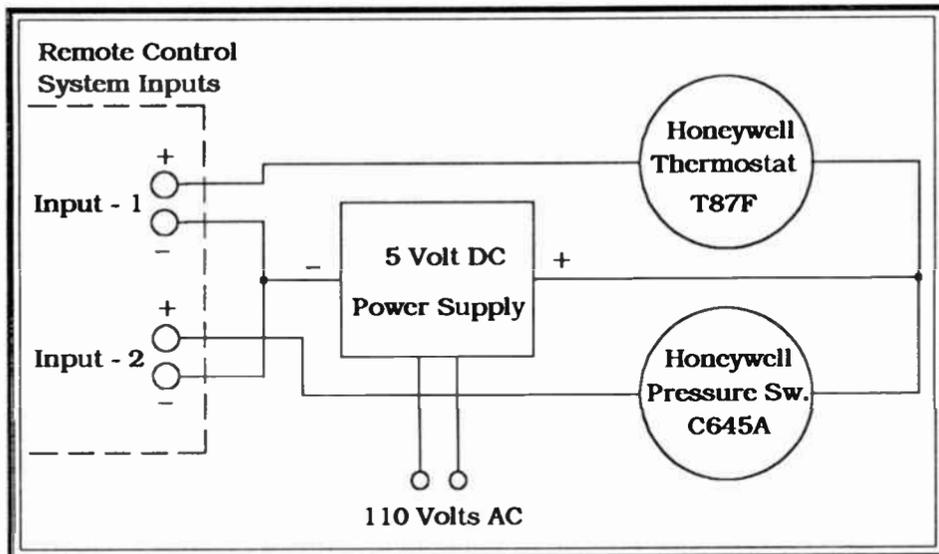


CRL Systems
2522 West Geneva Drive
Tempe, Arizona 85282 U.S.A.
(800) 535-7648 (602) 438-0888
TELEX: 350464

Thermostat Remote

By Sam Mitchell - WOAK
LaGrange, Georgia
404-884-2950

Since it is very important to keep transmitter rooms cool at all times, we felt it imperative to know when our transmitter room (which is four miles from the studio), was over temperature, due to air conditioning mal-function. I installed the following system.



Most remote control systems have many inputs, most of which are not used. So, we purchased a 5 volt DC supply from Radio Shack, and installed a typical wall thermostat (Honeywell T87F) in the transmitter room. The negative side of the DC supply goes directly to the remote control input and the positive side goes through the thermostat. We adjusted the remote control potentiometer to give us a display reading of 3 Volts, with the thermostat closed. We then set the room thermostat to a maximum safe temperature (we selected 82°F). Whenever the transmitter room is at the desired temperature, we receive a 3 Volt reading at the studio at that selected remote control position.

If the temperature ever goes above 82°F, the reading will fall to zero because the wall thermostat will open when the room temperature rises above our setting. This may seem very crude, but it sure can stop a crisis from transmitter room over-temp.

Also, it's imperative that we keep Nitrogen in our coax cable (especially in our climate). Therefore, we installed a pressure switch on the output of our Nitrogen regulator, which works identical to the room thermostat connection. When Nitrogen is present at the proper pressure, the pressure switch is closed and we receive a reading at the studio on another remote control position. If the Nitrogen pressure should drop too low, the pressure switch opens, and we receive a zero when we "dial up" that particular remote channel. Since we monitor all transmitter room functions continuously during the day, we are never low on Nitrogen for more than a couple of hours.

Again, these methods may seem crude, but they work well, especially considering the cost of installation.

MCI JH-110 Tape Deck Tip

By Dave Graves - KMJX/Magic 105
Little Rock, Arkansas
501-224-6500

When working with the analog torque board on the JH-110, it is sometimes hard to set the offset nulls to exactly zero. Adding two 1 megohm feedback resistors (one from pin 2 to pin 6 on IC-4 and the other from pin 2 to pin 6 on IC-10), will help to make this adjustment easier and more stable. Some of the newer tape decks already have these resistors in place.

If you still have trouble with the offset null adjustment, you may replace IC-4 and IC-10 (741 op-amps), with TLO-81 op-amps. This modification should make for a very stable offset null adjustment.



NORTHEAST

BROADCAST LAB, INC.

Technics Sale

Inventory Clearance

	Model	List	Sale
	SPL-222	269.95	215.00
	SPL-550	369.95	284.00
Compact Disc Players	SLP-555	379.95	295.00
	SLP-770	539.95	399.00
	SLP-999	549.95	415.00
	SLP-1200	1399.95	955.00
	SL1200MKII	499.95	365.00
	SP-15	849.95	595.00
Turntables	SP10MK2A	1349.95	955.00
	SH-15B2 Base	459.95	330.00
	SH-15B3 Base	459.95	330.00

Offer good until July 1, 1989

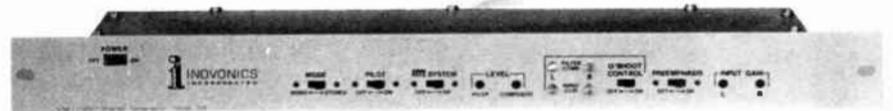
10373 Saratoga Road
P.O. Box 1179
South Glens Falls, NY 12803
Tel 518-793-2181
Fax 518-793-7423

P.O. Box 565
Southampton, PA 18966
215-322-2227

FMX™ Stereo Works!

It doesn't take a Ph.D. to explain FMX System math. How about 240,000 on-air hours to 70 million potential listeners? Those are real numbers.

FMX Stereo works. Scores of U.S. stations and many overseas broadcast authorities have proven the System's total compatibility. Receiver manufacturers are committed and in production, and so are we.



Our Model 705 uses inexpensive digital circuitry. It works with existing station equipment to get you on-air in FMX Stereo for only \$1800.

Inovonics will preview a new FMX Stereo product at NAB '89. Our all-new 706 has full instrumentation and can be remote-controlled.

SEE THE 705 AND 706 AT NAB BOOTH 1473

FMX is a registered trademark of Broadcast Technology Partners.

Inovonics Inc.

1305 Fair Avenue
Santa Cruz, CA 95060

Tel: (408) 458-0552
FAX: (408) 458-0554
TTY: (408) 458-0557
Tlx: 3730800



ITC & SMC Cart Deck EQ Tips

**By Dave Hebert
Paco, Washington
509-545-9672**

ITC Low-Frequency Equalization Adjustments

In early ITC tape cartridge machines (RP/WP series, 3-D series, etc.), dramatic improvements can be made to the low-frequency response.

The emitter resistor of Q102 (2N5089), R107, and the same emitter resistor of Q106 (Q108 on some models) in stereo units, can be replaced with a 500 Ohm miniature pot. You are then provided with an adjustable low-frequency control which can greatly improve the bottom end of these units.

Since the tape head can have a great deal to do with the low-frequency response, this control should be adjusted for flat response at about 100 Hz.

On some circuit boards, the emitter resistors are 100 Ohms. In this case, the adjustment control should be 150 Ohms to allow for full adjustment of the low end response.

After these modifications, the overall audio quality of the ITC machines seems to take on an "open" quality.

SMC Low-Frequency Modifications

The SMC model P-1 program pre-amp board can be modified to provide a much improved low end frequency response with some minor component value modifications.

Change the following components: R6 from 4.7K to 5.6K, C4 from 8mFd to 33mFd, C5 from 8mFd to 22mFd, and C8 from 4mFd to 250mFd. If the low-frequency equalization is unsatisfactory at 100 Hz., then further experimentation with the value of R6 can be done.

SMC has added a 50pF capacitor across R13 (22K) to help prevent oscillation in the output stage.

Satellite Dish Interference

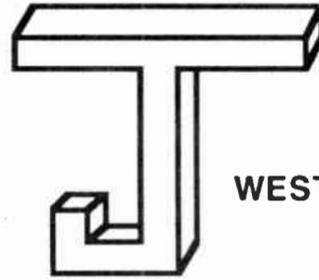
**By Sam Mooney - WTQR-FM
Winston-Salem, North Carolina**

A problem developed with interference to Satcom 1-R, transponders 19 and 21, that started off as an occasional pop in the audio. As time passed, it grew from just a burst of noise one or twice a week, to several bursts an hour. We "look" at several satellites and a host of transponders, and none of the others were affected.

A check with a spectrum analyzer did not reveal any signals that could cause the problem. A tunable IF filter did not clear the problem either. In our search, we heard a story of a micro-wave oven (blocks away) causing trouble at one station - - but this was not our source.

To keep the story short, I won't even start to tell of all the things we tried. We kept logs on times and durations of bursts, weather conditions, etc. Finally, we tried an AM radio tuned down at the bottom of the band and did hear a noise burst that was coincidental with the satellite noise. A walk around the building localized the noise in a breaker panel in the conference room, with forty breakers in it!

Which one was the culprit and what did it feed? After a process of elimination, a breaker was found, that when turned off, cleared up the problem. Tracing the wiring through the building, we found that the breaker supplied a VAV (variable air volume) box in the ceiling of one of the offices. This VAV contained a large contactor, powering a heat strip and an SCR motor speed control. When the device cycled on and off, the contactor arced and caused the noise which rode into the satellite receiver on the power line. Why it affected only two of the transponders, we still don't know, but we got rid of our trouble and gained a few more grey hairs.



SQUARED →
TECHNICAL SERVICE

543 WEST 100 NORTH
WEST BOUNTIFUL, UTAH 84010

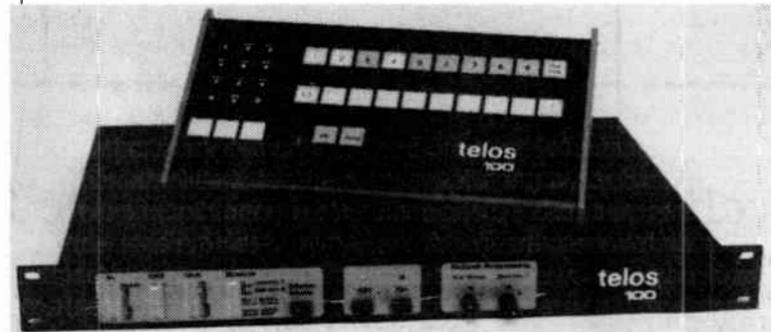
801-298-8515

EQUIPMENT REPAIR AND CALIBRATION SERVICE

WE SERVICE MOST AM/FM BROADCAST MONITORS,
REMOTE CONTROL SYSTEMS, EXCITERS, STL's, TSL's,
RPU's, ETC.

GIVE US A CALL

- CHECK OUR RATES-
- TURNAROUND TIME-
- STL LOANER PROGRAM-



Nobody does it better.

The Telos 100 and Telos 10 digital hybrids are the acknowledged leaders in providing the highest quality telephone talk. And now we introduce the most complete family of interfaces and accessories. More than ever, Telos hybrids can provide you with the performance and features required by your installation. Isn't it time for you to experience the pleasure of great phones?

Call Toll Free 800-732-7665



**BRADLEY
BROADCAST
SALES**

Where Service and Engineering Make the Difference

8101 Cessna Avenue • Gaithersburg, Maryland 20879-4177
MD & DC: 301-948-0650 • FAX: 301-330-7198

Tips From The Field

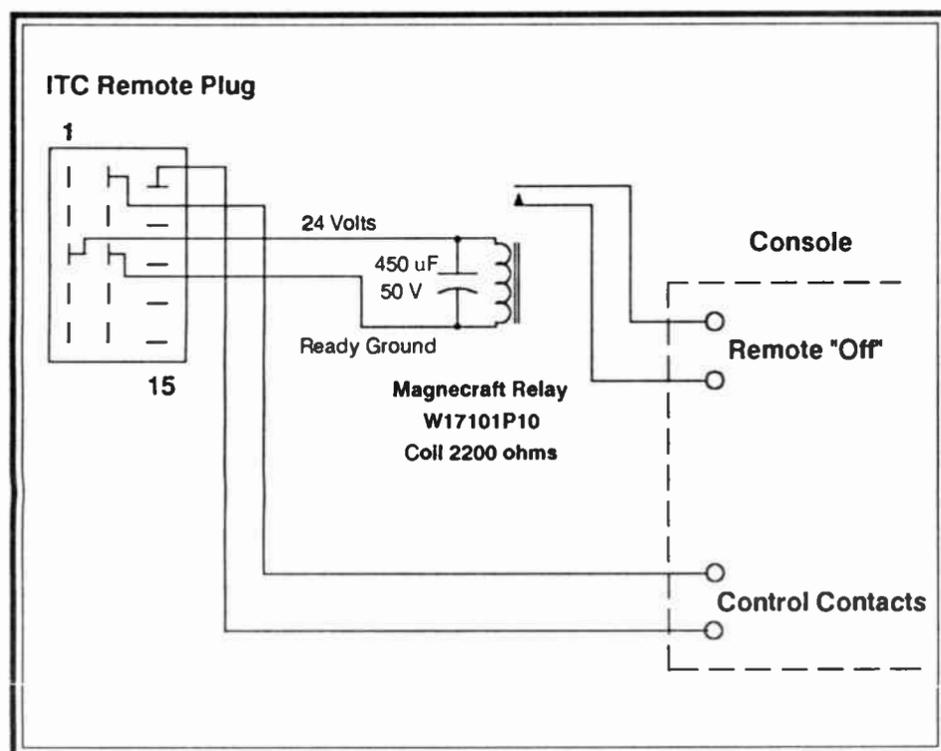
Technical Tips From Around the Country

Cart/Console Mute Control

WCNN Radio
Atlanta, Georgia

Problem: You have single cue cart machines, and a logic controlled console. You want the cart machine to cut off the channel after a cart has played, and you don't have a secondary or tertiary tone to do it...

Answer: I went into our ITC 3Ds and brought the connection for the stop light out to interface with the logic controller for our Broadcast Audio Associates console. Two advantages here: 1. The cart stops, the stop light shines, the channel is off. 2. If there is more than one source on the channel, and it is left on, when you insert a cart, it will shut off the channel because the stop light will light. We did this at WCNN a year ago and have loved it since.



Technics SP10-MKII Turntable Fix

By Bob Nance - WEGL
Auburn University, Alabama
205-826-4057

Our studios are equipped with Technics SP10-MKII turntables. Included in the circuitry of the turntables, is a de-bouncing circuit. The necessity of this circuit is apparent, as the on/off functions are accomplished with one switch. For some unknown reason, as the turntables age, the de-bouncing time gets smaller and smaller. Trying to fix this problem, I opened the case of the turntable and just about choked! The entire circuitry is located on one circuit board that cannot be removed from the case, and all of the components are on the inaccessible side (I suppose that I could have dismantled the case, but it is a pretty formidable contraption).

My next thought was to attempt to de-bounce the circuit from the outside. I thought of this because the remote switches we use are very old and connected through Belden 2-conductor cable to the remote connection on the back of the turntables.

Rather than spend a lot of time analyzing the circuitry and trying to come up with the ultimate solution, I simply placed a 2200uF capacitor across the on/off button. This solved the problem and made a lot of talent happy, as they did not have to cross their fingers to hope that the turntable started properly each time.

Anyone using this turntable might be interested to know that both of ours developed the same problem.

. . . parting is such sweet sorrow . . .
SHAKESPEARE (1564-1616) *Romeo and Juliet*

You thought it would last forever - and it nearly did. On the other hand, boat anchors also have a long operational life! Now, times have changed, and listeners correctly perceive that some stations sound noticeably better than others. Compact discs can make a big difference, but require a wider audio bandwidth to fully exploit their spectacular transient response. Older consoles were simply not designed for today's stringent technical performance or absolute around-the-clock reliability. Ours are.

BROADCAST AUDIO CORPORATION builds sensible, practical audio consoles, with performance proven in all 50 states. They're easy to use, easy to understand, and a joy to work with. Plus, **THEY SOUND GREAT!** Since we don't cut corners, our consoles cost more than some widely advertised brands. However, the few audio consoles worthy of comparison are priced substantially higher than ours.



We're in Booth 1053, proudly displaying several of our 11 models, with mainframe sizes of 6-24 mixers. After you've checked the ergonomics and ergonomic features, take a listen to the smooth and pleasing audio quality. Then, ask us about special NAB prices, and possibly quote "**The Bard!**"



BROADCAST AUDIO CORPORATION

11306 SUNCO DR., RANCHO CORDOVA, CA 95742 (916) 635-1048

The Complete RF Exposure Measurement System from Holaday Industries

Measure Both E and H Fields

ANSI RF exposure standard requires measurement of both the electric and magnetic field.

Automatic Self-zero

Completely automatic self-zeroing eliminates drift, improves accuracy of readings.

Recognized by Federal Agencies

Evaluated and used by NIOSH, OSHA, EPA and CDRH, as well as state, local health departments and consulting engineers.

NBS Probe Design

Isotropic probe design originated by National Bureau of Standards.

Displays Time Average Reading

Real-Time display of the current six minute average relates directly to the ANSI RF exposure standard. Also calculates average of user-selected test intervals. This feature is also useful for doing spatial averaging by programming appropriately timed test intervals and using constant probe velocity over a prescribed area.

Exclusive from Holaday Industries, Inc.



Model HI 5000SX



For more information, please call or write:



HOLADAY INDUSTRIES, INC.

14825 Martin Drive
Eden Prairie, MN 55344
Telephone: (612) 934-4920
Telex: 29-0922 FAX: (612) 934-3604

Tips From The Field

Technical Tips From Around the Country

Satellite Dish Tip

By Donald J. Larsen
Idaho Falls, Idaho

If you have ever had to find a given satellite for some audio feed, you know that the only information you are generally given is the orbital position, which provides no specific information as to the azimuth and elevation of your dish. Get to be friends with your local NBC television station. Several years ago he was provided with a list of the azimuths and elevations for all satellites. He might be willing to share the information with you.

Criterion Solenoid Tip

By Sydney Marshall - WDME

A recent Radio Guide tip (Jan-89) mentioned the filter cap in the high-voltage DC solenoid circuit used in some cart machines, such as the Gates ATC Criterion. It suggested measuring the ripple across the solenoid, when energized. A quicker method, at least on the Criterion, is to use a freshly bulk erased cart.

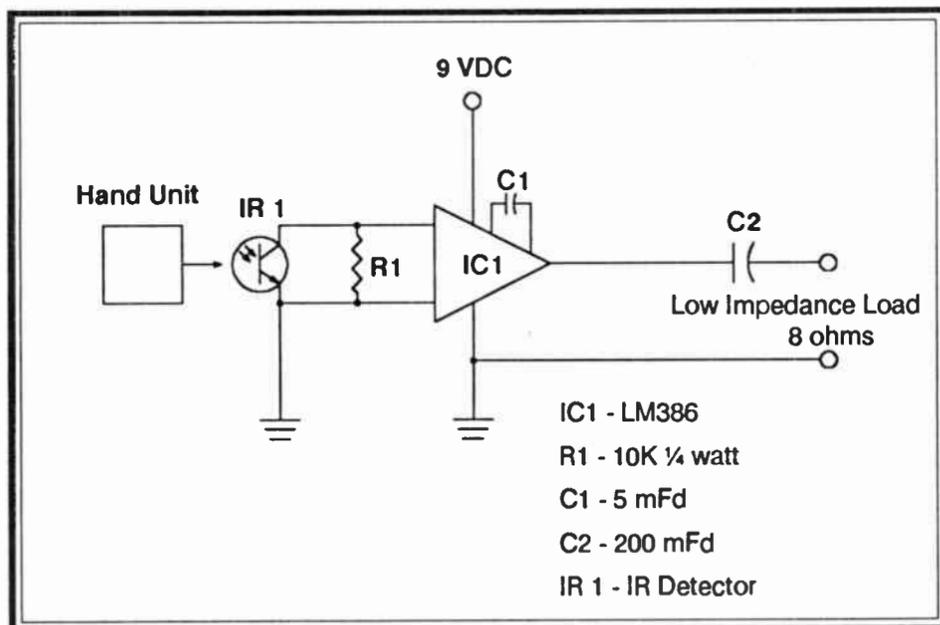
Just pot the machine up in audition and insert the blank cart. If you hear an increase in hum when the tape rolls, replace the solenoid DC filter capacitor. It's the can on the left (100 mFd / 100 VDC). I use tubular units mounted on two single tie strips mounted with the original can mounting screws, under the chassis.

If the hum is still there, replace the 1000 mFd / 50 VDC can on the right. The center can controls the relay time-delay. If this opens, your cart will re-cue just after it starts.

IR Remote Control Tester

By A.B. Parker - KSAU
Nacogdoches, Texas

With the increased use of infrared in remote controlled consumer equipment, such as CD players, more of these pieces of gear are finding their way into the control room. When the output of the unit loses gain, or ceases to operate for whatever reason, a method is required for testing. There is a "card" available to convert the IR to visible light but, that is all that it does. For less than five dollars, the following circuit can be built:



This circuit is capable of providing much more information. The output may be connected in a variety of configurations: to a headphone, a speaker, an oscilloscope, frequency counter, or an external amplifier. Most IR hand units have an audio frequency component within the carrier wave.

CRL SPOTLIGHT

Converting to the
NRSC Standard?
Want to Improve Coverage
of Your Station?



CRL's AM2 audio processing system is a COST EFFECTIVE way to convert your station to the NRSC standard, and in many cases improve your coverage as well. The two unit system consists of a two-band AGC unit with our dynafex® single ended noise reduction circuitry (AGC-400) followed by our tri-band peak modulation controller (PMC-450). Split studio and transmitter sites? Use the AGC unit at the studio and the limiter at the transmitter! An adjustable presence band boost lets you augment vocal clarity and punch. A patented overshoot corrected low-pass filter ensures maximum modulation control. Low frequency tilt correction circuits plus adjustable asymmetry levels assure compatibility with all transmitter types. Suggested retail price is only \$2995. Our TWO WEEK TRIAL PROGRAM will prove to you how sound of an investment the AM2 mono system is. Call or write us NOW for details.



CRL Systems
2522 West Geneva Drive
Tempe, Arizona 85282 U.S.A.
(800) 535-7648 (602) 438-0888
TELEX: 350464

CARTING RECORDS??



YOU NEED SYNCHROSTART! SynchroStart makes dubbing records or CDs to cartridge a 'one-button' operation. Produce carts that are tightly cued and consistent with **no guesswork**. Just hit the START button . . . the turntable starts, audio mutes during the start-up, then just when the stylus is precisely at the beginning of audio, audio is switched on smoothly and the cart machine starts! All automatically. Whether carts are dubbed by the PD or by the 'nighttime college kid', they'll all be **tight and perfectly cued** every time. In Stock.

HENRY ENGINEERING
(818) 355-3656
We Build Solutions

Contract Engineers

Radio Guide will provide space here for contract engineers wishing to expand their business. To be listed here, just give me a call at (507) 280-9668. This list is not a recommendation of any particular engineer.

Tom Becker
Miami, Florida
305-775-1351

Peter C.L. Boyce
Midamerica Electronics Svc.
New Albany, Indiana
812-945-1209

James Boyd
Boyd Broadcast Tech. Svc.
Tualatin, Oregon
503-692-6074

Mike Brown
Portland, Oregon
503-245-4889

Lee Freshwater
Blue Ridge Consultants
Flat Rock, North Carolina
704-693-1642

Chuck Gennaro
Wisconsin Rapids, Wisconsin
715-423-6763

Kirk Harnack
Memphis, Tennessee
901-278-1306

Richard A. Hyatt
Maine Engineering Assoc.
Gardiner, Maine
207-582-4192

John Morton
Durango, Colorado
303-247-8734

Don Musell
Broadcast Engineering Svc.
Mouth of Wilson, Virginia
703-579-4461

Mark Pallock
Marandee Broadcast Eng.
Chatsworth, California
818-882-9475

Ransom Y. Place III
Danbury, Connecticut
203-798-9395

John Ramsey
West Hartford, Connecticut
203-243-4703

Lee Soroca
Soroca Electronics
Syracuse, New York
315-468-5123

Tom Toenjes
Signal Specialists
St. Marys, Kansas
913-437-6549

Dave Wrenn
Aiken, South Carolina
803-649-1663

Brad Johnson
Central California
209-526-6277

Scott Dean
Dean Engineering
Fresno, California
209-434-2358

Gary Smith
Advanced Technical Svc.
Abilene, Texas
915-672-5149

James A. Chase
Electro-Labs
Angola, Indiana
219-665-6427

Gary Reardon
Ware, Massachusetts
413-967-6156

James Droegge
Electronic Engineering Svc.
Beatrice, Nebraska
402-228-0780

Michelle Hunt
Denver, Colorado
303-469-1293

Tim Pozar
Broadcast Engineering Cons.
San Francisco, California
415-695-7727

Mark Bohach
Columbus, Ohio
614-385-7583

Bob Ladd
Bellevue, Ohio
419-483-2511

Dave Hebert
Pasco, Washington
509-545-9672

Dave Biondi
The Radio Service Company
Houston, Texas
800-444-2301

Bud Stuart
STURADCO
Susanville, California
916-257-7820

Ronald J. Dot'o Sr.
Salem, Oregon
503-378-7024

John L. Nix
Salem, Oregon
503-581-4056

Steve Agnew
Broadcast Technical Svc.
Lincoln, Nebraska
402-475-8920

Marsh Johnson Sr.
Broadcast Operational Sys.
Albany, Oregon
503-928-8318

Carl Sampieri
Sampieri Engineering
Huntsville, Alabama
205-830-8300

Don Roden
Roden Engineering
Huntsville, Alabama
205-533-3676

Don Haworth
Haworth Engineering
Fargo, North Dakota
701-237-5346

Jim Taylor
Jim Taylor Engineering Svc.
Augusta, Georgia
404-738-2911

Mike Tosch
Interstellar Broadcast Eng.
San Diego, California
619-576-8239

Jeff Twilley
Ocean City, Maryland
301-289-4545

Howard M. Ginsberg
Communications Eng. Inc.
Essex Junction, Vermont
802-878-8796

Donald Frank White
Roanoke Rapids, No. Carolina
919-535-2599

Adam Perry
S&B Communications Inc.
Buffalo, New York
716-832-7090

Thomas C. Taylor
Total Communications Tech.
Old Fort, North Carolina
704-668-7977

Roger Cucci
Techworks
Milford, Connecticut
203-878-3196

Harold Snure
Calvmet Business Comm.
Merrillville, Indiana
219-769-4044

Dwayne Burlison & Assoc.
Houston, Texas
713-890-6565

Rick Cruz
Mount Vernon, Ohio
614-397-6440

Mark Persons
M.W. Persons & Associates
Brainerd, Minnesota
218-829-1326

Hal Ross
Air Com Communications
Greenville, Pennsylvania
412-588-8999

Russell Hines
Cincinnati, Ohio
513-721-7625

Jim Zastrow
Zastrow Technical Service
Schofield, Wisconsin
715-359-9282

Steve Holderby
Bemco Inc.
Oklahoma City, Oklahoma
405-943-2409

ACM Communications
Napa, California
707-257-6000

R. Michael King
Circuit Doctors
Frisco, Colorado
303-668-3167

Joe Bellis
RMF Associates
Cape Girardeau, Missouri
314-651-4272

Brian Walker
Olympia, Washington
206-438-2390

Jay Brentlinger
Broadcast Engineering Inc.
Phoenix, Arizona
602-867-0181

Ken Bartz
Bartz Engineering Services
Fargo, North Dakota
701-237-3006

Greg Blanchard
Avila Engineering
San Luis Obispo, California
805-473-2396

J. Boyd Ingram
J. Boyd Ingram & Associates
Batesville, Mississippi
601-563-4664

Troy D. Spencer
Bassett, Virginia
703-629-1161

Tom Oja
ACM Communications
Napa, California
707-257-6000
800-354-8600 (CA only)

Tom Lange
TECS Electronics
Kohler, Wisconsin
414-458-1816

Lamar Ritchie
Lamarco Inc.
Hazard, Kentucky
606-476-8438

Steve Weber Jr.
Fresno, California
209-276-1249

John Simmons
Simmons Communications
Columbus, Georgia
404-596-0265

Jim Slawson
Broadcast Engineering
Swainsboro, Georgia
919-237-2011

Bill Bowin
Bowin Engineering Services
Galion, Ohio
419-468-1771

Steve Gordoni
Wheeling, Illinois
312-870-1463

Chris Scott & Associates
Bowling Green, Kentucky
502-781-1233

Michael G. McCarthy
McCarthy Radio Engineering
Mount Prospect, Illinois
312-640-8965

J.R. Galbreath
Broadcast Technical Services
Colorado City, Texas
915-728-8076

Anyone Else?

Call 507-280-9668

-- or --

Write to:
Rochester Radio
511 18th Street SE
Rochester, MN 55904

To be included in this
listing

Please - contract
engineers only, no
professional con-
sulting firms.

LPB introduces the brand new console with a ten year track record.

The full-featured, low profile
Citation II Audio Console...

FOR COMPLETE INFORMATION, CONTACT:
LPB, INC. / 28 BACTON HILL ROAD / FRAZER, PA 19355 / TEL (215) 644-1123 / FAX (215) 644-8651

...and LPB Studio
Furniture: Standard,
Premium and Custom
Components for all
applications.

See them both at NAB Booth 1541.

LPB®

Discover the Delta Difference.

In addition to AM Stereo, Bridges, and Ammeters, Delta provides a rugged line of products for your FM or TV facility. Fully interlocked Coaxial Transfer Switches, a Transmitter Power Controller, and the new High Power Pulse Reflector-meter all ensure your station operates efficiently. To experience the Delta Difference, contact John Bisset today at (703) 354-3350. Delta Electronics, Inc., 5730 General Washington Drive, Alexandria, VA 22312.

The Above Standard
Industry Standard.

DELTA ELECTRONICS

©1989 Delta Electronics, Inc.

Delta
Inovonics FMX & NRSC
L.P.B.

Energy Onix
Hnat Hinder
CRL Stereo TV

All the Major Brands at Competitive Prices

Ron Radio Communications

P.O. Box 201
Brightwaters, NY 11718
"Professional Broadcast Engineers serving the Industry"
800-666-3525

AM-DA Adjustment
Frequency Searches
License & CP Applications
Studio Installation

Jim Saunders
President



(802) 226-7582
FAX: 802-226-7738

COMMERCIAL RADIO COMPANY

Transmitter Parts for: RCA, Gates, Collins
Non-PCB Filter and Mica Transmitting Capacitors

DUTTONSVILLE SCHOOL DRIVE
CAVENDISH, VT. 05142
DANIEL W. CHURCHILL

Consulting Communications Engineers

- FCC Data Bases
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.

Consulting Communications Engineers

1306 W. County Road F, St. Paul, MN 55112
(612) 631-1338 "Member AFCEE"

Radio Guide

April, 1989 Volume 2 - Issue 4

Mail to: Radio Guide 511 18th Street SE
Rochester, MN 55904

Fill out the information below, and then circle the number of any manufacturer from which you would like additional information.

- | | |
|-------------------------------|------------------------------------|
| 1 - Television Technology | 16 - J-Squared |
| 2 - Data World | 17 - Bradley Broadcast |
| 3 - Dorrough | 18 - Broadcast Audio |
| 4 - Tom Jones Recording | 20 - Holaday Industries |
| 5 - Noise Free Radio | 21 - Henry Engineering |
| 6 - Titus Technological Labs | 22 - LPB Inc. |
| 7 - Ramko Research | 23 - JRF Magnetics |
| 8 - Kahn Communications | 24 - Delta Electronics |
| 9 - Broadcast Devices | 25 - Stanley Broadcast Engineering |
| 10 - Econco | 26 - Communication Data Inc. |
| 11 - Audio Broadcast Group | 27 - Northern Magnetics |
| 12 - RAM Broadcast | 28 - Ron Radio |
| 13 - CRL Systems | 29 - Owl Engineering |
| 14 - Northeast Broadcast Labs | 30 - Commercial Radio Co. |
| 15 - Inovonics | 31 - Doug Vernier Broadcast |

Name _____

Title _____

Company _____

Address _____

City _____

State _____ Zip _____ Phone _____

FCC's Engineering AM, FM and TV Data Bases

On floppy (or) 9-track tape

Call today to request a free sample

Communication Data Inc.

6105 E. Arlington Blvd.
Falls Church, VA 22044
703-534-0034

SBE STANLEY BROADCAST ENGINEERING

James S. Stanley
Engineering Consultant

P.O. Box 24601
Tempe, AZ 85282

(602) 264-8752

NORTHERN MAGNETICS

CERTIFIED TAPE HEAD SERVICES

Northern Magnetics is an industry leader in the supply and service of tape heads and tape head products.

P.O. Box 16409
Minneapolis, MN 55416

Phone: (612) 333-3071
Telex: 1561238 MPS UT
FAA Repair Station # C14-57

SEARCHFM - SOFTWARE

Professional MSDOS Broadcast Software.
SEARCHFM, QCHANNEL, EDFM, SEARCHTV
With monthly FCC database pool service.

Doug Vernier, Broadcast Consultant

1600 Picturesque Dr.
Cedar Falls, IA 50613
319 266-7435



Optimize — don't compromise:



If you demand optimum performance from your tape recording equipment . . . you need our services!

JRF maintains a complete lab facility insuring precision relapping and optical alignment of all magnetic recording heads and assemblies. Worn unservicable heads can be restored to original performance specifications. 24-hour and special weekend service available.

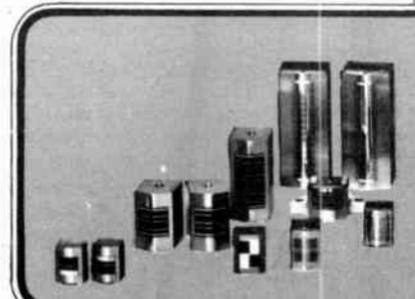
- Broadcasting
 - Mastering
 - Recording Studios
 - Tape Duplicating

New and reconditioned replacement heads from mono to 24-track . . . Many in stock.

For repair or replacement, we're at your service!



Call (201) 579-5773



JRF/Magnetic Sciences, Inc.

Kennedy Road • P.O. Box 121 • Greendell, NJ 07839 • Telex: 325-449



TELEVISION TECHNOLOGY CORPORATION

MEMO

TO: FM Station Owners
FR: Bill Kitchen, President Television Technology Corporation
DT: April 10, 1989
RE: **We just built the world's Best FM Transmitter!**

That may sound like a strong statement to make but here's why TTC can make that claim about its new FMS-4000 transmitter:

- *Broadband Operation -- No tuning required!*
- *100% Solid State Components -- No tube replacement costs and greater efficiency*
- *Fully-Automated Control Circuitry -- Integral Remote Control Interface is Standard*
- *Redundant Power Amplifiers -- Automatic power control and thermal protection*
- *High-efficiency FET Power Amplifiers -- Single transistor type in IPA/PA stages*
- *Self-regulating Power Supplies -- no external regulation required*
- *Superlative Overall Specifications -- Best in the Industry!*
- *Integral Lighting Protection*

These are some of the reasons why the FMS-4000 is definitely the world's best FM transmitter. There are many more!

Unfortunately, we've got some good news and some bad news about the FMS-4000 transmitter. First the bad news: We have a production limit of 100 transmitters this year and can't guarantee delivery of your unit if you don't place your order early enough.

Now the good news: The price is an amazing \$29,500 and we'll offer a \$4,000 discount on the first ten units only. You can take advantage of this discount if you are one of the first ten buyers and you place an order at or before the NAB convention.

If you're headed for NAB, stop in at Booth 3500 to see this tremendous new product. Ask for Dale Leschak, Steve Maddy or myself.

See you there!

An International Company Serving Radio and Television

650 South Taylor Avenue • Louisville Colorado 80027 • U.S.A. • TWX 910-938-0396 TTC COLO • FAX (303) 673-9900 • Telephone: (303) 665-8000

For Sale

1975 RCA BTF-20E on 100.5 mHz.

Good condition. Out of service 5 months.

Spare final and other parts.

A great main or standby.

Available now for \$8,500 FOB Mississippi.

WBLE

PO Box 73

Batesville, MS 38606

Call 601-563-4664

J. Boyd Ingram

Gates FM-10H3 at 92.9 mHz.

This one operated well, until removed from service recently for power upgrade. It has some spares and a TE-3 exciter.

Gates FMC-6 bay antenna tuned for 92.9 mHz, but may be re-tuned. It has de-icers and its matching transformer. Let's talk. We'll listen to all offers.

Bob Williams

KRWN

Farmington, NM

505-327-4449

9-SMC 350 Carousels - \$500 each

3-SMC green equipment cabinets - \$100 each

1-SMC EPS-1 computer with logging (including data terminal & printer) - \$1000

1-SMC RAC-31 remote control - \$200

1-SMC PDC-5 clock - \$100

1-SMC TAC-1 time announce dual cart - \$300

1-SMC DS-20 audio switcher (problems) - \$200

1-Marti RMC-2 remote control system - \$500

1-Gates Stereo Statesman audio console - \$400

1-Orban 621B parametric equalizer - \$300

2-Elcom Insta-Peak II gain reducer - \$200 each

1-SMC 121 cart recorder (needs bearings) - \$600

Jerry Jeske

KVLY-FM

Edinburg, TX

512-383-7478

ITC Premium R/P, perfect condition - \$995

ITC Premium delay R/P - Best Offer

ITC PDII R/P - Best Offer

QEI FM Mono modulation monitor - Best Offer

RCA BTE-15 Exciter with stereo & SCA generator - Best Offer

ERI FML3E, 4 years old, 101.7 - Offer

Andrew 1 5/8" foam line, 350 feet, new - Offer

Andrew 1 5/8" connectors, adapters, relays, all new - Offer

Orban 8000A, with manual - Offer

Orban S/T chassis for 8100A - Offer

Prodelin automatic de-hydrator - Offer

Tapecaster 700P mono playback - Offer

Spotmaster 500C (missing board) - Offer

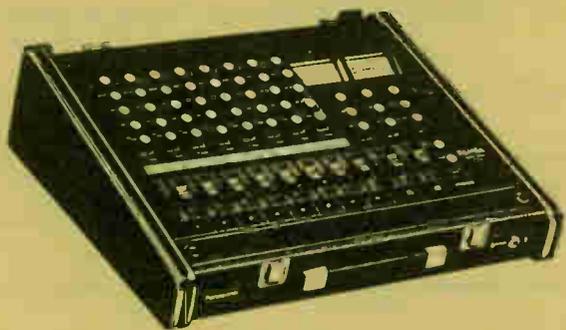
Scala FMV 100 watt 88-108 antenna, for low power or standby - Offer

Micro-Trac 4-pot stereo mixer (new) - Offer

JNL 6-channel PA-style mixer (new) - Offer

Misc 100 watt PA, speakers, mikes - Offer

Send For Our New Flyer



All Equipment We Sell
Is Warranted for 30 Days
With a 10 Day Right of Return
-- TRADES WELCOME --

Hall Electronics

- 16 Pages of Radio's Best New & Rebuilt Values
- Over 600 Items in Stock
- Your Satisfaction Guaranteed
- We Buy Equipment Too -- Please Call

P.O. Box 7732
1712 Allied St.
Charlottesville, VA 22901

804-977-1100

Jim Phillips
 WZOM
 414 Washington Ave.
 Defiance, OH 43512
 419-782-8591

Truscon self supporting tower. On the ground near Des Moines, Iowa. Re-installation and concrete base plans are available. - Best Offer

2-Anixter-Mark P-9A72GN1, 950 mHz, 6-foot STL grid dishes. One dish will require new feed assembly. Both have M1 mounts for up to 3 1/2" O.D. pipe. Four years old - Best Offer

Jeff Hansen
 KDMG-FM
 100 Court Ave.
 Suite 103
 Des Moines, IA 50309
 515-282-1033

Moseley MRC-1600 remote control configured for STL use. 110 kHz control sub-carrier and 92 kHz SCA telemetry return - \$2500 or best offer

Lee Eichelberger
 KIDO Radio
 208-344-6363

Truscon 350 foot guyed tower, 48-inch face, solid rod with lighting, guys, base insulator and 60 foot antenna pole - Call

Orban 9000A/1 AM Optimod, like new - \$2000

Orban 8100/ST studio chassis for split operation of Optimod 8100A - \$500

Gates Executive stereo console, 10 pots, good condition - \$1500

Harris ME-1 modulation enhancer for MW series transmitters - \$100

RCA BW-66F tube type AM modulation monitor - Best Offer

Harris SC-90 automation controller with power supply, numeric logging, console and SMC-250RS carousel with interface - Best Offer

Gates ATC Criterion-1 cart machine, several available - Best Offer

William C. Galsser
 Director of Engineering
 WHBC
 Canton, OH
 216-456-7166

RF meters, used and tested Sangamo mica transmitting capacitors, assorted sizes, large variety

Dan's Discount Radio Parts
 Cavendish, VT
 802-226-7582

ITC Cart Machines

1-Mono Record/Playback - \$700
 3-Triple deck mono playback - \$800-\$900 each
 1-Triple deck mono playback with odd assortment of cards - \$700
 All with plugs and manuals. Most have new heads and capacitors. Call for details.

Phil Little
 KIEV Radio
 213-245-2388

ITC Cart Machines

3D mono - \$1200
 RP stereo - \$1300
 SP mono - \$600
 SP stereo - \$650
 RA mono - \$500
 RA stereo - \$550

LOFTECH AND TS1RM AUDIO TEST SETS

Three Audio Test Instruments Combined In One Unit.

Model TS-1



The Loftechs provide the user with a powerful tool that is capable of making audio frequency tests and measurements with a high degree of accuracy, efficiency, and in less time than conventional test instruments. These unique and reliable test instruments are affordable, and an excellent choice for any audio frequency application.

- Low distortion audio oscillator with a frequency range from 10Hz to 30KHz
- Frequency counter with frequency response of 1Hz to 99.99KHz
- DB meter with a range of -50 to 24dB from 20Hz to 20KHz

Models TS-1 RM-As Shown
 TS-1RMX-With Bal. Output



Rochester Radio Supply

511 18th Street SE
 Rochester, MN 55904
 (507) 280-9668

Loftech Audio Test Sets:

Model TS-1 \$249
 Model TS-1RM . . . \$297
 Model TS-1RMX . . \$367

Russco Studio-Pro turntables - \$100 each.

Or make an offer

Michael Brown
3740 SW Comus St.
Portland, OR 97219
503-245-4889

1-RCA BTA-5G parts (any or all). No plate or mod transformers.

1-RCA isocoupler, 20kW, 98.7 MHz, presently in aux service.

1-RCA BFC-12 12-bay FM antenna, presently in aux service.

4-RCA 7-foot equipment racks with back doors.

2-Mutual Tone detector cards on chassis with power supply (used for Larry King).

1-Moseley PBR-30 system, presently in use, telco single line configuration, good set of spares for your system.

2-Large Austin ring transformers, used for FM antenna de-icers.

1-429 foot Stainless 25 inch face galvanized tower, presently standing in AM service, ready to remove.

1-314 foot Stainless 25 inch face galvanized tower, presently standing in AM service and as FM aux antenna tower, remove in late June.

Monte Chaney
Chief Engineer
KWTO-AM/FM
417-883-9000

Older Stainless tower, 240 feet overall including 36 foot pole at top for FM antenna. It is in 20 foot sections, except for top pole. This is a heavily constructed tubular tower with 29.5" face and includes bottom plate

and insulator. Top pole is tapered starting at 4.5" with steps and fits approximately 4 feet down into top section of tower. Tower is on ground ready for loading and is in good shape except needs cleaning and painting. \$2500.00 plus any loading and freight expenses.

Forrest Ramsey
Manager/Chief Engineer
WJAY
PO Box 1005
Mullins, South Carolina 29574
803-423-1140

2-ABCO model 500 Lazy Susan cartridge racks. Holds 500 carts. \$400 each plus shipping.

Ernie Swanson
WZTR-FM
414-964-8300
Fax 414-964-2855

1-Harris SX-5A transmitter with extender panel plus some spare parts. Station went to higher power so ready to go. On the air since 1986. Tuned to 870 kHz.

Terry Patty
Cook Communications
205-635-6284

2-Mark P-9A72GRN six foot grid antennas plus mounts and approximately 700 feet of 7/8" transmission line. 2 1/2 years old.

Various MYAT transmission line elbows, flanges, adapters, gas barriers. Items are for 3" and 4" lines. Excellent condition, never used.

Will consider trade for stereo console and cart recorder.

Beat the #1* Killer

(*Temperature Extremes Kill Transmitters)

List \$195⁰⁰

TEMPSENZ
Remote Temperature
Sensor



Now
\$99⁹⁵
While Supply
Lasts

- Works With Any Remote Control
- Constantly Monitors Transmitter Temperature
- Easy to Install and Calibrate



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

(619) 433-5600

(800) 748-5553

JUST ONE

STOP

AT BOOTH 1041 GETS YOU:

1. 240 Lines of New Equipment
2. "Turnkey" Service
3. Solution for Class "A" 6000 Watt
4. Knowledgeable Personnel
5. Financing Assistance
6. "R & G" Equipment Averaging up to 50% Off.

(619) 433-5600

1-800-748-5553

FAX (619) 433-1590



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

OCEANSIDE, CALIFORNIA

Paul J. Kessler
KHUM
Topeka, KS
913-267-0960

1-CRL SPF-300 NRSC pre-emphasis/filter, perfect condition, selling due to purchase of new limiter - \$350.

1-CBS Volumax 4000, works, no manual, make offer.

2-Motorola 2-way model U43MHT-1000B, 12 volt, includes power cables, make offer.

John Franks
WHTH/WNKO
1000 N. 40th St.
Newark, OH 43055
614-522-8171

Complete set of 18" tower face brackets for ERI FML-3E CP antennas. Will cost \$500 new, selling for \$250.

Randal J. Miller
WRVI
815 West Dean
Virden, IL 62690
217-965-3388

1-Russco Studio B turntable, good condition - \$80.
1-QRK SF4H13A turntable with tone arm, good condition - \$125.
2-Tapecaster 700P playback cart machines, fair condition, needs pinch roller and cleaning - \$100 each.
1-BE 5301 triple deck mono cart playback machine, needs motor and bearings - \$750.
1-Belar AMM-2A AM modulation monitor, excellent condition - \$750.

1-BE 2100 record/play mono cart deck, in service, good condition - \$900.

1-Shure audio master, good condition - \$25.

1-Spotmaster 1070P record/playback cart machine, needs work - \$400.

1-Scientific Atlanta 6603 Down Converter video receiver, excellent condition - \$700.

1-Wegener Communications 1601 receiver with 1621, 1645, 1646 cards, excellent condition - \$1,700.

1 set-Studio furniture, white Formica top with wing for two turntables, good condition - Offer

1-Gates M5136 mixer, portable with three pot input (sports?), fair condition - \$100.

Jim McMahan Jr.
WAMD
Aberdeen, MD 21001
301-272-4400
Fax 301-575-6890 (after 2 PM Eastern)

1-Technics SP-15 turntable, used very little and is in excellent condition. Looks and operates like new, manual and mounting template included - \$525.

1-Russco Studio-Pro turntable, low hours, looks brand new and works perfectly - \$325.

1-Collins 12" turntable, reconditioned and completely refinished to look and operate like new - \$95.

Audio-Technica ATP-12T stereo tone arms, new in factory boxes, never used, current list \$275, sell for - \$150 each or \$285 both.

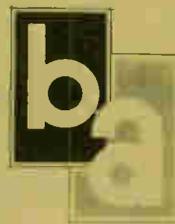
1-BE 3200 RP/DL mono record/playback cart machine with delay feature. Low hours, manual included, looks and operates like new. Current list \$3325, asking - \$1750.

I'm Going to N.A.B. For:

- A. *Crap Games*
B. *Dancing Girls*
C. *The Best Equipment Deal I Can Find.*



If you checked "C", check out booth #1041, North Hall at the Las Vegas Convention Center. We're **Barrett Associates** and we'll show you how we can help you S-T-R-E-T-C-H your equipment budget.



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

OCEANSIDE, CALIFORNIA

(619) 433-5600
1-800-748-5553
FAX (619) 433-1590

Risk...

buying used equipment and hoping it works.

Security...

buying reconditioned equipment with a 6 month warranty.



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

(619) 433-5600

(800) 748-5553

*We take the risk out
of purchasing equipment.*

1-BE Spotmaster 505 DR
mono playback cart machine.
Rack mount, excellent heads,
works and sounds great. Very
good condition and appearance.
No manual but do have sche-
matics. Asking - \$150.00

Gary Jones
KLXQ
PO Box 229
Uvalde, TX 78802
512-278-1102

3-Sculley Model 255 playback
decks
1-Visitar cart encoder
1-Extel printer
1-CBS Labs Model 411 stereo
peak controller
1-CBS Labs Model III automatic
level control
2-Marti CLA40H compressor
limiters
Bought for \$22,000, sell for -
\$9,500
Spotmaster 5-channel board -
\$950.

Gary Teaney
KQXY FM94
117 Nederland Ave.
Nederland, TX 77627
407-724-1292

**IGM complete automation
system. Taken out April 1 for
format change.**

1-IGM sequencer and master
terminal
3-IGM instacarts



CRL Systems
2522 West Geneva Drive
Tempe, Arizona 85282
(800) 535-7648 (602) 438-0888
TELEX: 350464 CRL TMPE. UD.

**Circuit Research Labs has for sale,
the following items:**

1	PMC-300A	\$650
5	SEP-400A	\$810
5	SEP-400B	\$810
1	SMP-800	\$1050
6	SMP-900	\$1170
8	SPP-800	\$1050

**Please call if you are interested in
purchasing any of these units. The
phone number is (800) 535-7648**

Only at NAB Booth 1041

You buy
**Fidelipac Dynamax
Cart Decks**

We
GIVE You
The Music!

**\$1,000
VALUE
FREE**

Buy

1 CTR 124 Record/Play
and

1 CTR 112 Play

Fidelipac Dynamax Stereo Cart Machines



or

1 CTR 14 Record/Play
and

2 CTR 12 Playback

Fidelipac Dynamax Stereo Cart Machines

Get FREE 150 Songs

From the Radio Program Services

*Format of Your Choice
Pre-recorded on Fidelipac
Dynamax Cobalt Carts.

*AC, Classic Rock, Mellow AC,
Country, Rock 'n' Roll Oldies



a Cooperative Effort of:



*Radio Program
Services*

and



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

OCEANSIDE, CALIFORNIA

(619) 433-5600

1-800-748-5553

FAX (619) 433-1590

Wanted

Old transmitting equipment catalogs, Collins and RCA, from the 1950s and 60s. I'll pay you for them or photocopies.

William C. Irvin
WHIS/WHAJ
900 Blufield Ave.
Bluefield, WV 24701
304-327-7114

Magnecord 1021 or 1022

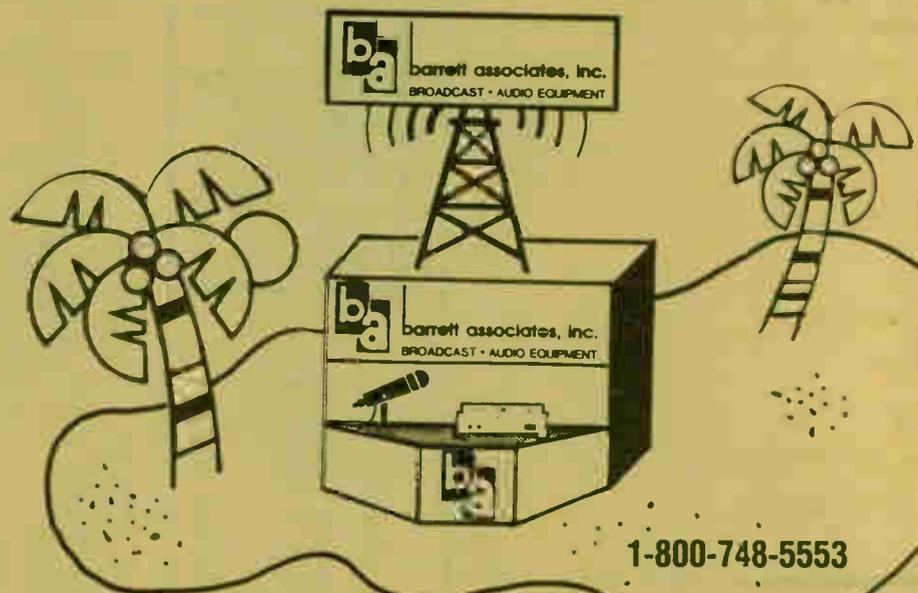
George McClintock
WNMQ
3314 West End Ave.
Nashville, TN 37203
615-383-2343

120 lpi leadscrew and half-nut
for Rek-O-Kut M-5S, 16-inch
overhead record cutting lathe.

Jim Wood
Inovonics
1305 Fair Ave.
Santa Cruz, CA 95060
408-458-0552

ITC 3D and RP stereo, any
condition, cash paid.

Michael Brown
3740 SW Comus St.
Portland, OR 97219
503-245-4889



**LOOK FOR OUR
ISLAND
AT THE NAB**



#1041 Las Vegas
barrett associates, inc.
BROADCAST • AUDIO EQUIPMENT

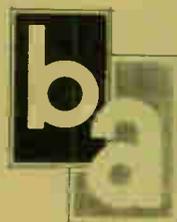
ATTENTION CLASS "A" BROADCASTERS

Do you need a new
transmitter, but you
are waiting for the
"rumored" power increase

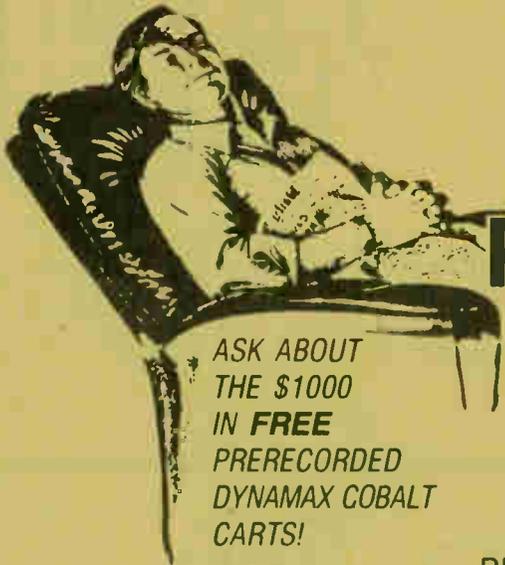


Wait No Longer!

Come to NAB Booth 1041.
See the Energy-Onix Single
Tube Grounded Grid Transmitter
that's **FIELD UPGRADEABLE** from
3.5 kw to 7.5 kw up to 12 kw.



(619) 433-5600
1-800-748-5553
FAX (619) 433-1590
barrett associates, inc.
BROADCAST • AUDIO EQUIPMENT
OCEANSIDE, CALIFORNIA



ASK ABOUT
THE \$1000
IN **FREE**
PRERECORDED
DYNAMAX COBALT
CARTS!

PLUS

ADC
UREI
ORBAN
RUSSCO
ANDREW
FIDELIPAC

BEYER DYNAMIC
HENRY ENGINEERING
ADVANCED MICRO DYNAMICS
RADIO PROGRAM SERVICES

240 Lines of New Equipment
RECONDITIONED GUARANTEED EQUIPMENT



Give Your Legs a Rest at NAB Booth #1041 Offering **ONE STOP** for Premiere Showings

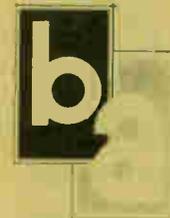
★ TASCAM: CD 701 Compact Disc System
3030 Reel to Reel with dbx incode/decode
102, 103, & 202 wr Cassette Decks
M-06ST 6 Stereo Input Mixer

★ Energy-Onix: 3.5 kw FM Transmitter
Field Upgradeable to 7.5 kw

Class A's Don't
put off that new
transmitter
waiting for your
power increase.
**Buy Now—
Upgrade When
power increase
comes.**

TOO MANY
SHOW SPECIALS
TO LIST.

STOP IN



barrett associates, inc.

BROADCAST • AUDIO EQUIPMENT

OCEANSIDE, CALIFORNIA

(619) 433-5600
1-800-748-5553
FAX (619) 433-1590