Radio Guide

Radio's Technology Magazine

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December - 1990

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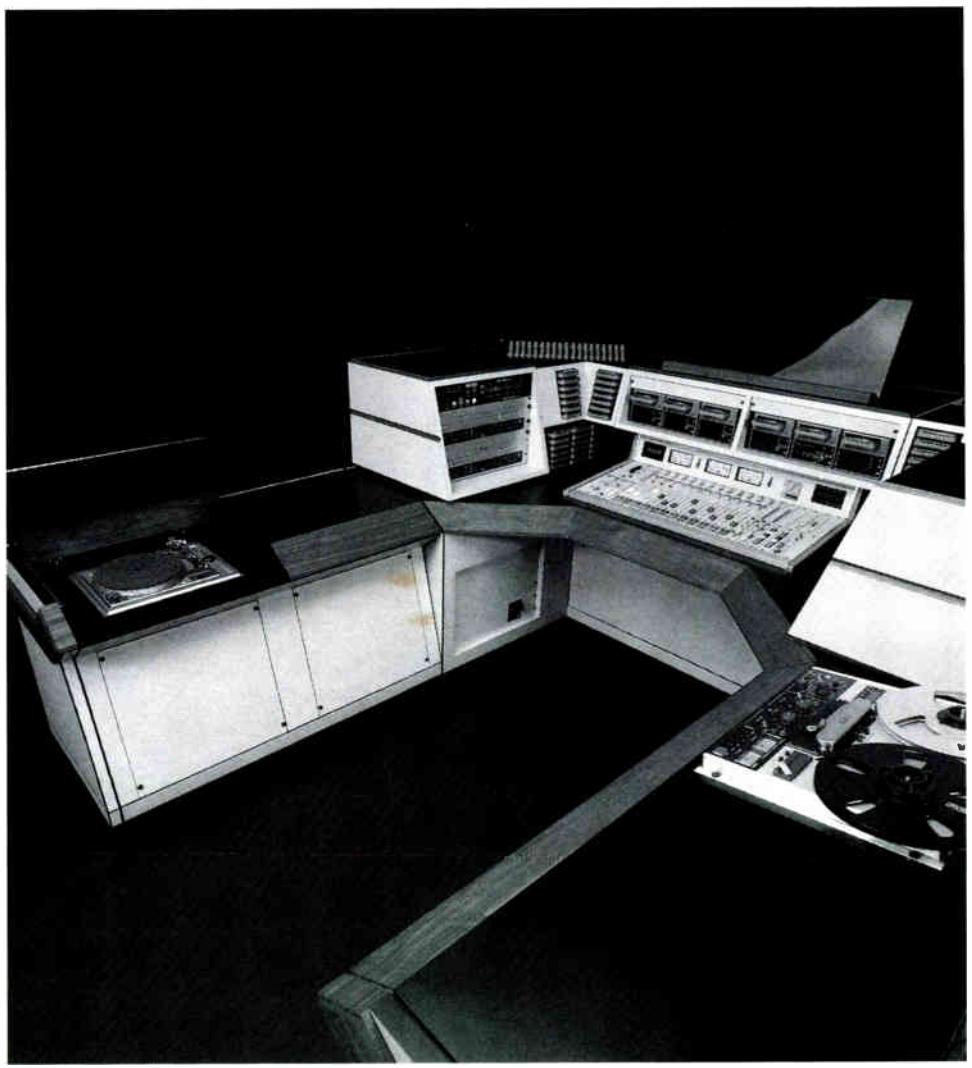

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Radio Guide
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December - 1990
Volume 3 Issue 12

Cover Photo

WBOS - Boston
Courtesy of Pacific Recorders

More After This!

Editorial Comments

FCC Tower Time

It has recently come to our attention that the FCC has conducted "surprise" inspections of over 300 broadcast and communications towers. Apparently, if the tower is not up to specs, the licensee could be liable for up to a $2000 fine.

More often than not, is seems that 90% of the station's staff hasn't the foggiest idea of where your station tower and transmitter site are located. Your job, as the station engineer, is to make sure that your towers are properly painted, lighted, guyed and maintained.

There's more to it that just maintaining the tower for that FCC inspection. This is one area of a broadcast facility where poor maintenance can actually lead to serious property destruction and loss of life. With this in mind, you should approach the subject of tower maintenance with a different attitude than you may have in the past.

First of all, don't do it yourself. Quite a few of you are expected to perform tower repairs and maintenance yourself. There may be a few of you that like to climb, and have no problem with it. My concern is with those who are, more or less, forced into the situation by station management.

Insurance Problems

No matter whether you're at 5 feet or 500 feet, you're still climbing the tower, and that brings into play the question of insurance. If you check your station's insurance policy, you may be surprised to find out that you will not be covered if you are climbing a tower. Even if there is not a clause to that effect written into the policy, you probably won't be covered anyway.

Of course, by tower maintenance, I am not talking about painting the tower, tensioning guy wires, or checking and adjusting tower plumb. Most of these duties are well beyond what most of us feel we're capable of. I am talking about the "simpler" things such as repairing the beacon flasher, installing an RPU antenna, and replacing burned out lamps.

These "simple" things no longer are simple when you find you don't have the tools or safety equipment necessary to do the job properly. And when tools are lacking, there is a tendency to "use a bigger hammer" or, even worse, circumvent safety procedures that you know are right.

Now that winter's here, the situation, in many parts of the country, is even worse, and the possibility for danger is magnified. Snow, ice, and especially wind chill can turn what seemed like a routine repair into a disaster.

It's Your Call

Most of us are willing to do what is needed to get the job done. In many cases, a great deal more than is expected of us. It's part of the territory of a broadcast engineer. What should not be expected of us, let alone demanded, is that we perform duties that we are not suited, equipped, or insured to do.

Ray Topp - editor

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Radio Guide Forum

Letters, Questions, Help & Parts Wanted From Radio Guide Readers

Letters to the Editor

Even the Dogs Can Hear It

Editor: Now that we all are using (by decree of the Royal FCC with urging from the court jester, the NAB) NRSC, I'm sure you have all been blown away with the phenomenal improvement in AM audio. Why, out here in the desert, AM stations from all over the country come in with crystal-clarity, with absolutely no fading or interference -- and with audio that is indistinguishable from FM broadcasting.

I'm surprised that no one had thought of it before: the problem was that we were trying to listen to wideband stations with narrowband radios. No...no...no! Now we are going to listen to narrowband stations with wideband radios. This makes perfect sense.

And now that AM audio is perfect, you have probable noticed that new life has been breathed into the many failing AM stations. What a marvelous turn-around. No more stations going dark because the land they occupy is worth more that the station. No more stations simulcasting because they can't afford to keep a separate programming operation alive. Yessir, between the NRSC and stereo, AM radio is now on the full road to recovery. FM -- watch out!

"The Desert Chief"

(name withheld to protect the guilty - ed.)

Help Wanted:

Help Wanted: Tulsa AM/FM seeking assistant engineer. Formal basic electronics training and two years radio broadcast engineering experience with studio and transmitter equipment required. Immediate opening. No phone calls please. Mail resume and description of your capabilities to:

Chief Engineer, KRMG/KWEN, 7136 S. Yale, Suite 500, Tulsa, OK 74136. NewCity is an Equal Opportunity Employer.

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Technical Manuals Wanted

Wanted: Technical book for Radio Specialties 1163-50-5 FM Deviation Meter.

Contact: Mark Persons, 402 Buffalo Hills Lane. Brainerd, MN 56401. (218) 829-1326

Wanted: Technical manual for Harris RF-201M 10-channel HF SSB transciever. Also need microphone or microphone and power connector for same.

Contact: Mark Starin, WJYY-FM, 457 Varney St., Manchester, NH, 03102. (603) 625-1165

Wanted: Wire marking machine and technical manual for RCA Fleetfone CMV-24 low-band receiver/transmitter.

Contact: Mark Starin, WJYY-FM, 457 Varney St., Manchester, NH, 03102. (603) 625-1165

Editor's Notes:

Parts Missing?

It's come to our attention that a few of you may not have received the Equipment Guide last month. We don't have a clue as to why that may be the case. Last month's issue of Equipment Guide was a separate 5-1/4" x 8-1/4" publication with a blue cover, and was poly-bagged along with Radio Guide. If you didn't get it, give us a call at (507) 280-9668, and we'll get one out to you right away via 1st class mail.

Go Ahead Copy Us

A few SBE chapters have contacted us about reprinting information from Radio Guide in their newsletters. We have no problem with that -- in fact we encourage it! Just give us the proper credit. If any SBE chapter newsletter editors out there would like to contribute to Radio Guide, we would certainly encourage that as well.

This One's For You

The Radio Guide Forum pages are for you. If you have a gripe, we'll print it. If you need a part or a specific piece of gear, we'll let every station in the U.S. know about it. The Forum is also an excellent way to obtain a copy of that long-lost tech manual.

Ray Topp
editor/publisher

Do You Know Someone Who Can Use Radio Guide?

Send Us Their Name We'll Get Them on The List

Are You a Writer?

We're looking for monthly columnists in these areas.

Audio Processing
Test & Measurement
Practical Theory

Radio Guide Forum

Letters, Questions, Help & Parts Wanted From Radio Guide Readers

Parts Wanted

Wanted: Parts for Howe Audio Productions 9000 series board.

Contact: Howard Gordon, WGY, 1430 Balltown Rd., Schenectady, NY 12309. (518) 381-4851

Wanted: NAB adapter hubs to fit Pioneer reel decks models 1024L and 1011L.

Contact: Bill Oostenburg, KCKY, P.O. Box 6, Coolidge, AZ, 85229. (602) 723-5448

Wanted: Used power transformer for Harris Gatesway-80 console.

Contact: Rudy Vazquez, WSRF, 3000 SW 60th Ave., Fort Lauderdale, FL 33314. (305) 581-1580

Wanted: Used Gates BFE-10C exciter for $150. May take others, if available.

Contact: Thomas Barnes, KRIL, 1410 Crane Highway, Odessa, TX, 79760. (915) 332-6870

Non-Profit Needs Gear

Non-profit organization wanting FM transmitter, audio console, STL system, cassette/cart machines, etc. For overseas missionary radio station. Tax-deductible receipt available or quote price, condition, etc.

Contact: Jim Goldring, 1904 S. Piccolo Way, Las Vegas, NV 89102. (702) 364-9350

Radio Partners Needed

Partners/investors wanted for new high-powered FM startup in mountain states and for AM/FM combo in deep South. $10K minimum, active or inactive. Serious inquires only!

Contact: Larry Fuss, Contemporary Communications/KOOZ Radio, P.O. Box 159, Fayetteville, GA 30214. (404) 460-6159

Equipment Wanted

Wanted: Belar AMM-2 modulation monitor (or newer).

Contact: George McCLintock, WNPM/WWCR, 4647 Old Hydes Ferry Park, Nashville, TN 37218. (615) 255-1300

Wanted: 880' 3" Heliax; 20kW FM transmitter; PCL-505/C STL; 6' Anixter Mark STL dish.

Contact: Dennis Orcutt, KNGL-FM, 1200 E. Britton Rd., Oklahoma City, OK 73113. (405) 478-5104

Wanted: 10-bay FM antenna on, or near, 98.3 mHz. Also need 440' of 1-5/8" Heliax. Need 10kW FM transmitter as well.

Contact: Roger Paskvan, 3516 Mill St., Bemidji, MN 56601. (218) 751-3077

Wanted: Fairchild DART-384 with one 7.5 kHz card. Would also like Monroe remote control for DART.

Contact: David Lane, WMVO/WQIO, P.O. Box 348, Mt. Vernon, OH 43050. (614) 397-1000

Wanted: One or two Otari ARS1000's on good working order.

Contact: Greg Pyron, KOMC/KRZK, P.O. Box S, Branson, MO 65616. (417) 334-6003

Wanted: Reel-to-reel, 1/4", 1/4-track, 10" reels, 1-7/8 IPS, reproducer.

Contact: Buck Burdette, KBUX Radio, 16031 Camel Dr., Quarzsite, AZ 85346. (602) 927-5111

Wanted: Used A-2 Audiopak carts or shells and wire rack or plastic box cart storage.

Contact: Doug George, WOYL/WHTF, 1360 Copenhagen Rd., York, PA 17404. (717) 266-6606

Wanted: Complete STL set up to replace phone lines. Need total system; receivers, transmitters, coax and dishes.

Contact: Joe Davis, KLSR, P.O. Box 400, Memphis, TN 79245. (806) 259-3511

Wanted: Used 8-10 channel stereo console. Preferable Wheatstone, Arrakis or Autogram.

Contact: Maxx Murphy, KLOZ-FM, 209 E. 2nd St., Eldon, MO 65026. (314) 392-3793 Fax (314) 392-7617

Wanted: Sony 1" Type C VTR with lots of lower drum and head life left. TBC & DT a plus. Prefer Sony model 1100A.

Contact: Sid Shumate, WVIR-TV, 503 E. Market St., Charlottesville, VA, 22902. (804) 977-7082

Wanted: 1kW mono FM transmitter in good condition. 91.1 mHz or close. Also need 203' tower (Rohn 25G or similar) and lighting kit for same. Need 3-bay FM antenna on 91.1 mHz.

Contact: Harvey Luke, WVOB, Bethany Bible College, P.O. Box 1944, Dothan, AL 36302. (205) 793-3189 Fax (205) 793-4344

Wanted: ITC stereo playback cart machine. Must be in good condition. You must be willing to part with it cheap.

Contact: Paul Lotsof, KAVV, P.O. Box 42977, Tucson, AZ 85733. (602) 889-9797

Wanted: LPB Signature II, 5-channel console. Also want a 1kW Harris solid state transmitter. Need color weather radar too.

Contact: Art Sutton, WMGA, P.O. Box 1380, Moultrie, GA 31776. (912) 985-0580

Wanted: Complete Automation system for $5000 or less. Need a minimum of 4 reels, 3 Carousels, brain, cords, manuals, and spare parts (if available). Also need an NBC digital satellite receiver. Will trade SMN "Country Coast-to-Coast" receiver.

Contact: Skip Schulz, WUPY, 540 River St., Ontonagon, MI, 49953. (906) 884-9668

Wanted: Used FIM-41 field intensity meter, GR-1606 RF impedance bridge, or OIB operating impedance bridge.

Contact: Frederick Spaulding, Consulting Engineer, 883 San Simeon Dr., Mountain View, CA 94043. (415) 961-5018

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State of the Art

By Chip Morgan - Morgan Broadcast Eng.
Folsom, California - (916) 983-9834

Here's the First Step Towards Telco Broadcasting

Sprint Gateways has introduced Live Broadcast 900, a new possibility for radio stations to reach a new or more distant audience. Imagine rolling out a new format or carrying a live event in your market and allowing hundreds or thousands of people from all over the country to call in and listen at the same time. Other long distance carriers have had it for a while. Be the first in the U.S. to try it.

From Broadcasters to Information/Entertainment Providers

Fiber optics and ISDN will allow a radio listener to call a local station on the telephone and be connected to data as well as music. Real interactive radio may be commonplace. Imagine the research possibilities! Meanwhile, a listener will be able to call their "hometown" station long distance and get the same quality (for a fee). A future alliance between newspapers and radio stations?

Another Way to Make Major Bucks

Using your tower site(s) for paging companies and cellular sites isn't such a bad idea. Sales of pagers and portable phones are predicted to grow by more than 31% a year to 2.7 billion in 1994. When worldwide paging and portable phones become reality, tower space will really be at a premium. Keep these facts in mind as you price your tower rentals!

A Laptop With Full-Sized Keyboard

Fujitsu has announced a thin new laptop called the FM R-CARD, which only weighs 2.2 pounds and runs for eight hours on two regular penlight cells. The system weighs half as much as current models. The only problem is, it uses a unique operating system that's not compatible with DOS or UNIX. Fujitsu owns 58 percent of Poqet, the company that sells a miniature "palm" computer. The FM R-CARD is being marketed only in Japan. Poqet may introduce a DOS compatible machine in the US soon.

It's Cool to Wear Ear Protection at Concerts

Your parents always told you to "turn it down or you'll ruin your ears." Now some people aren't saying "what?" Some pretty famous musicians are encouraging other musicians to turn down their on-stage amps to protect their hearing. Phil Lesh of the Grateful Dead wears ear guards during performances. Guitarist Ted Nugent says he has lost all hearing in his left ear and wears ear protection on his right ear during concerts. Even superstars Bruce Springsteen and Elton John have lowered their amps on-stage. Music may sound better loud today, but you may not be able to hear it at all tomorrow!

Your Personal Phone Will be the Size of a Pen

But not for a few years. Meanwhile, Mitsubishi has developed a cellular phone that measures 2.2 x 1 x 6.3 inches and weighs approximately 10 ounces. It's called the model 3000 and has up to 80 minutes of talk time, with 150 minutes if you use the bigger battery pack. It's now the smallest, lightest and most powerful unit available today.

The Spectrum is Getting Even More Crowded

Radio-based telephone and computer networks are coming to the office. There's already a wireless LAN, and now several American and European communications firms are talking about using spread spectrum systems to distribute data and voice around the office building. The AT&T Merlin phone system already has a cordless handset, and a new system from Sweden uses tiny telephones that fit in shirt pockets (getting closer to the pen phone every day).

Computers in the Salespeople's Cars?

A new device called "Trip-Trak" can keep a log of a salesperson's driving, including time and duration of the driver's stops, maximum speed between stops and the length and mileage of each trip. The unit lists for only $395 and can be installed under the dashboard of almost any vehicle in less than an hour. The system can be used not only for tracking time management skills, but also for vehicle use records for income tax purposes.

Video on Your PC

We've talked about manipulation of broadcast video on your PC before, and it's coming a step closer to reality. Now there are at least two systems which can combine live video, animation and computer-generated characters on your PC. One is the "Video Toaster" and the other is "Digivision." Computer animation and PC manipulation of video is expected to be a $50 billion global market by 1994.

Electronic Mail by Your Regional Bell Operating Company

Pacific Bell is the latest RBOC to introduce an electronic mail service. It's called Pacific Bell Connection. The company says it will allow competing E'mail systems to communicate with each other and act as a hub, plugging terminals, PCs and workstations into a flexible network. This is further documentation of promises by the phone companies to provide interconnectability between all types of computers.

You Don't Have a Phone at the Tower Site?

If it's because there are not phone lines there, here's another idea. Check out the Telemobile Phonelink. It can reach up to 50 miles into remote areas, and works with any phone system manufactured today. It works on 12V and DC and provides 2-10 watts of power on a single antenna.

By Russ Erickson - BE
Quincy, Illinois - (217) 224-9600

Grounded-Grid PA Finals

In the September issue, we left off talking about grid-driven tetrode PA amplifiers. Now let's look a grounded grid (cathode-driven) final PA amplifiers.

Transmitters like the AEL, CCA, CSI, Energy-Onix, and QEI all use a grounded grid final. The Broadcast Electronics FM-1B and FM-1.5B also use a grounded-grid final. This design does offer its own advantages, because the final tube is a triode.

It is inherently simple. There is no need for a screen supply, because there is no screen circuit. The control grid is a ground (zero bias), so there is no grid bias supply. There is only a plate supply for B+, and the cathode supply (filament). Obviously, there is a substantial reduction in needed cabinet space, because of the fewer parts needed over a grid-driven tetrode. The biggest drawback to this design is the enormous amount of drive required to the final.

Whereas a grid-driven tetrode has a final amplifier gain of approximately 100 (300 watts of grid drive to yield approximately 30,000 watts of final transmitter power), a grounded grid amplifier has a gain of about 10 (3,000 watts of drive required to yield 30,000 watts of transmitter power). This means the IPA, literally the Intermediate Power Amplifier, needs to be substantial. Consequently, the overall efficiency suffers, and is typically less than a grid-driven amplifier.

Since the RF circuit in a grounded grid amplifier is so simple, few things can wrong. One failure mode I have seen is when the tube shorts grid to cathode. With no drive from the IPA, you will still see Plate Current, and the grid current indication on the meter will be going negative (possibly pegged negative). The reason you are getting Plate Current is logical. The emission is leaking through the grid, since the grid is shorted to the cathode.

So what are the differences in specifications and capabilities between a grounded-grid and a grid-driven amplifier?

A transmitter's specifications are based on the performance capabilities of the exciter. Once your strip away the exciter, the true capabilities of the transmitter are obvious.

It seems the synchronous AM noise issue is on everybody's lips today. I recently spoke to a gentleman, over the course of two weeks, on just that issue. When I finally convinced him there was a lot more to consider in a transmitter than just the synchronous AM noise figure, I found out he never bothered to consider such mundane things as reliability, stereo performance, service and parts backup, etc. So let's take issue with the synchronous AM noise question.

The synchronous AM noise spec for a transmitter is determined by the bandwidth of the transmitter. The lower the AM noise spec, the wider the bandwidth. But what does that mean?

It's the ability of the transmitter to transmit the incoming signal without degrading or otherwise coloring the signal. It's the centering of the transmitter's tuned stages around the exciter's carrier and its composite audio components.

So what's the issue? Research has shown that a bandwidth of 800 kHz is sufficient, and a bandwidth of 1.4 mHz is optimum for FM transmission. Although a bandwidth of 2-3 mHz would be nice in theory, it's not necessary for excellent stereo and SCA performance.

Or would extra bandwidth actually "be nice?" Have you ever seen a amplifier that is too broadband work into narrowband load (eg. a transmitter with 3 mHz BW into a combiner). The BW of the transmitter actually has to be narrowed so it doesn't oscillate, breakup, and launch itself into orbit.

So isn't that the real issue? You can't hear synchronous AM noise, you can only realize its effect, the same as you can't see the wind, you can only see and feel it's effects.

So the real issue boils down to excellent stereo and SCA transmission capability. These are the specs that your listeners can really hear, and how they judge your radio station. What can happen to degrade this capability?

Transmitters

Continued . . .

1. Noise (in dB) 2. Crosstalk (in dB)
3. Intermodulation Distortion (in %)
4. Separation (in dB)

Keep the intermodulation distortion as low as possible. This is the kind of distortion that drives the young girls wild, literally away from you station. 0.02% is a good target as that is the best spec available from any modern transmitter. Audio gear should easily meet that.

Crosstalk, either main channel audio into sub-channel (or vice-versa) or left channel stereo into right channel (or vice-versa). Tuning your transmitter for minimum crosstalk from main into subchannel is the old tried and true method for establishing if your transmitter's passband is centered around the carrier. You don't want Madonna triggering your pager, after all.

Keep the noise figures on each individual piece of equipment as low as possible, as noise is cumulative (meaning it adds up). Consoles should be >-100dB (-70dB, for less expensive consoles), cart machines -60dB, STL systems -72dB, CD and DAT players -100dB. Don't forget digital is here, and you need to try to keep your transmission system as noise-free as the source material.

These are things that truly affect your station's performance, and how people judge your station. I have read where some people claim a lower synchronous AM noise figure will improve your fringe area coverage. HUH? Here is a sample of a statement backed up by no scientific evidence.

Base your research on things you can qualify and quantify, things that have been proven to improve your listenership. What else can you do? Never go off-air!

Sounds simple? Well I know it's not. But you can maintain your equipment to the best of your ability, and balance your budget so you can afford back-up systems for emergencies (even if it takes awhile). A back-up exciter, STL system, a production studio you can get on the air quickly if the air studio goes down, even a good back-up transmitter (perish the thought) would save the day and make you, the engineer, the hero. And don't forget, your owner, general manager, or sales manager certainly doesn't want to be down! If you can show how you can improve profitability, they will listen (just don't conflict with the new order for bumper stickers).

10 years ago, we tuned our transmitters for best compromise between max. PA efficiency and min. crosstalk of the main channel into the SCA. Remember how lousy efficiency was? I remember a certain transmitter that if I got 56% PA efficiency and a synchronous AM noise figure of about -35dB, I would treat myself to a beer. We have come a long way in FM transmitter technology, and life still does not revolve around your synchronous AM noise figure.

Radio Engineer

By Tim McCartney - McCartney Radio Eng.
Bemidji, MN - (218) 751-1680

I Don't Put Up With People Like That Any More

It's a great fantasy: I sit in my large, cushy office as my executive assistant greets the unethical station managers and owners who appear at the door. Since I no longer tolerate their kind, they are politely turned away.

Such a vision unfolds from my own experiences and recent discussions with engineers in the field, in which a common theme continues to emerge: engineers do not feel appreciated for their legitimate and often spectacular contributions. On several occasions, overworked and unrecognized colleagues have clearly been on the brink of imploding. They need colleague comfort/conversations in which their feelings are comprehended and discussed.

MIT: "Like" Your Employees

The radio engineering community is not alone in feeling this way about its employment. A recent Massachusetts Institute of Technology study, authored by a group which included a Nobel economics prize recipient, examined American business. The group argued that businesses are missing out by not treating their employees better, and that if you want to get ahead in business, start by liking your employees.

Other facts round out this scenario. "Business Week" reported that the 1960 boss-to-employee salary ratio of 41-1 has increased to 93-1. Despite this disparity, poor salary is not the primary complaint of employees. Rather, they are concerned about being ignored by bosses, perceived as the enemy, and forgotten when major decisions are made.

In addition, the American work force has slipped from the highest paid position in the industrialized world to 12th. Germany pays its workers an average $18, Japan $15, and the U.S. $13. Worker dissatisfaction is certainly not the sole culprit for these varied salaries, since economic blame is generally impossible to accurately assign.

But, why don't American bosses take a wild shot and try the happier employee approach? Perhaps they refuse to allow any facts to get in the way. As I observe and hear about some radio station managers/owners in action, I remain puzzled. And, I still hope that I did not wear similar shoes when I was a GM.

Fractured Therapy Tales

Perhaps a few soothing words will help engineers who feel abandoned by management. At the risk of becoming one of those people I no longer tolerate, the following dream sequence is offered. Imagine these understanding remarks being directed to you, the engineer:

Dr. Joyce Brothers: *Your GM needs a woman.*

George Burns: *I remember when chiefs were called God.*

The Former GM: *I wish you hadn't given the IRS my name.*

The U.S. Supreme Court: *You were right. Everyone else was wrong. You win.*

The IRS: *How is your former GM's name spelled?*

Ted Kennedy: *Cracking your GM for a few bucks is harder than opening a Nebraska liquor store on Sunday.*

The Group Chief: *Come to headquarters and let's talk.*

The GM: *You're right. I did it. It's my fault. I'm to blame. I'm sorry.*

Bureau for Better School Reuntons: *Don't worry. Everyone else feels the same way.*

The Traffic Director: *You know, radio would be a lot more fun if it weren't for the boss and the advertisers.*

Carnack: *Name something that's banged, cut, and screwed. A hammer, a saw, and a ------*

The Owner: *How's that transformer-thing coming?*

The PD: *I know that changing the transmitter tube, cleaning the socket, and proper tuning require more than three minutes of down time. I understand.*

The DJ: *When I bang the console, it pops. So, I don't bang it any more.*

The Travel Agent: *I agree with you that pre-boarding and de-planing are both consentual encounters and possibly examples of emotion discomfort.*

Richard Nixon: *Your GM has been accepted into my management ethics seminar.*

The Congressional Representative: *I loved your story about whatever it was you were talking about. I mean, I agree with whatever it was you just said. It reminds me of vegetarian leather.*

The Former Engineer: *There's nothing you can say about the GM that isn't true.*

The Sales Manager: *The GM should be a woman!*

The Senator: *Radio is just caught up in the slowing up of the slow down. And, by the way, if I say anything particularly clear, you've misunderstood my point.*

The Assertiveness Trainer: *Your GM is over-qualified for our program.*

The GM: *Good-bye radio! I'm leaving tonight on the 2:30 'Hound.*

Gone Too Far?

Well, I know I've done it this time. The "Radio Engineer" column is not a committee effort -- it comes right from me to you. And, it's easy to exceed the bounds of appropriateness. But, sometimes a little excess is reasonable.

Actually, I am very grateful for this forum. I was privileged to have had a similar column which ran two years in another publication and I truly enjoyed hearing from so many colleagues. The best compliment went something like "you write about the things I think about." So, that's the inspiration which, hopefully, will make engineers feel better in the process.

Besides, somewhere a regular column should be available to an engineer who is truly outraged by the ethics degradation trickling down to station management. I am absolutely certain that this type of behavior is not necessary and is leading our industry down the wrong road. Did I mention that I no longer put up with people like that anymore?

BTF-20 Off The Air

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Recently, WMUK was off the air for 10-1/2 hours because I put my faith into two assumptions: 1. Meters on the front of a transmitter will steer your attention in the right direction and, 2. Objects at rest will stay at rest.

WMUK uses an RCA BTE-20 transmitter. When I arrived at the site, the PA overload lamp was lit. Turning the high-voltage back on, caused the plate current and plate voltage meters to deflect, but not (and here's where I made my first mistake) the driver cathode current or PA screen voltage indications.

Both of these are fed from the same low voltage supply, so the investigation started there ... and stayed there for 10 hours. The contactor was replaced, and the tube socket was torn apart, trying to find the "low-voltage supply problem." It would have been continuous work, were it not for the interruptions from the studio.

Almost as a desperation measure, Randall Kells, my assistant, decided to open all the doors and by-pass the interlocks to check for arcing and sparks as the transmitter overloaded. When we opened the high-voltage cabinet, we found that the cable for the grounding stick had shorted against the high-voltage rectifier stacks, grounding and overloading the high-voltage supply.

This cable was inspected three weeks ago and was nowhere near the stacks. Since there is not a lot of vibration in the cabinet or major temperature changes, I surmised that spring-tension of the cable had pulled itself over to the high-voltage stacks.

Because I was getting some deflection on the high-voltage meters, I assumed that all was well in the high-voltage cabinet. I was misled because the high-voltage overload relay was activating before the low voltage contactor.

I offer this as a reminder of two things: 1. No amount of meter indications and schematics can substitute for a compete visual inspection, and 2. Abandoning assumptions is the most difficult aspect of troubleshooting.

Station Automation

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A Few Basics and an ITC 750 Fix

In the September issue, we talked about the three basic ideas involved in the concept of radio automation:

1) Automation involves a sequence of events.

2) Each event has a beginning and an ending.

3) The automation system knows about the beginning of each event, but it must be told about the ending.

This month, let's look at the basic types of source equipment traditionally used in automation. We'll save the newer high-tech sources for a future column.

For the purposes of this discussion, let's assume you're a music station. News and talk formats can be automated, too, but it's easier to discuss in terms of songs and spots. These are the two basic types of program material you'll use in your automation system. Additional material may include PSAs, promos, jingles, and liners. I'll use the term spots to indicate these types of program material, and songs to mean songs, news/talk programs, etc.

In order to automate your radio station, you must be able to store a large number of songs and spots online. Online storage is available to the automation system at all times. The amount of online storage you have determines, to a large extent, the amount of walkaway time your system will provide.

The two most important variables in calculating walkaway time for an automation system are:

1) Number of units of online spot storage.

2) Number of songs in online storage.

Most of your spots will be repeated several times each day, so you'll want to have enough spot storage for all the unique commercials you'll need available online during each walkaway period.

Example: You would like six hours of walkaway time from your system. You have 27 different announcements to play during this period. Therefore, you need online storage for 27 units (minimum).

But just having the right number of spots available isn't enough--your spot system must be able to play spots consecutively and in practically random order. Why random order? Because you might need to change one or more spots at the last minute and, to your system, that will seem random. Some playback systems, like the Instacart (48 carts) from IGM, are built with this in mind and can play several spots back to back; others, like the Carousel from SMC (24 carts) aren't. However, the Carousel is less expensive and you can purchase several for the price of one Instacart. Budgetary and engineering considerations will figure heavily in such decisions. We'll talk about these and other multi-cart systems in more detail next month.

2) Songs will usually be stored on cart, reel-to-reel, CD, or DAT. If you're using a satellite format, they come from your network. Other possibilities include videotape and cassettes. Computer hard disk storage is currently too expensive to receive serious consideration for storage of music libraries.

Ideally, you could have enough online storage for your entire music library. In practice, however, this is usually not practical with large music libraries. Most stations are content to change tapes or other media every few hours. You may have to do this with spots, anyway (depending on your spot load).

Once you know how many spots and how much song storage you will have, you can use your format clock to help you determine your system's walkaway time. In some cases, to get the desired walkaway time, you will have to add song storage or change the format clock.

Example: Your automation system has four reel-to-reel decks. One for up-tempo currents, one for down-tempo currents, one for recurrents, and one for oldies. Your PD's format clock calls for four recurrents per hour. You need six hours of walkaway time. This format clock requires 24 recurrents per walkaway period, but each of your recurrent library tapes only contains 20 songs. You must add another deck or talk the PD into changing the clock.

In the coming months we'll talk about specific automation controllers, both old and new, all kinds of source equipment, programming tips and tricks, and lots more. If you have a question or problem you'd like some help with, fax or write me here at Radio Guide and I'll try to get the answers. We'll print some of them in this column.

ITC 750 Reel Deck

Many automation systems use ITC 750 reel-to-reel tape decks for music playback. If you have these machines, you probably have at least one that has problems. One of the most common problems with ITC 750s is the solenoid power supply.

If your machine exhibits intermittent solenoid problems; ie. pinch roller or brake solenoids failing to hold in the engaged position, look for the following: a very dirty relay or a bad solder joint(s) on R3.

If you're only having problems with one solenoid, check the relay that operates it. It's possible that the contacts have gotten too dirty or charred to pass the required current. Try burnishing the contacts or replacing the relay.

If your problem is with more than one solenoid, or if the relay checks out OK, chances are you have bad solder joints on R3. This is a 20W, 50 ohm power resistor mounted on the motherboard (see photo on page-15). R3 gets very hot during operation. Often, it gets so hot that the solder connecting

Continued . . .

it to the board melts. Then you get a cold joint or complete disconnection from the circuit. Clean off the old solder and remove the part. If damaged, replace it. Otherwise, check its leads for corrosion and old flux. You might have to burnish it with a piece of fine sandpaper. Reinstall the part and remember to check this as part of your routine maintenance.

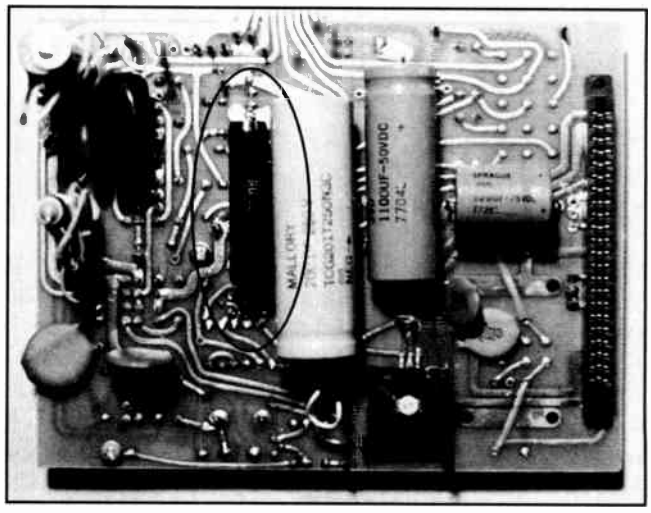
Another common ITC 750 problem is brakes. It's no secret that the original design of this machine had some flaws, and this one causes engineers more grief than any of the others.

The 750 uses brake bands made from a leather-like material that loses its effectiveness after a few thousand plays; the material becomes flat and smooth, causing a loss of friction. It is also susceptible to heat, and has been known to fuse itself to the brake roller (hub), putting the machine out of service.

Brake bands for this machine are no longer available from ITC. You can use Otari ARS-1000 brakes with some modifications. First, cut off the pin socket at one end of the band. You'll need a hacksaw; it's stainless steel. Use the old ITC band as a guide. The hole in the Otari band corresponds to one of the holes in the ITC band. Make a second hole in the new band corresponding to the second hole on the ITC band. You now have an ITC 750 brake band that's better than the original. Install it.

Before you replace the reel motor assembly, be sure to clean the solenoid and plunger thoroughly, especially the two washers that are connected to the plunger. Take them off, and lightly buff them with steel wool until they shine. Do the same with the pin that rests between them. Smoother brake action will result.

When you replace the reel motor assembly, you may need to shim it away from the deck plate to keep the Otari brake band from rubbing the brake roller. Trial and error will tell.



ITC 750 Circuit Board With R3 Circled

DA Systems

By W.C. Alexander - Crawford Broadcasting
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Replacing the Phasor

One of the projects that has been in the planning stages around the Corporate Engineering offices here at CBC for the past year or so is the replacement of the transmitter and the phasing/coupling equipment at KBRT in Los Angeles. Although we have done this kind of thing a time or two before, this was once again a learning experience and provided a wealth of empirical data on which to base planning of future projects. I have been considering several different topics for this month's column; with this project still fresh on my mind, perhaps sharing it with you would be a good way of cementing the facts in my own mind as well as disseminating the information gained.

The History of KBRT

Anyone familiar with southern California radio probably knows about KBRT. The station signed on the air in 1953 as KBIG. It operated using that call until 1980, when CBC purchased the station and changed the call.

The unique and distinguishing characteristic of KBRT is its transmitter site location on Santa Catalina Island. It seems that I see this bit of trivia mentioned from time to time in one publication or another. Catalina itself has a colorful history, the details of which are well beyond the scope of this article. However, for the sake of those that do not know, I will say that Catalina lies 26 miles off the nearest point of land on the coast of southern California.

Although it is often glamorized in television, the movies and literature, Santa Catalina is actually a mostly uninhabited desert island with a year-round population of about 3,000. The KBRT site is several miles as the crow flies from the only population center -- a one-square-mile tourist mecca called Avalon, but it is quite a distance by road. The site is well into the island's interior at an elevation of 1500 feet above sea level; one need only travel a quarter mile or so to the ocean, but watch that first step!

The site was originally constructed in the early fifties, long before there was any commercial power available to the interior of the island. Twin 60 kW diesel generators powered the transmitter plant, and a smaller, 5 kW, single-phase unit powered ancillary equipment and the apartment which adjoins the transmitter building. A 2,000 gallon underground storage tank provided the diesel fuel feed to the generators, and a 1,000 gallon gasoline tank was installed to provide motor fuel for the vehicles.

The original package of equipment was provided by Gates Radio. The compliment consisted of a BC-10B transmitter, a custom phasor and custom ATU's, and an audio console with turntables and tape equipment. The Gates transmitter was bumped to auxiliary status in the late sixties with the purchase and installation of a new Collins 820F 10 kW transmitter. The Collins served as the main until 1983, when a new Continental 316-F pushed it to auxiliary service. The old Gates was set outside and wrapped with tarps; that is where it remained for several years until it was moved to a warehouse on the mainland. It is still in that Orange County warehouse awaiting a buyer to come along.

Along with the more-or-less continual upgrading of the transmitter equipment over the years, the rest of the equipment has also been replaced as it became obsolete. Remote control was added when its use for AM DA's became legal, digital remote control replaced the stepper-type in the early seventies, a Gentner VRC-1000 was installed in 1986, and now a VRC-2000 is used for remote control. C-Quam AM Stereo was implemented in 1987, along with new audio processing equipment and a new ground system.

The owners of KBIG/KBRT have done their part to keep the transmitter plant current over the life of the station, and this year, it was time to replace the Collins transmitter with a new, all solid-state unit, and to replace the phasor and ATU system with a new, broadbanded system.

Phasor Designs and Coax

The original KBRT phasor used a tank-type power divider circuit. This design offered a minimal component count and good stability, but very poor adjustability. I pity the poor souls who were charged with the initial setup of the array! The common point resistance of the array was 87 ohms; the tank shunt capacitor was normally adjusted to resonance, and if everything was okay, 87 ohms was what you got.

The original array used 1-5/8" rigid, air dielectric transmission lines. These lines were routed to the towers above ground in wooden trays. The rigid lines were replaced in 1983 with 1-5/8" air dielectric Heliax, routed through the same above-ground trays as was the old rigid line. These trays finally deteriorated beyond the point of economical repair and were removed in 1986; the Heliax lines were extended and buried.

Back in the days when the KBRT site was originally constructed, the Operating Impedance Bridge (OIB) had not yet been invented. All RF resistance and reactance measurements were made using a regular low-level bridge, such as the General Radio 1606B. Mutual coupling was virtually impossible to accurately gauge. The standard practice was to do whatever was necessary to "make" the pattern, then adjust the ATU Tee network so that the transmission line input and output currents were close to the same value.

DA Systems . . . (continued)

This technique was known as balancing the lines, and worked pretty well unless one or more of the lines were some multiple of 1/2 wavelength. In the case of KBRT, there was a 1/2 wavelength line and, although the lines were all pretty well balanced, the VSWR was quite high on at least one of the lines. This was evidenced by the fact that there were "hot spots" along the length of the reference tower transmission line. One of the goals of this project was to match all the lines and get rid of the VSWR and the resulting losses.

With these facts in mind, I set out to design a phasor. An ohm's law type power divider was the circuit of choice because of the ease of adjustment that such a design affords. The power distribution in the three towers was predicted to be 12% in tower #1, 38% in tower #2, and 50% in tower #3. Because of the rather large difference in power between tower #3 and the other two, I elected to tie tower #3's phasor directly to the common point buss. This choice saved on some components, cut the cost somewhat and added to the eventual stability of the system, but it caused some problems in tuneup. More on this later. Phasor and ATU networks were designed with as close to 90 deg. phase shifts as possible, keeping the reactances in the network legs to reasonable values. Mutual coupling values for the two power divider coils were assumed in the design, and these assumptions turned out to be very close to the measured values.

A Tee network was placed into the design between the common point buss and the phasor input to transform the true common point impedance (predicted to be 18 ohms+j11) to 50 ohms+j0, which the new, solid-state transmitter really wants to see at its output terminals. Because of the low output impedance, some pretty hefty components were required in the shunt and output legs of this network.

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Putting It Together

Our Chief Engineer, Gary Bloodworth, lives at the transmitter site. This is a necessity because of the extremely remote nature of the site; when the marine layer moves in and creates zero-zero visibility on the island, there is virtually no way that anyone could get to the KBRT site. Since moving to the site several years ago, Gary has learned all about the "system" by which things work over there.

Getting anything onto the island is a real challenge and trial of one's patience. For small items, there is the UPS/Federal Express plane that runs (almost) every day. If you've got a phasor, transmitter or anything of crate size to get onto the island, there is a barge that runs three times each week, weather permitting. You can probably get your stuff on the barge without any problems, unless you've done something to honk off the guy at the mainland freight terminal who decides what goes and what doesn't. Fortunately for us, that guy was on vacation and our equipment made it over almost on time.

Once on the island, there is one mover that can take the stuff up the hill. I've got to say that the guys from the moving company were great. They were creative and unafraid of hard work. They got the new stuff up the mountain and off the truck and the old stuff onto the truck and down the mountain with no delays or excuses.

The transmitter went in with no problem. It took the better part of a day to get it in place, wired with AC power, hooked to the remote control, and plumbed into the antenna. There were no problems with the unit, except that yours truly forgot to remove the meter shorting clips and caused a couple of fuses to blow. (Hey, those tags that said to remove the shorting clips were really faded and hard to read...)

Before we could remove the old phasor and ATU's, we had to do something temporary with the antenna so that we could stay on the air. There is a "long-wire" standby antenna in place between two poles (it has been there for who knows how long) that had its own "L" network and everything. But at some point in the past, someone robbed the matching network of the output capacitor. Because the antenna parallels the ground between two telephone poles, and because it is electrically quite long, the wire has a low (8 ohms) RF resistance and a high (+j300) inductive reactance. I needed a .0005uF capacitor to properly match it with the other components already on hand in the matching "L" network and, unfortunately, we were fresh out of that value. So forget the wire and move on to something else. Fast, because sign-on is approaching fast!

The simplest solution was to float two of the towers and feed the remaining radiator as a non-directional element. This worked out quite well. The catch is that, under the FCC Rules, we had only 24 hours to get back to normal operating parameters before notifying the Commission. At sign on, next morning, that clock started ticking.

We removed the old phasor with great difficulty. As far as I know, it hadn't been moved from that spot since 1953. It took a lot of crow-barring, hammering, and muscle to get it out of the hole in the wall where it sat, but we managed, and somehow even got it out the back door (this was just Gary and me doing this). I never knew I had a masochistic streak in me, but now I know. In fact, moving the old phasor out might even qualify as "attempted suicide." Don't try this at home, folks!

The new phasor arrived shortly, and we had some help getting it into place. We had it wired and plumbed in a few hours.

The ATU's we uncrated and pre-set to theoretical values while on the ground. Then, we installed them in the two floating towers. With those installed, we switched to one of those towers as the non-directional radiator and floated the third tower, installing the new ATU there without ever leaving the air. I should probably mention that we operated at 1 kW non-directional, and 1 kW can develop some pretty respectable voltages across the base of a nearby floating tower (I have the RF burn scars to show for it!), so if you ever find yourself working under these conditions, be careful.

Continued . . .

Making It Work

I used the antenna monitor to set up the phasor proper for the appropriate phase shifts and approximate power divider settings. I discussed this procedure in detail in part 1 of the AM DA series (Radio Guide, June-90). This gave me a starting point from which to proceed with the adjustments. After the phasor was given preliminary adjustment, the lines were connected and the system was configured for directional operation.

This is probably as good a place as any to discuss driving point impedances. The design and adjustment of a DA's ATU's hinges on the knowledge or proper assumption of the system's driving point impedances. One would think that, in an operating system, an OIB could be used to measure the actual DPI's. This would normally be true; however, a couple of roller inductors in the old KBRT phasor had failed and could not be moved. When we inserted the OIB into any tower's base circuit, the insertion effect messed up the DA parameters enough to invalidate the measurement. Since we could not adjust the phasor to compensate for insertion effect, we had our choice of assuming the measured values were close, or of using other assumed values based on calculations of mutual coupling between towers. I elected to go with the measured values. This was a mistake.

The problem that immediately showed up was the inability to get the power down in the highest power tower. Remember? This one is tied directly to the common point buss. The current in the remaining two towers was very low and nothing I did would raise them, although the phase shifts were about right. This is the point at which I started wishing that I had included a high-power tower power divider control in the phasor design.

However, by changing the value of the shunt leg in the highest power tower's phasor network down from 50 ohms, I was finally able to reduce the current in that tower and raise the currents in the other two towers. This was enough to obtain the licensed parameters on the antenna monitor.

With the pattern now correct, I inserted the OIB in the output line of each ATU, compensated the system for insertion effect, and measured the true driving point impedances. With the right DPI's in hand, the correct values of the ATU Tee networks were recalculated and reset. The shunt leg of the highest power tower's phasor network was reset back to 50 ohms, and the entire system was readjusted for the correct parameters on the antenna monitor. The actual common point impedance was measured with the OIB, and the leg values for the common point Tee network were calculated and set. Using the common point bridge built into the phasor, that network was fine-tuned for 50 ohms+j0.

As the last step in the tuneup process, the OIB was inserted into the input of each of the ATU's. The system was adjusted to compensate for insertion effect, and the bridge controls were set to 50 ohms+j0. With the switch in the FWD position, the sensitivity control was set for full scale. Then, without changing anything, the switch was moved to the REV position and the VSWR at the output of each line was read on the OIB's meter. In this case, they were all 1.1:1 or less, but if they had been much higher, the ATU Tee nets would have been readjusted slightly and the system re-tuned for proper parameters until the VSWR was acceptable. The base currents were also noted and recorded at this time.

Wrapping it Up

At the conclusion of the project, which occurred at about 4:00 AM, two hours before our 24-hour deadline, all our goals had been realized. A quick check of transmitter sideband response showed good symmetry. Stereo response of the new transmitter into the new DA system was quite satisfactory. While monitor points were well within tolerance, the base currents were all slightly higher after the installation of the new phasing and coupling equip-

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DA Systems . . . (continued)

ment. With the base current ratios being the same as before the change, the increased base currents would indicate increased efficiency and lower losses. Were a DA proof to be done, I'm confident that an increase in pattern RMS would be evident.

We can only guess about stability; it probably won't be as good as it was with the old tank-type divider, but at least we will have the control we need to keep the array in adjustment when it does drift a bit.

In about 100 hours total over a five day period, we managed to just about replace the KBRT transmitter site. Gary and I were pretty tired when it was all done, and I had more RF burns on my hands than I care to think about, but the experience was rewarding. KBRT's transmitter site is set for the '90s.

What did we learn from the project? First and foremost, we learned that driving point impedances should be known and recorded for all modes of any operating DA. If you maintain a DA that was built in the '50s or before, it's probably a given that the DPI's were never measured. Borrow, rent, or buy an OIB and measure them now, being careful to re-adjust the system for insertion effect anytime the bridge is inserted. Record the measured DPI for each tower and mode in a place where it won't get lost or forgotten. A good place is in/on the ATU itself. Kintronic Labs provides a place on the ID plate of its ATU's for this purpose, but anywhere is fine; use a laundry marker, a "Sharpie", or some other indelible ink marker.

Second, we learned the value of having a power divider coil in the line to all towers. A temporary coil would have been welcome at 1:00 AM on the night we tuned up the system. If, in the future, I design another phasor with one of the towers tied directly to the common point buss, you can bet I'll have a 15 or 22 uH variable inductor around to temporarily install for tuneup.

There were a lot of little things that we learned that really don't bear mentioning here, but they were valuable nevertheless. I'm sure you picked up on them as you read this account.

Sure, it was a lot of hard work, but it was worth it. I'd do it again tomorrow!

Studio Site

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Acoustics For The Broadcast Engineer

At first glance it doesn't seem that the subject of acoustics has much to do with radio frequencies, but if we examine the physics of radio waves (electromagnetic radiation) and sound waves (mechanical vibration), we find that there are several principles that are very similar. A good understanding of one can lead to a better understanding of the other.

In each case, an energy transducer causes one form of energy to be radiated outward as another type of energy in the form of waves. Conversely, the waves thus generated can be intercepted by another energy transducer to be converted back into some form of energy that we can utilize.

Generation and Transmission

Electrical energy is almost always the first form of energy that concerns broadcast engineers. In one case, electrical energy is fed into an antenna which transduces it into electromagnetic (EM) energy waves which then radiate outward from the antenna as our "signal." In the other case, electrical energy is fed into a loudspeaker or headphones which then transduce it into mechanical energy waves. These waves then travel outward through some medium, usually air.

Granted, mechanical energy waves (sound) are also generated by banging on a drum with a stick, blowing air into a horn and human vocal cords. In each case, some amount of energy must be injected into the device in order for it to be converted into sound waves. Sound waves also transmit very well through solid material.

Reception or Interception

The interception of electromagnetic waves is done by another antenna, although often of a very different type and size. The result is that the EM energy is transduced back into electrical energy which can then be amplified and processed into whatever form it was generated for originally. The interception of sound waves can be done with a microphone or some other device which transduces them into electrical energy, but it can also be intercepted by the ear which transduces the waves into audio intelligence or sounds that can then be processed by the brain.

All of this is pretty basic. How are the two forms of radiating energy related to each other? Let's review a bit of theory relating wavelength and frequency. In both cases, as the frequency increases, the wavelength decreases. Most of us have, at least, been exposed to the formula relating wavelength, frequency and the velocity of EM radiation (commonly called the speed of light):

$$\lambda = \frac{c}{f}$$

"c" denotes the velocity of EM radiation in a vacuum. For practical purposes, this is a constant because this value decreases only very slightly in air. It is normally considered to be the same. This velocity is approximately 300,000,000 meters per second. It is determined by the permeability and the permittivity of a vacuum.

Lambda λ is a Greek letter denoting the wavelength in meters. F denotes the frequency in Hz.

Since this is familiar information, it's not necessary to work examples here, other than to point out that if you plug the AM frequency of 1,000 kHz into the formula, you will find that its wavelength is 300 meters. If you plug in 100 mHz (which is near the middle of the FM dial) you will find that the wavelength is 3 meters. Obviously, the FM frequency is 100 times higher than the AM frequency, and the wavelength is reduced by a factor of one hundred.

Audio Wavelength Formula

The wavelength of sound is much more variable due to many factors, so bear in mind that we will be working in approxima-

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Continued . . .

tions. To give you an idea of how some variables affect sound velocity, here are some facts about it:

In dry air, at temp. of 32 deg. F, velocity is 1088 feet per second (FPS).

In dry air, at temp. of 68 deg. F, velocity is 1130 FPS.

In humid air, velocity is greater depending on the humidity.

In water, for comparison, velocity is almost 500 FPS.

In steel, velocity is about 16,000 FPS. (If a tower rigger is working up on a tall tower and you rap the bottom of the tower with a hammer, he should "feel" the vibration in his hands before he "hears" the sound from below with his ears).

Steel is also a very efficient transmitter of sound waves, a fact that you are probably aware of if your studios have metal studs or other materials in the walls.

The approximate formulas at room temperature for sound waves are:

English: $\lambda = \frac{1130}{f}$

Metric: $\lambda = \frac{334}{f}$

1130 is the constant for velocity in FPS and 344 is the constant for velocity in Meters per second, and "f" denotes the frequency in Hz.

These formulas are obviously similar to the one for EM wavelength, the only difference being the constants in the right hand sides of the equations. Since we do most of our dimensions in feet in the USA, let's do a few examples. Everyone uses 1,000 Hz as a test tone at some time or another, so it makes a good starting point.

Plugging in numbers we get:

$$\lambda = \frac{1130}{1000} \quad \text{(or 1.13 feet)}$$

For those used to using the EM formula for antenna dimensions, etc., this seems like a pretty short wavelength. What about the whole audio range that broadcasters work with? It's fairly well accepted as 50 Hz to 15 kHz, although you may expand it if you wish. Let's plug these numbers into the formula and see what this range is in wavelength. Without repeating the equations above, we quickly see that the range encompasses from 22.6 feet to 0.07533 feet (or about 0.9 inch). If you know about pipe organs, this will help you understand the very deep note from the 32 foot pipe.

With these relatively short wavelengths, if we were working in RF, we would say we were up in the microwaves, but this is the audio sound that we work with every day in studios and control rooms. This is a pretty broad bandwidth and, after all, the spectrum ratio of 50 Hz to 15 kHz is 1:300

Reflections, Bounce and Boom

Now it's time to get into some practical application of acoustics to your facility. Room shape, room dimensions, the type of walls, floor, ceiling, furniture, equipment and human bodies all get into the act. Rooms are typically square or rectangular. What does that do for the sound? If the walls, floor and/or ceiling are hard, the room is typically "hot" or "live" to certain frequencies depending on the room dimensions. Typical dimensions are often in the wavelength range mentioned in the previous section. What happens then? Acoustical standing waves. It's a form of reverberation, commonly known as a reverb, that is often generated intentionally for special effects. However, it's usually not wanted in a studio or control room.

Applying basic antenna theory, it doesn't take too much imagination to visualize the half-wavelengths and wavelengths that add and/or cancel within such an echo chamber. Resonances can be found at different frequencies with an audio oscillator, an amplifier and a loudspeaker placed at different experimental locations in a room.

Just turn the volume up on the amplifier and slowly sweep through the oscillator's dial, listening for peaks in the sound. Also open the microphone channel on the

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console and watch the VU meter. If the room is really "hot", the peaks may be almost painful to hear and the VU meter may show distinct peaks at certain frequencies based on the directivity, sensitivity and frequency response of the microphone.

Don't forget the dimension from ceiling to floor. Concrete, tile or other hard floors can really get into the act in reflections. Metal equipment cabinets may resonate at certain frequencies that surprise you. Windows are hard surfaces that can reflect as well as conduct sound through to another area.

What to Do?

So you do an experimental audio sweep and find some problems. What can you do about it? First, rebuild all studios and control rooms into trapezoidal shapes. Make sure that walls are nowhere near parallel. Tilt the ceiling, perhaps in several sections. You can't do much for the floor other than carpet it, because people have to have a level place to walk. By having no parallel surfaces, reflections will be rapidly broken up and attenuated. Replace any single glass windows with double pane glass with the two panes not parallel with each other. Placing them at an angle will attenuate sound coupling thorough them. Also mount the glass in elastic material.

Not practical, you say? The boss will say you've gone totally bananas this time and fire you? Seems very unreasonable to me. Well, maybe we can do something else.

Soft Irregular Surfaces

Placing old egg cartons on the walls, works, but lacks class and may not be aesthetically pleasing. There are also remnants and samples from the local carpet store, but you may wish to look into some of the foam rubber acoustical material that is available from several manufacturers. The common idea among these three suggestions is to provide soft, irregular surfaces over hard, smooth surfaces that may be reflecting and causing unwanted resonances in your sound. The irregular surfaces break up the waves and the soft surfaces absorb them.

If you really have problem areas, you can partially simulate the trapezoidal room shape mentioned previously by placing acoustical materials on panels and suspending or placing them at strategic points that will break up the parallel surfaces that are resonating. To experiment, you can use a sheet of plywood perhaps two feet by four feet and cover one or both sides with acoustical material. Being lightweight, such a panel can be suspended from the ceiling at various experimental angles until the sound you want (or the resonances you don't want) is attained.

Most people don't like a totally "dead" studio in which there are no acoustical reflections at all. The panels mentioned previously allow you to do trial and error experiments inexpensively and easily. You may elect to install one or more panels permanently hung from the ceiling or wall. If somebody asks questions, Just tell them you have a "mod" decorator.

Summary

Sound waves and radio waves are similar enough that you can use knowledge of one to apply to the other. Both radiate from some source. Both are capable of being reflected and/or absorbed. Both can be resonated or de-resonated by various means to accomplish a desired end. Both are forms of radiant wave energy, one electromagnetic and the other mechanical.

While an EM wave usually needs an electrically conductive surface to reflect from, the sound wave usually needs a hard, smooth, inelastic surface. The important difference for practical application is in the wavelengths of the frequencies involved. Typical studio dimensions and construction are often conducive to reflections and resonances at audio wavelengths. Simple experiments can do much to determine where problems originate and the application of basic physics can help solve them.

Station Security

By Harlen Riley - Sentry Signal Systems
Center, Texas - (409) 598-5641

Intrusion and Fire Alarm Protection That You Can Install Yourself

Intrusion is usually attempted by curious amateurs, looking perhaps for hand tools, drills or similar equipment, or the highly professional radio thieves that know exactly what they can sell.

Our main objective here is to keep the intrusion alarm system as simple as possible, yet within reason to do as much protection as possible.

A word of caution, any system can be compromised. A balance must be struck in the amount of protection needed to sufficiently deter intrusion, and the amount of time and funds available. Probably, the first deterrent would be warning signs that the building is protected by an alarm system. Of course this does not deter a professional.

The installation techniques of alarm systems varies, according to the type of building involved. The type of building is the first thing to consider. Most modern remote buildings are either metal or masonry block type, but this can be applied to wood frame buildings. We can also include studio and control room areas. These will be taken up at the end of the article.

Simple intrusion circuits have been in use for the past sixty years. In the past, systems ran off of drycells, but usually now run off of 110 volt power supply with a gel cell battery backup. The older control panels run off of six volt DC. but most of the newer models run off of 12 volts DC. Also with the backup type power supply, most of the panels use a single power source and originate and terminate the loop in the control panel. In the older panel, a milliammeter was incorporated to read the current in the loop. This would normally run from 2.5 to 5.0 ma. Using the drycells at the end of the line, the meter would read the condition of the batteries. The loop relay would normally hold reliable down to 2.0 ma.

The output of the control panel is six or twelve volts at up to five amperes when the relay circuit is opened. Some control panels have a dry closure when the loop relay circuit is opened. Some control panels have also a dry closure when the loop relay circuit is closed.

The more modern control is electronic with no relays and uses origination of the loop at the panel and an end of line resistor at the far end of the loop. This panel also goes to alarm if there is either a short or an open on the loop. Most panels will allow from two to five hundred ohms of loop resistance which would take care of any normal loop. Some modern controls have two or more loops in the panel with a LED indicator illuminated if the the loop is in the normal condition.

There is no limitation of the number of devices on the loop. The limiting factor is in troubleshooting the loop. Probably not more than five devices should be on each loop. In a typical remote building, there would be normally less than ten devices. If more than ten devices are desired, there is a device with either four or eight inputs with one output. That is, from four or eight loops can be utilized with one output. The inputs can be individually disabled and also a freeze position allows troubleshooting down to the individual loop. A LED indicator for each loop tells which loops are complete.

There are three different methods of authorized entry in to such a building. By key, shunt lock key and then turning off the control with same key. The third method is by use of a touchpad. By using a delay on the entrance door sensor, the key or touchpad can be inside of the building.

In the key method, it is advisable to use a round key such as is used on vending machines, or a high security key lock such as Medeco (trade name) or similar. First, these locks are difficult to pick, but more important, it is extremely difficult to get these keys reproduced. And since they are unique, it is easier to remember who has the various keys. The Medeco key is flat so doesn't take up as much room, on the usually many keys on the ring, as the round key. In all cases, a key log should be kept unless you want to change the lock every time somebody leaves employment.

First, the older method is a shunt lock on the entrance door, and then using the same key to turn off the instrument. The second method is for the keyed control switch on the front entrance that turns the complete system on or off. Also a couple of led indicators to indicate if the system can be turned on and an indicator that tells if the control is turned on. This is the more modern type of control. Third, along with the more modern control, there are touchpads available with led indicators, with the sequence of opening and closing numbers being easy to change. Also these switches should be trapped, so an attempt to dissemble the switch will activate the alarm.

Let's look at the various methods of activating the control panel. First there is the door mounted magnetic switch. The switch can be either a magnet activated mechanical switch or a reed switch. In the past, the reed switch was not desirable for circuits that were not opened very often as the reed would freeze in the closed position. The modern reed switch is reliable though. Also there are switches that can be mounted in the door frame and door, that can not be visually detected. These work well on wooden door and door frames. The magnet is mounted on the door and the switch is mounted on the door frame. Spacers are used to align the switch and magnet and to isolate the units from the metal door or door frame.

One rather easy way to enter remote buildings with no windows, is

Station Security . . . (continued)

through room air conditioner openings. Is only necessary to simply push the air conditioner in to the building and enter through the opening. The only protection is to place steel bars on the outside or place a trap switch on the inside. This is simply a wire connected to a tab or two tabs, and the tabs go into an insulated double ball trap switch. The insulated double ball trap switch is two spring loaded metal balls insulated from each other. A piece of metal is attached to the trap wire and inserted in the switch, which in turn completes the circuit. When the trap wire pulls out the piece of metal, the alarm will be activated. The circuit can also be completed through the trap wire using another trap switch. This way, if the trap wire is either cut or pulled, the alarm will come on.

Another method of protecting openings, is by lacing across the opening with 30 or 32 gauge insulated magnet wire. carefully scrape the varnish from the wire and solder the splice or connectors. Be sure there is no strain on the splices. Insulated nails or hot glue can be used to fix the trap wire to the edge of the opening. Stack vents and ceiling vents can be trapped in various ways.

Space protection is not advisable in such buildings because of the hostile environment. This includes air flow, RFI and rapid temperature changes. Vibration detectors can be fixed to the cinder block walls if attack is anticipated by this method. One problem with metallic buildings, is that by unbolting a panel, ease in accessing the building is made. In the metallic building, traps and trap wire can be utilized about two feet above the floor. The trap wire can be glued to each panel. If the interior wall insulation is used with a woven wire retainer, the trap wire can be weaved into the woven wire with two traps at each corner. Another common wire should parallel the trap wire to facilitate troubleshooting the loop.

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Continued . . .

Photoelectric cells could probably be used if deemed necessary to protect the interior of the building. One type has both a transmitter and receiver in the same case and a reflector is used to complete the beam circuit. The other type has a separate transmitter and receiver. Also the transmitter beam is sufficiently wide on some units, that two receivers can be used with one transmitter.

If a chain-link fence surrounds both the the tower and building, there is equipment that can be used to detect climbing or cutting the fence. The wiring is usually in conduit with the sensors from ten to twenty feet spacing. This senses vibration to the fence and trips the alarm. This type of detector though, if isn't installed and adjusted properly, can cause false alarms. Either a shunt lock at the gate or a timed delay entrance can be used to open the gate and the building door to turn off the equipment.

One advantage of having the chain-link fence protected is an earlier break-in can be detected. Also, if the tower is within the fence, this would detect somebody attempting to climb the tower. In the case of multiple towers with fences, this protection could be extended to these fences. If wiring is not feasible, a wireless radio transmitter at each tower base would be feasible if 110 volts AC were available. This equipment is rather reasonable in price and has a quarter mile of range.

The next thing to consider inside of the building is some sort of fire alarm reporting. This can be combined with burglar alarm, but would be better to be a separate control and circuit, with a separate indication at the control point. With a dual channel tape transmitter, or even a digital dialer with up to eight channels going to a central station. Probably the best type of fire detector would be the ionization type detector. This picks up products of combustion and would probably detect transformer burning before fuses or circuit breakers would trip. Secondly, a rate of rise temperature sensor is a simple trouble free type of detector. With a quick rise in temperature, it will trip. It will also trip on a predetermined high temperature. These devices come in a 160 to 210 degree range.

Other type of detectors that could be utilized would be high water alarms, high or low temperature detectors and emergency power on. Caution must be used in using electronic type controls and detectors that could be useless in high RF power environments.

In protection of studio and control room facilities, the same type of activation can be used as was in the transmitter or remote facilities. Since the environment is less hostile, various space protection devices can be used. The most reliable, is the passive infrared device (PIR). Basically PIR devices have an optical system connected to detectors in fan shaped segments. When a warm blooded body passes from one segment to another segment the PIR goes into alarm. This equipment has a range of from 50 feet in a 90 degree dispersion to range of a 100 feet with seven to eight degree dispersion. Some detectors have a second look down pattern to catch anyone trying to crawl under the pattern.

Exterior glass can be protected by a piezo-electric device that detects breakage of the glass and is mounted directly on the glass. Also there is a sound detector that is mounted on the ceiling and protects abut ten or twelve feet of glass. Finally there is the obsolete application of lead foil on the windows. This take practice to apply properly and is at the mercy of window cleaners over a period of time.

The next thing we will take up is the reporting devices. These are connected to the output of the control. And in the case of an alarm bell or siren, the power to operate the bell or siren is taken from the control panel. Most sirens are of the electronic variety using 30-50 watt speakers for the sounding devices. It is suggested to use a speaker inside the building and one or two on the outside of the building. Of course in an isolated remote location a sounding device has little value if there are no residences nearby. It does tend to chase the amateur break-in operator away though. The exterior speaker should be trapped to prevent cutting the wires to, or detroying the speaker.

Station Security . . . (continued)

The next reporting device would be to annunciate at some remote location such as a local police or Sheriff's office, the control studio or possibly at an employee's residence.

The first means of interconnect is the direct line that has been, and still is used for connection to the police station or telephone answering services. This is a fail safe type of service and an indication at the receiving end detects if the line is faulty or that an actual alarm is received. This is also the most costly, with a one time charge of up to nearly two hundred dollars and a monthly charge of two or three dollars per quarter mile.

The second method is a tape or electronic dialer that is connected to the telephone at the remote location. This device can dial up to four or five different numbers sequentially and by voice announce: "This is an intrusion at (Name) location." This an endless loop tape that dials all of the numbers on the tape and then stops at a conductive coating on the tape. This way, if four or five numbers are on the tape, the odds are one of the called locations will answer the telephone. Tape dialers are usually dual channel, so two different type of message can be transmitted. Example would be intrusion on one channel and emergency generator on the other channel with a different set of numbers called on each channel. Electronic dialers are all electronic and use a digitized voice for the announcements. Electronic tape dialers are more costly but can be programmed in the field.

Another type of dialer dials a dedicated number that activates a receiver which handshakes with the dialer, then the dialer electronically identifies itself and gives up to eight different codes. Each of these codes can be given a certain alarm condition. The receiver then tells the transmit dialer to hang up. The receiver has a readout of the dialer (customer) number and the alarm code. This information can also be directed to a printer.

There are a number of Central Stations that receive these calls on a 800 type of number and then the Central Station will call the predetermined locations that could take care of the alarm. This could be the local police force or a company employee. This type of service is very cost effective with the monthly service costing from 15-20 dollars per month.

The last method of reporting would be to use your own remote control equipment. This would be especially true if you are on a twenty four hour schedule. You could use a low frequency tone on your metering feedback circuit and then decode it at the control point. This should work on either Telephone line or STL remote controls. Encoder oscillators can be purchased for from thirty dollars up and the decoders are around fifty dollars. You could use multiple tones and decoders to activate different alarm functions such as power failure, intrusion or fire. The decoders could activate a relay which in turn could activate a light or Sonalert device.

Tips From The Field

Equipment Technical Tips
From Radio Guide Readers

System 90 Modification

WJAG/KXEL Radio
Norfolk, NE - (402) 371-0780

We had recently gone to a new satellite format and had encountered a problem with our automation system entering the satellite breaks at the proper time. When the satellite DJ's would start the break, they weren't consistently leaving enough time for our satellite receiver to trigger the automation system. It would sound good 90% of the time.

However, the other 10% of the time, the DJ's would talk over the tones, causing us to receive just two syllables of the next event. It was very annoying on our end. The satellite service refused to do anything different to help us, and the receivers were switching as fast as they were designed to ... and of course, they wouldn't give us the schematics. You know the old story; confidential information and all that. We were faced with solving the problem ourselves.

The satellite people said to build a circuit to trigger on the leading edge. This sounded fine except who needs another box and power supply around. I'd always felt I'd had enough of those boxes.

We were using a Harris System 90 as our automation system. We had modified a cart source card to accommodate the satellite service. This card triggers the EOM on the trailing edge of a contact closure. The satellite receiver people have a built-in delay circuit that can't be adjusted to trigger fast enough and it holds the relay too long. So I modified the automation cart source card to trigger on the leading edge, gaining us 10ths of a second, but just long enough to cure the problem.

The modification consisted of cutting the PC board at pin-9 of U6b, on the cart source card and inserting a 1 uF capacitor between pin-9 and the junction of R6 and C4. This causes it to switch much faster without the addition of yet another black box.

Marti RPT-30 TechTip

If you have an older Marti RPT-30 that's 2-3 years old, contact Marti for the latest update. The updates make your older RPT-30 better able to withstand the rigors of remotes and increase the RF stability. Changes include a new I/O filter cover plate, more RF grounding to strengthen the input connection and eliminate spurious emissions, a new frequency switch and circuit on the modulator, a meter update to calibrate compressor indication and a change of the bias chip capacitors on the multiplier board to improve RF stability.

All of these changes and a complete re-proof are just $75.00. Give us a call at Marti (817) 645-9163.

Contract Guide

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BBS Listing

Broadcast Oriented BBS Listings

201 769-1779
Visions Infoline II
Sysop(s): Jeff Morgan
Plainfield, NJ
BBS Type: Wildcat - Speed: 3/12/24
PC-Pursuit Code: NJNEW

201 857-8880
Rockboard
Sysop(s): Adam Curry
Verona, NJ
BBS Type: Hermes (Mac) - Speed: 3/12/24
PC-Pursuit Code: NJNEW

203-438-9908
Orion's Nebula
SysOp: Ward Carpenter
Ridgefield, CT
BBS Type: OPUS - Speed: 1200/2400

205 859-3030
Traveler
Sysop(s): Mike Bennett
Huntsville, AL - Company: WAHR-FM
BBS Type: Phoenix - Speed: 3-2400
PC-Pursuit Code:

206 443-6170
W. Wash. Freq Coord
Sysop(s): Walt Jamison
Seattle, WA
BBS Type: OPUS - Speed: 3/12/24
PC-Pursuit Code: WASEA

206 566-1155
AmoCat
Sysop(s): Rich Langsford
Tacoma, WA
BBS Type: Wildcat - Speed: 3-9600 HST
PC-Pursuit Code:

212 415-3500
HyperCube Systems
Sysop(s): Mike Oswald
New York, NY
BBS Type: PCBoard - Speed: 3/12/24
PC-Pursuit Code: NYNYO

212 645-8673
Communication Specialties
Sysop(s): Rich Brooks
New York, NY
BBS Type: Searchlight - Speed: 12-9600HST
PC-Pursuit Code: NYNYO

214 647-0670
DFW Freq Coord Counc
Sysop(s): Darryl Doss
Allen, TX - Company: SBE Chapter 67
BBS Type: OPUS - Speed: 3-96 HST
PC-Pursuit Code: TXDAL

215 364-3324
Satalink - Sysop(s): Ron Brandt
Huntingdon Vly, PA
BBS Type: PCBoard - Speed: 12/24/9600
PC-Pursuit Code:

216 529-0121
Signal BBS - Sysop(s): Lynn Laymon
Rocky River, OH
BBS Type: PCBoard - Speed: 3/12/2400
PC-Pursuit Code: OHCLE

219 256-2255
Radio Daze
Sysop(s): Mike Shannon
Mishawaka, IN
BBS Type: GAP - Speed: 3/12/2400

301 725-1072
FCC Public Access
Sysop(s): Bob Weber
Suburban DC, MD - Company: FCC
BBS Type: custom - Speed: 300/1200
PC-Pursuit Code: DCWAS

303-341-0129
Colorado Broadcast Frequency Coord.
SysOp: Jeff Brothers
Aurora, CO
BBS Type: OPUS - Speed: 2400

303-949-3253
Master Control
SysOp(s): Lynn Osburn
Avon, CO -
BBS Type: OPUS - Speed: 300-9600v.42

305-828-7909
Telcom Central
SysOp: Ray Vaughn
Miami Lakes, FL
BBS Type: OPUS
Speed: 300/1200/2400/9600HST

315 474-5070
SBE Chapter 22
Sysop(s): Steve Hines
Syracuse, NY - Company: SBE
BBS Type: RBBS - Speed: 3/12/2400

317 935-0531
Allied-Radio World
Sysop(s): Bob Groome
Richmond, IN - Company: Allied
BBS Type: Michtron - Speed: 3/12/2400

402 289-2515
KFMQ 102 Connection - Sysop(s): Dan ?
Lincoln, NE - Company: KFMQ Radio
BBS Type: WWIV - Speed: 1200/2400

404 320-6202
AV-Sync Atlanta (tm)
Sysop(s): Bill Tullis
Atlanta, GA
BBS Type: PCBoard - Speed: 12-9600HST
PC-Pursuit Code: GAATL

404 982-0960
Rock & Roll Atlanta
Sysop(s): Bob Helbush
Atlanta, GA
BBS Type: PCBoard - Speed: 1200-2400
PC-Pursuit Code: GAATL

407 239-2607
Producer's Circle
Sysop(s): Skeeter Durham
Orlando, FL
BBS Type: GT Power - Speed: 3/12/2400

407 649-9834
Electronic Arts Info
Sysop(s): Jeff Alwin
Orlando, FL
BBS Type: QuickBBS - Speed: 3/12/24

408 985-8675
KOME Silent Side
Sysop(s): Greg Argendeli
San Jose, CA - Company: KOME-FM
BBS Type: Michtron(Atari) - Speed: 300/1200
PC-Pursuit Code: CASJO

412 981-3151
Mabel's Mansion
Sysop(s): Charles Ring
Sharon, PA
BBS Type: OPUS - Speed: 12-9600HST

414 771-3032
Second Opinion
Sysop(s): Mark Timpany
Milwaukee, WI
BBS Type: Wildcat - Speed: 12-96HST
PC-Pursuit Code: WIMIL

415 391-2657
NCFCC - Sysop(s): Tim Pozar
San Francisco, CA
Company: Northern Calif. Freq. Coord. Cmte.
BBS Type: RBBS - Speed: 3-2400
PC-Pursuit Code: CASFA

415 571-6160
Production World
Sysop(s): Wes Dorman
San Mateo, CA
Company: Film/Tape World Magazine
BBS Type: Red Ryder Host - Speed: 3/12/24
PC-Pursuit Code: CAPAL

415 641-4373
Information Radio
Sysop(s): Dave Evans
San Francisco, CA
BBS Type: Wildcat - Speed: 3-2400 v42
PC-Pursuit Code: CASFA

419 228-7236
Black Hole BBS
Sysop(s): Fred Vobbe
Lima, OH
BBS Type: TBBS 2.1 Multiline (8 Lines)
Speed: 3-14.4

501 753-6536
N.L.R.-80
Sysop(s): James Padgett
Little Rock, AR
BBS Type: Spitfire - Speed: 12-2400

518 283-4067
Northeast Networks
Sysop(s): John Nelsen
Albany, NY
BBS Type: PCBoard - Speed: 12/24

601 373-0160
Net-Works
Sysop(s): Herb Jolly
Jackson, MS
Company: Myers Bdcst Svcs/J&J Software
BBS Type: Galacticomm - Speed: 1/24

BBS Listing

Broadcast Oriented BBS Listings

602 438-0459
CRL
Sysop(s): Hank Langlinais
Phoenix, AZ
Company: Circuit Research Laboratories
BBS Type: RBBS - Speed: 12-2400
PC-Pursuit Code: AZPHO

602 482-1001
Catalyst
Sysop(s): David Kidder
Phoenix, AZ - Company: Take 3 Inc.
BBS Type: TBBS - Speed: 3/12/24
PC-Pursuit Code: AZPHO

602 872-9148
Broadcasters BBS
Sysop(s): Mark Shander
Phoenix, AZ
BBS Type: RemoteAcc. - Speed: 3/12/2400
PC-Pursuit Code: AZPHO

608 274-7776
Communications Exch
Sysop(s): David Willow
Madison, WI
BBS Type: GT Power - Speed: 12-9600HST

616 530-0821
Trillion - Sysop(s): Dick Castanie
Grand Rapids, MI
BBS Type: Wildcat - Speed: 3/12/24

617 439-5699
Boston CitiNet - Sysop(s): JAE/Koch
Boston, MA
Company: Applied Videotex Systems
BBS Type: Yellow - Speed: 300/1200
PC-Pursuit Code: MABOS

619 298-4027
So. Calif. MediaLine
Sysop(s): Steve Tom
La Jolla, CA
BBS Type: PCBoard - Speed: 12/24/96H
PC-Pursuit Code: CASDI

703 455-1873
VideoPro
Sysop(s): Tom Hackett
Burke, VA - Company:
BBS Type: PCBoard - Speed: 3/12/24
PC-Pursuit Code: DCWAS

703 538-6540
East Coast Pub Net
Sysop(s): Charlen Kyle
Suburban DC, VA
BBS Type: PCBoard - Speed: 3-2400
PC-Pursuit Code: DCWAS

707 553-8452
KDA Message System
Sysop(s): Keith Davidson
Vallejo, CA
BBS Type: PICS - Speed: 3-2400

713 997-7575
Ed Hopper's - Sysop(s): Ed Hopper
Houston, TX
BBS Type: PCBoard - Speed: 3/12/24
PC-Pursuit Code: TXHOU

713 855-4382
Cloud Nine
Sysop(s): David Armstrong
Houston, TX
BBS Type: PCBoard - Speed: 3-96HST
PC-Pursuit Code: TXHOU
Second node at 859-8195.

713 974-3912
SBE Chapter 105
Sysop(s): John Harvey
Houston, TX - Company: SBE
BBS Type: PCBoard - Speed: 3-12-2400
PC-Pursuit Code: TXHOU

717 731-8966
Cat's Castle
Sysop(s): Dale Fedorchik
Harrisburg, PA
BBS Type: Wildcat - Speed: 3/12/2400

719 634-5661
ColoSprgs Broadcast
Sysop(s): John Anderson
ColoradoSprings, CO
BBS Type: TBBS - Speed: 3/12/2400:

800-766-1720
Idiot Box BBS
SysOp: Michael White
Hemet, California
BBS Type: RBBS - Speed: 1200/2400

800-283-5313
The Spin-Off BBS
SysOp: Michael White
Hemet, California
BBS Type: RBBS - Speed: 1200/2400

801 967-9716
Planet Vulcan
Sysop(s): Chuck Condron
Salt Lake City, UT
BBS Type: Wildcat - Speed: 3-14.2KHST
PC-Pursuit Code: UTSLC

804 393-6390
Tidewater Media Link
Sysop(s): George Randell
Portsmouth, VA
BBS Type: PCBoard - Speed: 12/2400

804 550-3338
Flamethrower
Sysop(s): Jeff Loughridge
Richmond, VA
BBS Type: Binkley/OPUS - Speed: 3/12/24

804 973-8235
Broadcasters BBS
Sysop(s): Pat Wilson
Charlottesville, VA
BBS Type: PCBoard 12 - Speed: 3/12/24

806 352-2482
Radio Online
Sysop(s): Ron Chase
Amarillo, TX
BBS Type: PCBoard - Speed: 12-96HST
Second node at (806) 352-9365.

813 527-5666
St Pete Pgm Exchange
Sysop(s): Bill Blomgren
St Petersburg, FL
BBS Type: PCBoard - Speed: 12-96HST

818 248-3088
Hot Tips
Sysop(s): Mike Callaghan
Glendale, CA
BBS Type: Wildcat - Speed: 1200/2400
PC-Pursuit Code: CAGLE

818 363-3192
Call Sheet
Sysop(s): Wayne Parsons
Los Angeles, CA
BBS Type: TBBS - Speed: 300/1200
PC-Pursuit Code: CAGLE

818 567-6564
Hotline
Sysop(s): Jon Badeaux
Glendale, CA
BBS Type: PCBoard - Speed: 12-19.2HST
PC-Pursuit Code: CAGLE

916 338-5227
KBBS
Sysop(s): Mark Stennett
Sacramento, CA
BBS Type: QBBS - Speed: 3/12/24
PC-Pursuit Code: CASAC

916 646-3600
FM102
Sysop(s): Les Tracy
Sacramento, CA - Company: KFSM Radio
BBS Type: QuickBBS - Speed: 300/1200
PC-Pursuit Code: CASAC

916 646-9358
Scratching Post
Sysop(s): Stacy Rothwell
Sacramento, CA
BBS Type: QuickBBS - Speed: 3/12/24
PC-Pursuit Code: CASAC

916 728-5700
Entertain-Net
Sysop(s): Les Tracy
Citrus Heights, CA
BBS Type: TBBS multiline - Speed: 3/12/24
PC-Pursuit Code: CASAC

918 437-9004
The Radio BBS
Sysop(s): Clark Dixon
Tulsa, OK
BBS Type: QuickBBS - Speed: 2400

919 481-2947
Recording Studio
Sysop(s): Greg Nowak
Cary, NC
BBS Type: WWIV - Speed: 3/12/24
PC-Pursuit Code: NCRTP

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Broadcast BBS

By Mark Shander - KNXV/Fox-15
Phoenix Arizona - (602) 243-4151

Last month I promised a review of a new 9600 baud modem/FAX card combination, a product originally brought to our attention by Mike Callaghan from KIIS-FM in Los Angeles, who is also the system operator (SysOp) of Hot Tips BBS (four nodes available at 1-818-248-3088). This month, it is my responsibility to give a poor review to a product that essentially has great potential, but appears not to be able to live up to its promises.

The product is the SpeedModem Combo, manufactured by CompuCom Corporation in Sunnyvale, California. The SpeedModem Combo promises 9600 baud data communications when connected with other SpeedModem Combos over standard voice-quality telephone lines. The card is supposed to be capable of sending and receiving Group III FAX transmissions (std. FAX) at 9600-baud.

I contacted CompuCom, and made arrangements to purchase a SpeedModem Combo for The Broadcaster's BBS under their SysOp promotional deal. Under the terms of the discounted purchase, I was obligated to promote their product on the opening screens of our BBS. I also requested that CompuCom provide a loaner, which they did, so that I would have another SpeedModem Combo with which to evaluate the unit's 9600 baud capabilities.

By the time both SpeedModem Combo units arrived, another BBS in Phoenix already had a SpeedModem Combo installed and operating...sort of. The SysOp, who is a user on our system, asked if I would like to use his system to test data connections at 9600 baud. We were both eager to see how this product would perform. The regular price of the SpeedModem Combo was $279. It would have been a "deal" if it had performed as advertised.

Prior to calling the local BBS to test the modem for data transfer, I decided to test the FAX capability of the card. I sent a FAX to Ken Gallatin, the Placement Director at United Broadcast School in Phoenix. Ken received the FAX, which was sent at a speed of 7200 baud. I sent several other FAX transmissions to Radio Guide readers in Phoenix, and was never able to send a FAX at 9600 baud.

I asked Ken to send a FAX to the SpeedModem Combo, so that I could test the FAX receive speed. The SpeedModem Combo refused to recognize Ken's FAX machine. It kept triggering the FAX software to print a message on the screen indicating the SpeedModem Combo was not receiving a FAX call...even though it really was. As a matter of fact, the FAX software scared the heck out of me. When it determined it was not receiving a FAX call, it started writing to my hard drive! It marked off almost every available space on my hard drive as being unavailable.

I suddenly "lost" 10 megabytes of space! Thank God for PCTools 6.0 from Central Point Software. PC Tools fixed the problem, and revealed that no existing data on the hard drive was lost. It restored my free space. I repeated the FAX receive experiment a number of times using different software settings, until I was convinced that the SpeedModem Combo was not going to receive a FAX while it was in my computer.

Since I had two SpeedModem Combo units, I tried swapping the boards and repeated the FAX tests with the same results. The two units were almost identical.

The data test was equally disappointing. Although downloading a file took place at a reasonable rate (not quite as efficient as other 9600 baud modem protocols, though), uploading a file was unusually slow. I changed a number of values in the initialization string and, following the documentation included both on disk and in the operations manual, had poor results connecting to the local BBS.

Since CompuCom has established a support BBS in California, I decided to try using their BBS as a test site for file transfers. The data transfer rate while downloading was almost 850cps (characters per second). The data transfer rate when uploading was unknown; I was never able to successfully upload a file, using either Combo unit, connected to the support BBS.

I called the local BBS that was using a SpeedModem Combo one more time The file transfer rate during a downloading session was 350cps; uploading never exceeded 48cps. I admit it is likely that something was not set correctly on the local BBS, but the support system in California, which is operated by CompuCom Corporation, should have yielded excellent test results. It did not.

Both SpeedModem Combo units have been returned for a full refund. The promotional material for the SpeedModem Combo is very good. However, the units I tested did not live up to the expectations raised by the advertising slick. CompuCom recently announced on the support BBS that an updated firmware chip would be made available by the time you read this column. If the new replacement chip, which is being sent to all SpeedModem users free of charge, takes care of the problems mentioned in this review, the product is well worth the $279 investment. We'll have to wait and see.

Business Guide

Products and Services for the Broadcast Industry

Business Guide

Products and Services for the Broadcast Industry

Computer Connection

By Kelly Klaas
Twin Falls Idaho - (208) 733-7512

The first thing I need to do is recap some of the past columns (already?) to tie up some loose strings. First, for those of you interested in the ORCAD schematic drawing program I wrote about a couple of issues back, I have the address. Write to ORCAD, 3175 N.W. Aloclek Dr., Hillsboro, Oregon, 97124-7135. The phone number is (503) 690-9881.

For those of you still using the AT&T 6300 (like I am) and wish to add a 3.5 inch disk drive, I believe I have found the easiest way to do it. I got the information from the AT&T Computer Users Group Newsletter, PO Box 410321, San Francisco, CA 94141-0321. It was sent to me by Ed Ely of KNEW/KSAN in San Francisco. Newsletter subscriptions for non-members outside the bay area are $12 per year. I read the 16-page newsletter from cover to cover and got a lot more than $12 worth of information. If you are a PC-6300 user, this newsletter is a must-have. Many thanks, Ed.

First, if I read it correctly, a 1.43 ROM BIOS upgrade is available through the group for $15. Also, you must be using MSDOS 3.1 or higher. You can then plug a 3.5 inch diskette drive into the existing built-in floppy controller, but you can use it only in the low-density mode (720k). However, if you want to spring for an extra floppy drive controller, you can use it in the high density mode (1.44meg).

Remember when I was telling you about the MIT computer I was using on our Format Sentry FS12-C automation switcher? I finally swapped out that computer and got another one. It is actually the same model but in a nicer, more appealing box. I started having all kinds of trouble with the diskette drive. It got to the point where it wouldn't load the FS12-C programming, nor would it even boot up with the DOS diskette. I have had a little trouble with the new computer, but so far all I have been able to trace it to is a dirty read head on the floppy drive.

There were some tense moments when I started having the same error reading on the screen about a week after I got the new computer...and who knows, by the time you read this, I might have gotten fired for throwing it through our big plate-glass windows in the front of the station. I know you never feel that way, but I do sometimes.

The main problem I have had with the programming that comes with the Format Sentry switcher is that from time to time, it will not advance to a music fill sequence area that starts with event number 4000. I called Bob Owen at Sentry Systems and he was stumped as well. He decided to send me another diskette of the program. We decided there was a possibility the program on the original diskette may have had a glitch or some such thing. I will keep you posted on how this turns out.

I have recently read about an electronic component that most manufacturers now put in nearly all electronic equipment made. It is called a "critical detector." Maybe you have read about it. I am quite sure if you have been engineering for any time at all, that you have experienced its effects. A critical detector can actually sense the degree of "need" for that particular piece of gear, and the more it is needed, the sooner it will become inoperative. If you start to beat on it, then every other sensor in every other piece of equipment near it will also sense this and make that gear inoperative as well. There is no way to repair or replace these "critical detectors." You just have to wait until everything is calm and it might start working again.

I have recently run across a nifty (nifty?) little program, furnished by Motorola, to its distributors. This program allows you to find a semiconductor device using the parameters you are looking for. If you are a builder, this program would be a slick addition. I have a friend who is a Motorola distributor and I took a look at this program with him. Therefore, I don't know if it is available to the general public or not.

Nevertheless, I want to tell you what it will do. You can first choose, from a menu, the device you want to find. There are two separate programs. One for discreet parts, and one for IC's. However, it only covers semiconductors made by Motorola (of course). You can choose from Diodes/Rectifiers, Optoelectronic devices, Power Modules, Power Transistors, RF Devices, Sensors, Small Signal Devices, Thyristors and Zener/Transient suppressors. From that menu, your choice takes you to a sub-menu with all the categories available for the device you chose.

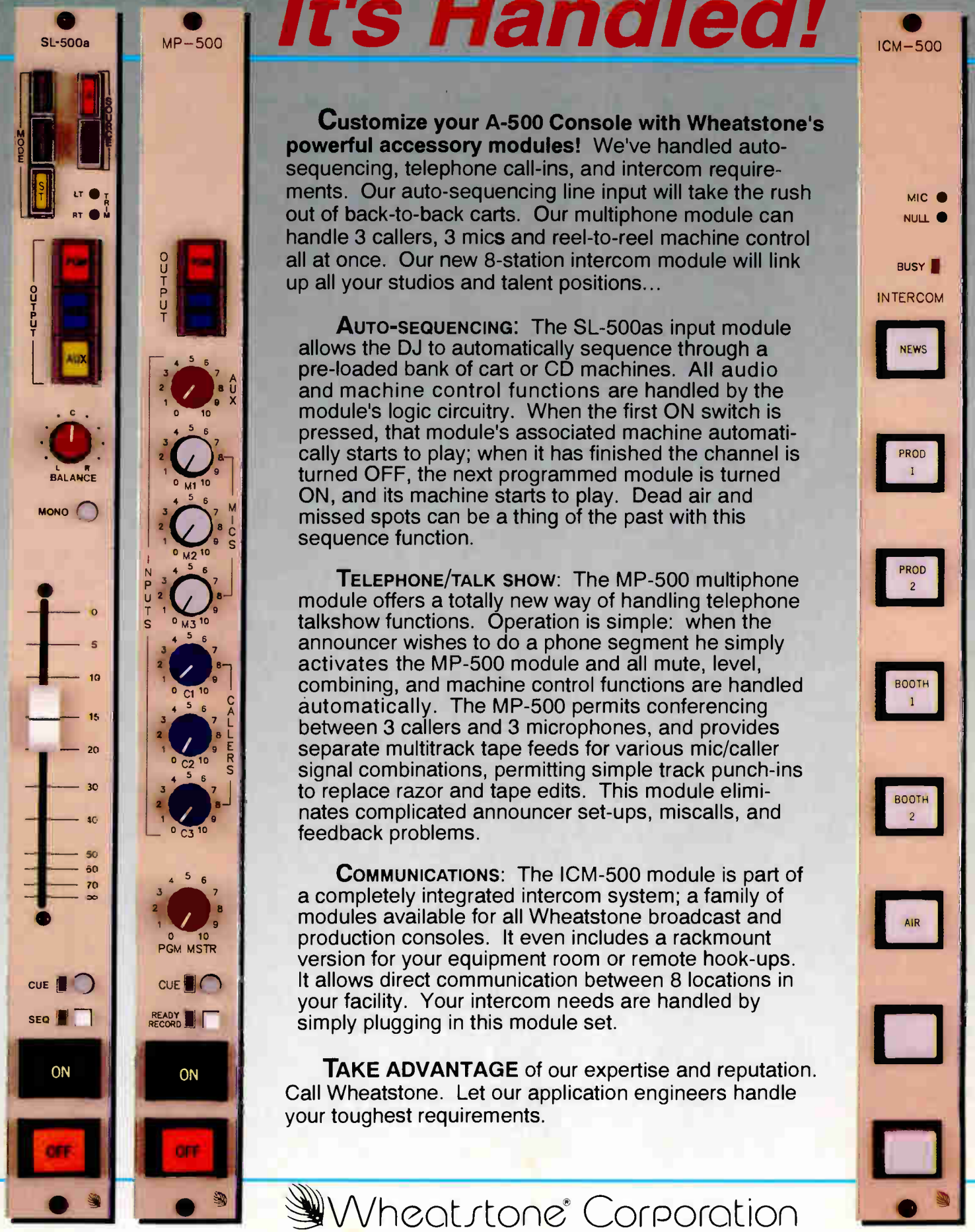
When you make your choice from there, you can decide how you want to search for your desired item. You can search for Parameters, Device numbers, Partial device numbers, Complementary Device numbers, Display Military Devices only, Surface mount only and Best Device First only.

After you make your choice, the program will display all the devices that fall within your search parameters. You can then decide which one you want, choose it from the list, and it will give you all the specs for that device, including the cost.

If you build gear from scratch and often need to find a semiconductor that will do just what you need it to using certain parameters, this would be the way to fly. You might want to contact Motorola to see if the program is available to other than distributors.

I also want to put out another appeal for your ideas. If you have some slick programs that the radio engineer could get some use out of, let me know so I can tell others what it is and how to obtain it. Also, if you use computers in a bizarre way for engineering purposes, let me know. You may not think it is interesting to others but let's let them decide.

It's Handled!



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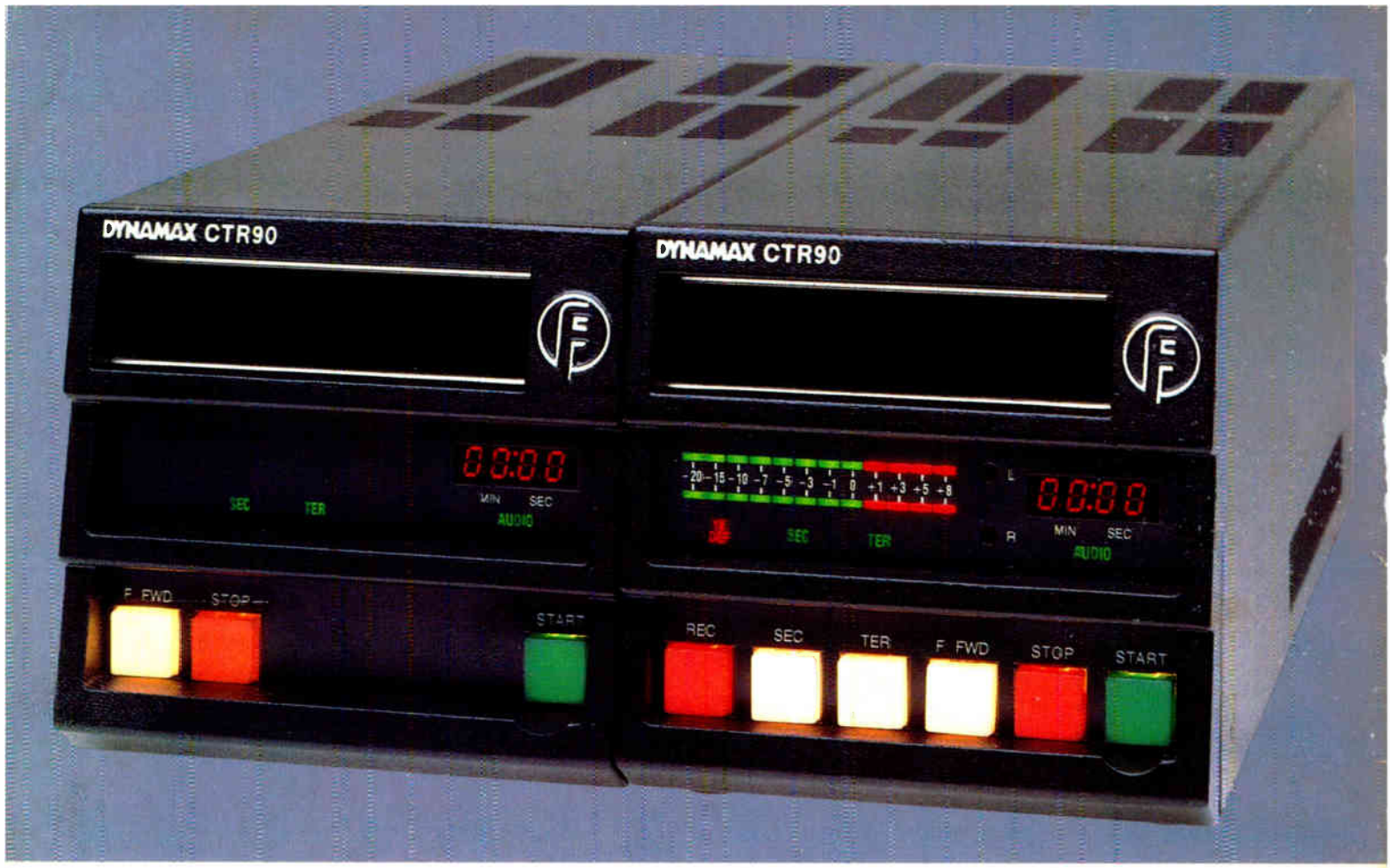

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