RADIO GUIDE

A Forum for Radio Engineers

Ray Topp Editor/Publisher (507) 280-9668

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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

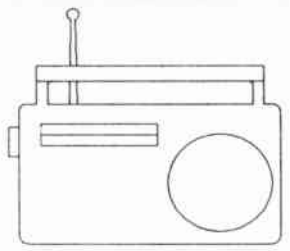
Please - Send Articles & Tips

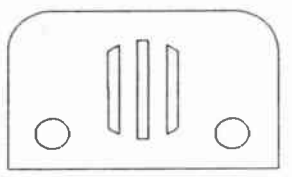
The computer bulletin board is not here yet, so here's my monthly pitch for articles. Did you fix something this month? Of course you did. There's not an engineer alive who didn't.

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 . . .

Mistakes and Corrections

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

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 December1988 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 μf/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 mFd capacitors (C9 & C10) and both of the 10 mFd 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.

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.

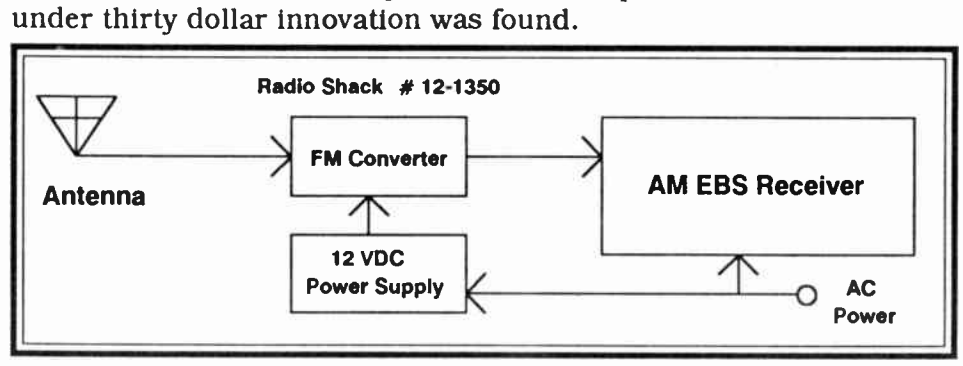
Next, it was my turn. My transmitter, just like the other station's, blew out random transistors for no apparent reason. After questioning Harris' customer service dept., one of the technicians said that this had been a major problem for them, and that they didn't know exactly what was causing the problem. 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.

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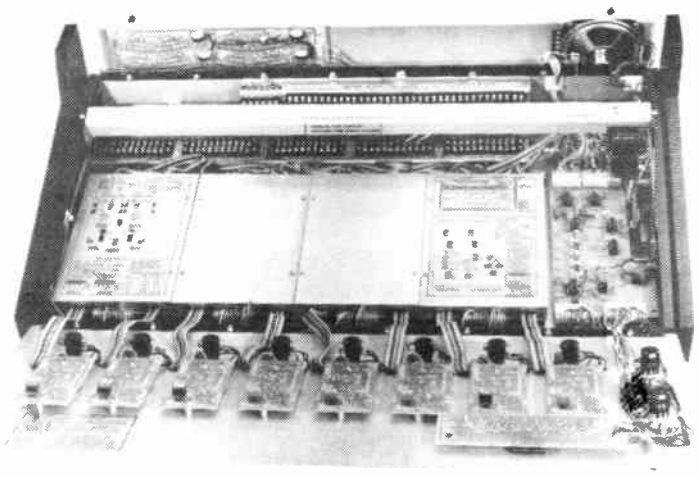

PARTIAL SPECIFICATIONS

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.
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MONITOR: Stereo, muted monitor outputs @ +4dBm. External 20 watt stereo amp included. Three position selector for PRO1, PROG2 & EXTERNAL in.
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DIST: Below noise floor. Typically .009%.
RESP: 10Hz-20kHz; ±1dB
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RCA BTF-40E Fire Danger

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

Here at WGH, we run 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 #1s 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 of 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.

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 tne 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 lass 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.

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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 since wave directly form 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 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 mittened 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.

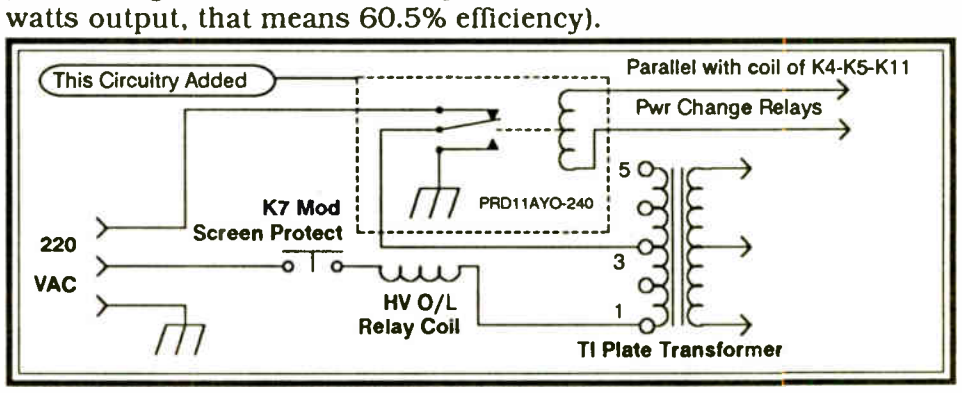
Bauer 707 Low Power Mod.

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

Our station, KORE-FM, operates at 5 kW daytime, with a cutback 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.

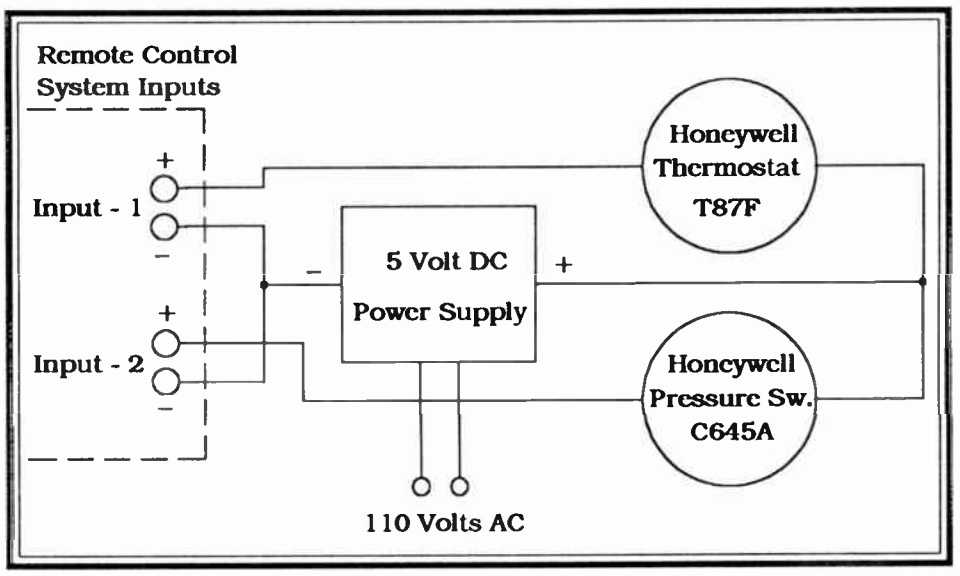
Carrier shift is -4.5% maximum, using this method, with THD under 5% at 85% modulation from 50 to 10,000 Hz. Audio quality is good. An added benefit from this modification, is having a 1 kW backup transmitter available when the main transmitter needs servicing.

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.

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 seems 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.

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.

Tips From The Field

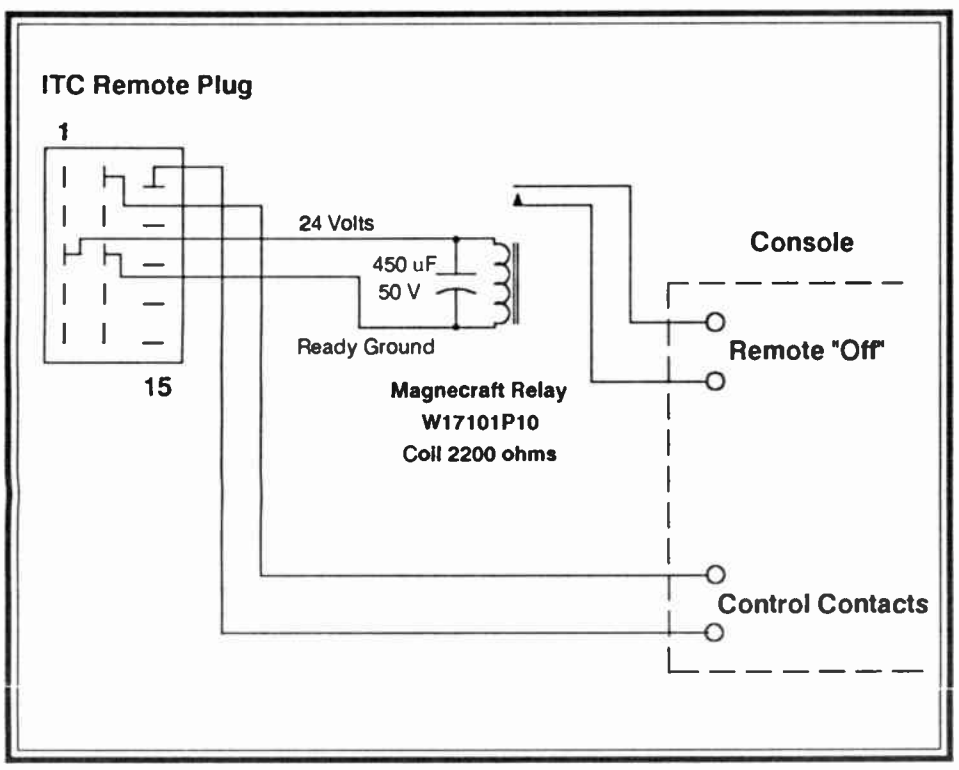
Technical Tips From Around the Country

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.

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.

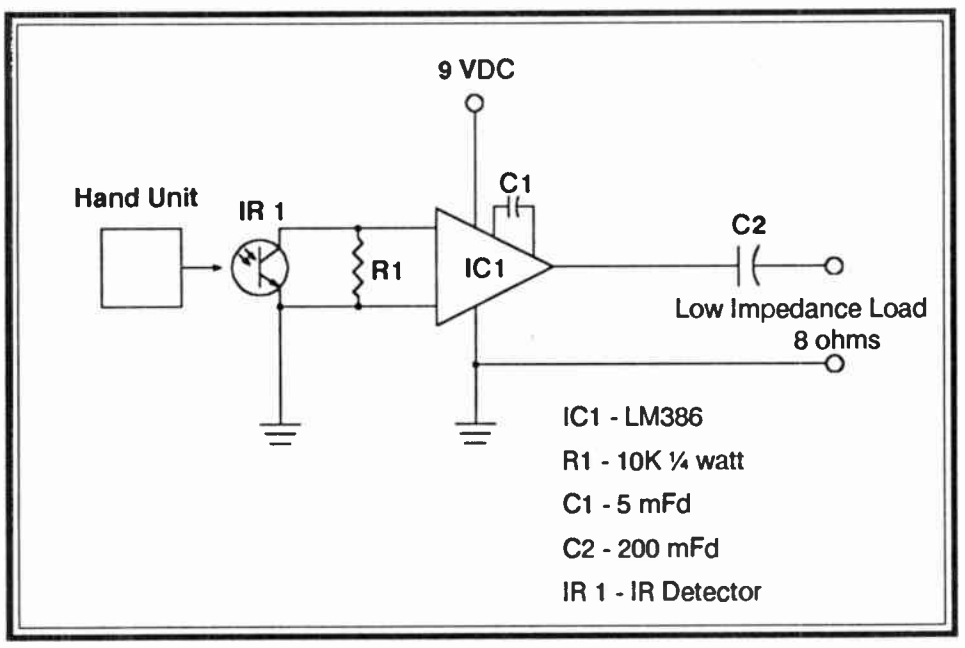
Just pot the machine up in audition and insert the blank cart. If you hear an increase in hum when the tape rolls, replace the solenoid DC filter capacitor. It's the can on the left (100 mFd / 100 VDC). I use tubular units mounted on two single tie strips mounted with the original can mounting screws,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

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.

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305-775-1351

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Midamerica Electronics Svc.
New Albany, Indiana
812-945-1209

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

Mike Brown
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Lee Freshwater
Blue Ridge Consultants
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Roden Engineering
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Jim Taylor Engineering Svc.
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Broadcast Technical Services
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915-728-8076

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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 consulting firms.

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
2 - Data World
3 - Dorrough
4 - Tom Jones Recording
5 - Noise Free Radio
6 - Titus Technological Labs
7 - Ramko Research
8 - Kahn Communications
9 - Broadcast Devices
10 - Econco
11 - Audio Broadcast Group
12 - RAM Broadcast
13 - CRL Systems
14 - Northeast Broadcast Labs
15 - Inovonics
16 - J-Squared
17 - Bradley Broadcast
18 - Broadcast Audio
20 - Holaday Industries
21 - Henry Engineering
22 - LPB Inc.
23 - JRF Magnetics
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31 - Doug Vernier Broadcast

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Title _____

Company _____

Address _____

City _____

State _____ Zip _____ Phone _____

TTC

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!

BK

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Equipment Guide

April 1989

Box 7001 Rochester, MN 55903 (507) 280-9668 Ray Topp - Editor

Moving Right Along

This is the second issue of the Equipment Guide. As you can see, it has expanded to eight pages. My goal is to establish the Equipment Guide as the primary source for all of your used equipment needs -- buying or selling. In my opinion, the other used equipment forums and publications have not done the job.

- Equipment Guide does not have ads that are ancient history.
- Equipment Guide does not limit you to a fixed number of words to describe your gear.
- Equipment Guide does not charge for jobs/positions wanted.

As with the Radio Guide, the Equipment Guide can only help you, if you help it. Use the Guide to place your classified ads.

Call me at (507) 280-9668, and let me know what you like, what you don't like and give me your suggestions. They will be used.

Ray Topp - - editor

Here's What To Do:

1 - Describe your used equipment for sale or wanted, in as many words as you feel it takes to do the job.

2 - Describe your help wanted or position wanted.

3 - If you have equipment for sale or wanted, enclose $3.00. Make the check payable to Rochester Radio.

4 - If you have a help or position wanted ad - - no charge.

Here's Where To Send It:

Equipment Guide
Box 7001
Rochester, MN 55903

Name: _____

Station: _____

Address: _____

Address: _____

City: _____

State: _____

Zip: _____

Phone: _____

Ad Copy Below:
(Use Extra Sheet of Paper if Needed)

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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 play-back - 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

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

Trusscon 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

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 deicers.

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.

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.

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 schematics. Asking - $150.00

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

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

1-IGM sequencer and master terminal

3-IGM instacarts

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

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

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OCEANSIDE, CALIFORNIA

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

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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
