Radio Guide

Radio's Technology Magazine

April - 1991

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Cover Photo

Courtesy of
Audio Broadcast Group
Grand Rapids, MI

Watch For The New

Equipment Guide

Coming Soon

More After This!

Guest Editorial

Frederick Baumgartner - Indianapolis, IN

Why The SBE? - A Personal Opinion

Yesterday, over lunch, the CE of one of the TV stations in our group (who happens to live in a city where the local SBE chapter is just a bit of a disaster) asked why I believed so firmly in the organization.

Like many people asked about a thing which has become a matter of faith, I don't think my answer was all that great. Surely someone had written a brilliant piece on the matter, and surely I had clipped it. But alas; no such document occupies my files. I can understand why. It is more than a bit presumptuous on the part of any technical person to commit such words to paper as if they could speak for the profession. I do so now only on behalf of myself, in the hope that those who are not active in the SBE will find some reason in these words.

I never believed that I could make a living in broadcasting (I believe my mother is still waiting for me to get a real job). Over time, I had some great "elmers" who passed on the black arts of directional antennas and video transmission. They also made me see that not only could this be a real job, but that this is an honorable profession, and good for our society. One brought me to an SBE meeting, and often I remind myself when doing the bull work of the society that I am only beginning to repay the debits I incurred that day.

I look at pictures of my predecessors and see respected men in suits. I see my peers, now far better educated and involved in a much more complex, competitive, and demanding field, and see what some wish to call a "necessary evil." Technicians who are easily hired, fired or given impossible tasks all to often by non-technical people coming through the revolving door of the now common quick-turn-over unregulated ownership. Like the Sunday trip to church, it is the SBE meeting that often renews my faith in this profession and returns my perspective.

I enjoy a certain camaraderie with those who also ply this profession, and the SBE meeting serves as an excuse for that gathering of souls. I can't remember a meeting where I didn't learn of some news I found helpful or interesting, or located a part or technical information.

The SBE helps careers. It is good to study for the certification exams. The encouragement I received after writing in newsletters encouraged me to write for bigger and more prestigious magazines. I have learned of jobs I was interested in, and jobs I shouldn't be interested in, and saw others find employment or better opportunities.

I know that I live to work behind the microphone and camera. I want respect for what I do and know. I want to have an impact on the course of this business and this profession. I see the SBE as the best hope on all fronts.

In simple basic matters, the SBE has provided affordable life insurance as well as the framework to learn my profession's secrets and skills. My job is made easier by the sponsored frequency coordination. I can (and the folks who hire folks like me) can separate the sheep from the dogs via the certification program (being certified shows that you are active in the industry, care enough to jump through the hoops and can pass the basic technical tests).

I am mystified by one major anomaly. My high school and college peer group became largely lawyers, doctors, engineers and scientists. These people are very bright and motivated, yet the average broadcast engineer comes in somewhere in the middle off the pack in terms of raw intelligence, abilities and work ethics.

My point is not that we are surrounded by incompetents, but that we as a profession are among the more competent, yet we often do not treat ourselves in a professional manner.

I believe we each have a choice, either to go it alone, to be the engineering cowboy, or to make this a profession.

Each engineer that can not find the time, can't afford the paltry dues, believe themselves too good to ever benefit from or help the SBE, or remains uncertified weakens this profession.

Frederick M. Baumgartner
Chapter 25 Indianapolis, Indiana

It's Your Turn Now

I've had my say ... so from now on, we'll open this page to our readers. For the next few months (and maybe indefinitely), Radio Guide will make this page available to any reader who wishes to express a viewpoint or just register a gripe.

Of course, to take up the remaining space on this page, I may be contributing my two-cents worth from time to time. But, I'm hoping that there will be enough interest in writing for this page so that we'll have a fresh perspective on the industry each month.

Ray Topp - publisher

Questions? Comments?

Fax to: (507) 280-9143

Radio Guide Forum

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

Letters to the Editor

Get Certified

I was prompted to write by a comment Mr. Seavy made in his letter to Radio Guide (Feb-91), the one, I assume, was directed at the SBE Certification program.

I would never suggest that an uncertified engineer was incompetent. I would support more strongly the notion that a certified engineer is competent.

Originally, I opposed the SBE getting into the certification business, but with the demise of the First Phone (alas) the non-technical types, managers, salesman and even DJ's need some way to separate the sheep from the goats - and now I support the program fully.

Perhaps the First Phone has lost its credibility as a good guide of competence but, having taken both the Broadcast Engineers and Senior Broadcast Engineer SBE tests, I will vouch for them as measures of skill. I would not claim that getting certified will yield a raise, but SBE surveys indicate that certification is worth about $6,000 in annual salary.

At this time, professional development programs such as the SBE's are the only game in town. I am glad that Mr. Seavy finds his career rewarding, and if he and others like him want more recognition from the non-engineering world, come join us.

Thomas M. Padwa
Capital Cities/ABC
New York City

The Desert Chief Responds

The "desert chief" feels that he must respond to Gary Kneisly of WNVW (RG Feb-91). Apparently the gentleman misunderstood the thrust of my comments since, of all people, I am a major fan of progress. Unfortunately, NRSC is too little, too late.

If Mr. Kneisley spent in the neighborhood of $1000 for his NRSC upgrade, it is obvious that his station was using the very processing that brought on the call for the bandwidth restriction in the first place. My Optimod 9100 only required about $300 for NRSC compliance, but then it had acceptable output filtering to begin with. Some of the other "splatter boxes" out there were not so adaptable.

This "desert tech" has indeed heard it all and laid hands on it all, including the wideband demos along with the various stereo systems. Some of it sounds amazingly good - but to what end? The dial is still cluttered, most AM stations sound like a telephone, and the idea that receiver manufacturers are "someday" going to produce wideband radios is pure bovine scatology.

Delco, for one, has made no secret of the fact that this whole push for NRSC was to throw the ball into the broadcaster's court. Privately, officials admit that they never expected any kind of industry standards or compliance and that they would be off the hook forever. Even though NRSC is a reality, Delco has announced no plans for compliant wideband radios.

But Mr. Kneisly's comments are typical of management (as opposed to technical) in his hope for NRSC to be the Savior of AM. If AM broadcasters are looking for reasons for the decline of their stations, they do not need to go snooping around in the engineering shop. I would suggest a stroll through the programs director's office, or perhaps a review of the station's overall business practices.

Are your program-length or paid religious programs doing all you expect? And if that is all in order, how about checking the money spent on transmitter site rent? Is the land worth more than the radio station? There are many reasons for the decline and fall of AM, not the least of which is poor audio quality-dictated by the laws of physics, not lack of NRSC.

Progress? I am all for progress. If I thought NRSC was "just the thing" to save AM, it would find no greater supporter than myself. But this magic bullet upon which owners and managers are relying for salvation, is a crock. The final question that comes to mind:" Does AM radio even deserve to be saved? What does it provide?

John M. Higdon
AKA The Desert Chief
San Jose, California

Help Wanted

Inside Sales Supervisor Harris/Allied

If you believe in the future of Radio and have 3 years successful background in sales of broadcast equipment, Harris/Allied is now recruiting.

Position: Inside Sales Supervisor
Location: Richmond, Indiana
Contact: Tom Harle
Phone: (317) 962-8596

Absolute confidence will be accorded all applications and resumes, which should include income history and requirements. Only serious and qualified applicants should respond.

(continued on page-6)

Radio Guide

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Radio Guide Forum

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

Maintenance Engineer

International Radio Broadcasting Company located in New York City seeks a Maintenance Engineer to assemble, install and maintain broadcasting and recording equipment. Requirements are a minimum of 5 years experience in a radio broadcast studio environment. Must be familiar with the repair and maintenance of mixing consoles, audio tape decks, turntables, CD players and other analog and digital devices. SBE Certification or FCC license desirable.

Excellent benefits offered. No phone calls please. Salary in the mid-30's. Send resume and cover letter to:

Radio Free Europe/Radio Liberty
Attn: Personnel Department (ME)
1201 Connecticut Ave. NW
Washington, DC 20036

Non-Com Donations

Handicapped radio announcer seeks donation of any and all types of studio equipment for a Class-C non-commercial FM station to be set up in the near future. Will accept both working and repairable equipment.

Dennis J. Wentzloff
Route 2 Box 212
Savannah, TN 38372
901-925-9236

Schematics Wanted

Harris Cart Deck & Spotmaster Console

Need schematic for Harris mono 90-2 cart recorder model #994-7997-001. Also need schematic for Spotmaster model 4BEM50 mixer board.

Jerome Orr
KLSC Radio
Lubbock, Texas
Fax 806-762-4033

AKAI Tape Deck

We just purchased an AKAI model GX-747 4-track deck. If anyone has a copy of the schematic for this deck, give us a shout. I need to adjust the pre-amp output on the unit.

Dave Cooper
WGRY - Dewitt Radio Inc.
6514 Old Lake Rd.
Grayling, MI 49738
517-348-6171
Fax 517-348-6181

Gates BC-1 & BC-5

Wanted: Any information on the care and feeding of Gates BC-5P (circa 1960) and Gates BC-1G (circa 1960) AM transmitters, including any life-extension suggestions.

Mark Smith - WJYY-FM
457 Varney St.
Manchester, NH 03102
603-625-1165

Equipment Wanted

Wanted:Sony MX-16 or MX-20 mixer. Also need a TEAC reel to reel, A7030SL(GSL) or 3300SX; Tascam 32 or 34B & AN20 box; Rek-O-Kut lathe.

John Parsons
10375 Cannas St.
N. Huntington, PA 15642
412-863-9590

Wanted: 2-Bay ERI Roto-tiller FM antenna tuned near 94.5 mHz., and an FM transmitter, 2.5 kW single phase, located in Northeast area. Also need an STL composite system.

Lynn Deppen - WGGY
2743 Perimeter Pkwy.
Bldg. 100, Ste. 250
Augusta, GA 30909
404-855-0555
Fax 404-855-1955

Wanted: Marti Electronics 26 mHz transmitter and receiver. Needed for amateur application. Tube unit OK. Also need an Orban 8100A stereo/SG processor. Fax or write with details on condition of unit and asking price.

Frederick Vobbe - WLIO-TV
1424 Rice Ave.
Lima, OH 45805
419-228-8835
Fax 419-229-7091

Wanted: Composite STL system with receiver and transmitter. Must meet current FCC bandwidth requirements and be in good working order.

Also looking for a low power FM transmitter for booster, 250 to 500 watts. Must be fully FCC approved. Will consider any in good working order.

Need a symetrix 528A microphone processor, good to excellent condition only. Buy or trade.

Bill Harris - KXLT
5350 S. Roslyn St., #210
Englewood, CO 80111
303-741-5654
Fax 303-220-7527

Wanted: X-100 cartridge re-loader, equivalent, or any cart re-loading machine.

Kirk Looney - WMSQ
131 B West Main
Havelock, NC 28532
919-447-0101

Wanted: Tepco J317 or J317M translator for Christian station translating Moody Net. Will buy or would appreciate a donation to non-profit organization. Also need antenna for translator.

Chris Daniel - KENA
HCR #9 Box 28C
Mena, AR 71953
501-394-6654

Wanted: Composite STL transmitter and receiver for use as a back-up.

Dave Seavy - KROC-AM/FM
122 4th St. SW
Rochester, MN 55902
507-286-1010
Fax 507-286-9370

Wanted: Orban FM Optimod 8000A.

Warren Wilson - WJXY
2519 NW Topeka Blvd.
Topeka, KS 66617
913-357-8888

Radio Guide Forum

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

Wanted: A Good used 5kW AM transmitter, tuned somewhere near our 1590kHz frequency. Anything but RCA!

Shawn Michaels - KVAB
P.O. Box 609
Great Bend, KS 67530
316-792-4317

Wanted: 3-foot 950mHz STL dish or Paraflector. Also need a Marti VHF or UHF RTP-2, as well as a Wegener Panda II SPSC receiver for Transtar. Need mainframe and cards #1689, 2046, 2-1610, 1644 and 1630.

Roger Paskvan - WBJI
3516 Mill St.
Bemidji, MN 56601
218-751-3077

Wanted: FM EBS decoder. Must be solid state and in good condition. Will consider encoder/decoder, if price is reasonable.

WWGO
3343 East Silver Springs Blvd.
Ocala, FL 32670
904-622-9550

Wanted: Technics EPA-250 tonearm. Complete assembly needed in excellent condition.

Chuck Poulton - WRUW-FM
11220 Bellfolower Rd.
Cleveland, OH 44106
216-368-2207

Wanted: Working vectorscope desperately needed by local cable station. Must be calibrated and working. State make, model and asking price.

Dave Bancroft - Wisconsin Cable
623 Clermont St.
Antigo, WI 54409
800-688-2001

Wanted: Marti STL-10 dual microwave STL, and a Tascam model M521, 4-track production console.

Also need an Orban XT-2 limiter, and a BE FX-30, FM exciter.

Joseph Barr - WVIS-FM
P.O. Box 487
Frederiksted
Saint Croix, USVI 00841
809-773-2220

Wanted: Scientific Atlanta receiver for CBS/NBC. Need 7.5 and 15 kHz cards. Looking for a bargain, but who isn't?

Jim Cooper - KTEM
301 N. Main St.
Temple, TX 76503
817-773-5252
Fax 817-773-0115

Wanted: 250W RF amplifier to use in conjunction with FM exciter at 93.1 mHz, for emergency backup. Also need used FM translator in good condition. Could use new 4CX250B tubes, as well.

Kurt Browall - KTRZ
P.O. Box 808
Riverton, WY 82501
307-856-2922
Fax 307-856-7552

Wanted: AM Optimod 9100A with NRSC update or AM Optimod 9100B. Also need an ITC mono, premium 3-deck playback with tones.

Rick Keefer - WJMC
1859 21st Ave.
Rice Lake, WI 54868
715-234-2133
Fax 715-234-6942

Wanted: Schafer 901 or 903 automation system.

Dennis Orcutt - KMGL
P.O. Box 14808
Oklahoma City, OK 73113
405-478-5104
Fax 405-478-0448

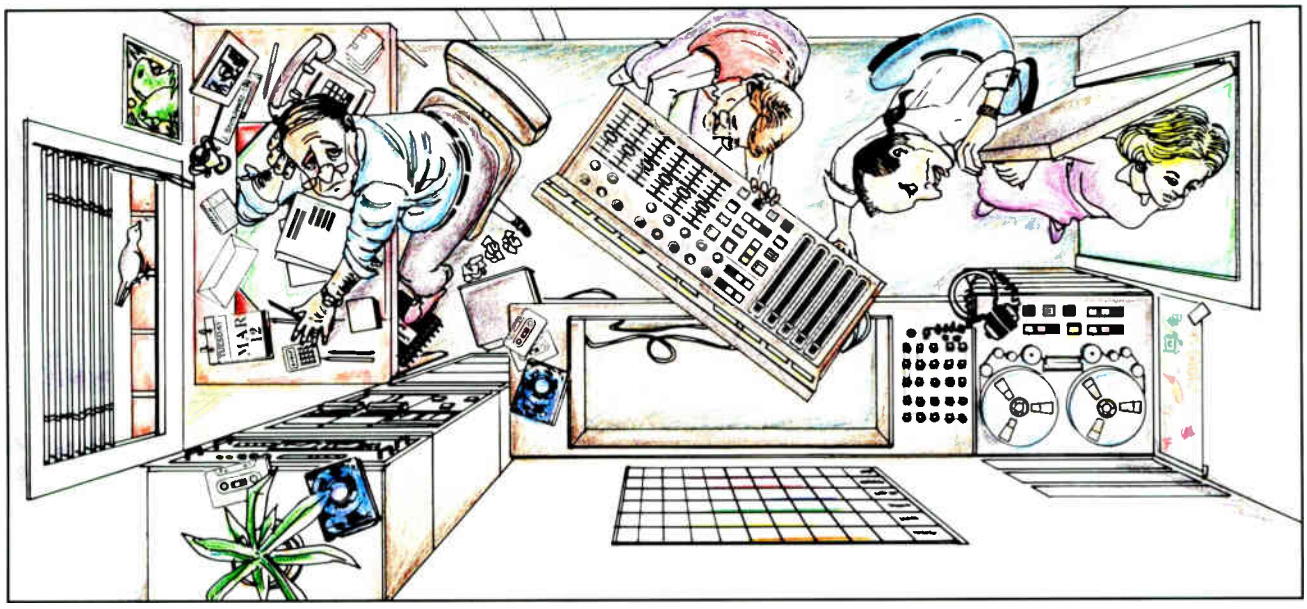
Wanted: 45 & 33 RPM records from the early 50's and 60's. We pay 50-cents to $100 each for records in great condition. We pay 5% finders fee for leads to stations or persons with records we need. We buy $10,000 worth - you get $500. We have references.

Bill Berry
Karavan Broadcast Service
13 Montgomery Place
Conroe, TX 77384
409-273-2801
Fax 409-273-4567

Wanted: Used EBS systems and Transtar gear for ACII format Also need an Orban 9100 or 9000 AM Optimod and a 3-tower antenna monitor.

Jim Stanford - WCNN
209 CNN Center
Atlanta, GA 30303
404-688-0068
Fax 404-688-4262

Watch For The New *Expanded* Equipment Guide Coming Soon



There's no room in your operation for an ordinary production console.

How do you turn a multitrack production room into a *real* profit center? With fast, efficient operation and superb audio quality—a combination you won't get from "beefed up" recording studio boards or on-air boards with a few tacked-on features. Unfortunately, if your budget didn't have room for PR&E's ABX, you had to accept one of these compromises.

Well, not any more. Introducing Productionmixer™, a genuine broadcast production console that costs no more than the board you thought you had to settle for. We think everyone—including management—will agree it's a better choice.

Production Directors are going to fall in love with Productionmixer's full multitrack capabilities, versatile EQ with 3 sweepable bands, built-in dual telephone mix system, auto timer, two stereo effects sends and flexible monitoring/mixdown system. Chief Engineers will appreciate its high RF immunity, powerful CMOS logic control, top-quality components and complete, full-support documentation.

General Managers may well get the biggest thrill out of Productionmixer—when they realize that it delivers PR&E reliability, performance and functionality for no more than a "compromise" production console. As with our highly popular Radiomixer, we've made Productionmixer affordable without lowering our standards.

If you're trying to build an extraordinary production room on an ordinary budget, Productionmixer delivers the creative power you need in an efficient, easy to use format. For more information and your copy of the color Productionmixer brochure, call us direct at 619-438-3911.

Productionmixer

Pacific Recorders & Engineering Corporation
2070 Las Palmas Drive • Carlsbad, CA 92009
Tel 619-438-3911 • Fax 619-438-9277

State of the Art

By Chip Morgan - CMBE
Sacramento, California - (916) 983-9834

DAB is Not the Only New Radio Technology

Even though broadcasters are concentrating on DAB as the solution to the future technical needs of our industry, DAB is not the only alternative. Digital is already changing everything we know about information and entertainment. Competitors for our audience will provide interactive audio and video as well as computer data (read information). Owners of radio and TV stations have a unique opportunity to use the programming talents they have to shape the future of entertainment. Now is the time.

Diversity DAB Transmission

Why don't we use diversity transmission for terrestrial DAB? Since the Eureka system already works well with multiple transmitters, an adaptation of that approach could be used in local markets. Ten or more medium powered transmitter sites for each market would fill many gaps.

Interactive DAB

The chosen DAB system had better be interactive, at least allowing ratings feedback, or we'll never be competitive with the Hypermedia that's coming. Consumers will be their own editors and producers, and we'll have a lot a competition. Advertisers will buy interactive media because they'll get instant feedback on the success of their campaign. How will radio & TV compete?

New Math Could Bring Better Audio and Video

A new branch of mathematics is helping to break down complex waveforms into simpler compacted signals. Wavelet theory apparently can reduce a problem from 10,000 calculations to 100. Wavelets are similar to Fourier transforms, but they also provide information about the location of specific events within an analyzed sample. In audio and video, digital compression and simplification could permit processing of specific attributes of the material, allowing accurate speech and image recognition.

A Combination Pager and Cellular Phone

So you've always wanted a cellular phone with a built-in pager? Well, you're in luck. Now there's a combination pager/phone that'll fit in your pocket. It has a 256 character alphanumeric display, and can even be set to vibrate when a call or page comes in. It only weighs 13 ounces and sells for $1,895. Available from Universal Cellular at 714-572-1000.

Undersea Cables Connect the World

In these days of satellites, when was the last time you thought about transoceanic cables? Three new transatlantic fiber cables are going to be installed between the U.S. and Europe by 1993. Links are also being planned from Europe to Asia as well as from Europe to Southeast Asia, via Africa.

No Computer Needed

Working from home is getting easier, now that Microtest Inc. of Phoenix has announced Lanport-II. It's a modem that connects directly to a network and lets users work remotely. There are three levels of security, including password protection, transaction, twisted-pair, token-ring and Arcnet.

Buy This Keyboard

Here's a hot new production toy from Yamaha. It's a music sequencer with 76 preset music styles including jazz, hard rock and country. The system plays the background and automatically makes your keyboard inputs work, no matter how badly you play! You can change keys, alter tempo and change instruments even if you can't read music. This is perfect for your custom beds for promos and spots ... and it's just $399 at your local music store.

How to Really Speed Up Your Computer

There's still a lot of great research coming out of the phone companies. One of the latest creations is an internal computer clock that uses lasers and photonic technology to raise computer speeds as much as 1000 percent. The optical clock system distributes pulses with no loss or variation. This allows faster processing and more accuracy according to the inventors.

Could This be True?

Researchers are projecting that telephone companies will take as much as $15 billion of the estimated $38 billion that will be spent in TV advertising by the end of this decade. A telecommunications database company called The Eastern Research Corporation says that Congress is ready to reduce restraints and allow broadband distribution of audio and video. For more information, call 201-539-4477.

Tan, Don't Burn!

Go ahead and leave your cassettes in the hot sun on the dashboard of your car. They'll be just fine - if you recorded your tunes on Sony's new UX Turbo tape. It's designed to take the heat ... up to 240 degrees. Get it in record and car stereo stores.

By Gordon Carter - Pro Audio Services
Chicago, Illinois - (708) 482-4142

Going in Circles

Time: *Monday, 10:00 a.m.*
Place: *General Manager's office*
People present: *GM, Program Director, Music Director, News Director, and yourself - Chief Engineer*

General Manager: "We need to do something to get more older listeners. Our latest book shows that almost no one over 30 is listening to us. Our under 30 book is good, but we need to appeal to older people. Any ideas?"

Program Director: "Our programming mix should be working for us. We are doing a mix of contemporary and 'oldies' that should be getting these people for us. Maybe if we played more 'oldies' it would help."

Music Director: "That's a good idea, but we have a problem. We have quite a few older LP's and 45's, but we have been playing all CD's on the air. All the oldies we play have been rereleased on CD, so we took all the turntables out of the on-air control room. We only have one production room with a turntable in it, and we only use that for spot production."

Chief Engineer: "Yeah, the music sounds so much better when we play it from the CD's."

Music Director: "But we need the greater variety that the LP's give us to attract the audience. I have a stack of letters from people complaining about us not playing music by so-and-so. We have the LP's, but they aren't real popular now so no one has put their stuff on CD."

General Manager: "Don't we still have the turntables we took out of the main control room last year? Why not put them back."

Chief Engineer: "But the CD players are so big they took up the space where we had the turntables. We just don't have room for the CD players and the turntables in that room."

Program Director: "What about putting them into a production room and dubbing the music to cart for air play. Those cart machines really sound good after you tuned them up last month. They probably would sound good enough for most of the old stuff."

Chief Engineer: "Well, I guess we could put them in Production Two. There is some room in there. We still have all the parts, but it will take some work to get it all going."

General Manager: "Good! Let's see if we can do this by the end of next week. We'll coordinate this with a new promotion for more oldies. Maybe we can even give away some of the duplicate records we picked up when our retired morning drive man gave us his collection last month."

Everyone leaves the meeting smiling, except you. Those turntables are old and haven't been used in almost a year. Besides, you've forgotten almost everything you knew about turntables and tone arms, which wasn't much. You don't have any books in your library about them, either. The only thing you even remember reading about turntables was in an old hi-fi magazine about five years ago, and that was about some $10,000 super rig. Now what?

Let's look at the two main parts of a record playing system. You have the turntable and the tone arm/cartridge combination. They don't look like much in most systems, and their functions are fairly simple. The turntable's primary function is to rotate the record at a constant speed while holding it in the proper position for the cartridge to play it. The tone arm's function is to hold the cartridge in the proper position relative to the record while the cartridge converts the mechanical impulses on the record to electrical impulses. The basic concept has not changed much from the day Edison recorded "Mary Had a Little Lamb" on his cylinder, but the details have.

Most turntables consist of a motor, a means of conveying the rotation of the motor to the platter, and the platter itself. At one time it was good enough to use a synchronous motor whose speed was dependent on the AC line frequency for this job, but as newer technology came along, the motors evolved into servo-controlled systems for very accurate speed control.

There are only a few ways to transmit the rotation from the motor to the platter. The two earliest were belt drives and puck drives. Belt drives used a belt turning on a pulley fastened to the motor shaft and turning around a pulley surface on the underside of the platter. The puck or rim drives used a rubber tired idler pulley between the motor shaft and the rim of the turntable. Both systems worked well, with a few cautions. If the belts, pulleys, or tire surfaces became dirty or oily, the turntable would run off speed or wow. Depending on the design of the turntable, some of these systems were dependent on the amount of pressure or belt tension for proper speed. I even knew of one type of turntable that you had to keep a supply of selected belts on hand to make work. The belts actually had a bump where the ends were joined to make a loop, and you had to select the best compromise between the "thump" generated by the belts, the speed of the turntable, and the pick-up (acceleration) of the turntable.

The platter (the device on which the record rests) is usually quite heavy and serves as a flywheel for the system. If you remember your high school physics classes, you will recall that a flywheel serves to smooth out the small speed variations in a rotating system. Many turntable platters may weigh ten pounds or more. If you look closely at the platter, usually on the underside, you will see some holes or weights that have been added to balance it. Proper balance of a platter means that it will perform up to expectations.

As technology has advanced, some of the newer turntables have used a direct drive system. With a direct drive system, the belts and pulleys have been eliminated, and the platter actually

(continued on page-12)

EXPERIENCE COUNTS . . .

Continental Electronics Installations At Master Antenna Facilities.

OLDSMAR TOWER PROJECT
Tampa, Florida
2 OF 2 STATIONS

WKRL 40 kW
WUSA 40 kW

TELETOWER PROJECT
Houston, Texas
2 OF 2 STATIONS

KLTR 27.5 kW / 21.5 kW (Aux)
KMJQ 50 kW

BRODIE LANE TOWER SITE
Austin, Texas
2 OF 2 STATIONS

KHFI 35 kW
KPEZ 21.5 kW

MILLER TOWER SITE
Dallas, Texas
6 OF 6 STATIONS

KKDA 40 kW
KLTY 40 kW
KLUV 40 kW
KOAI 45 kW
KZPS 40 kW
WRR 40 kW

LOXLEY TOWER SITE
Mobile, Alabama
3 OF 3 STATIONS

WBLX 27.5 kW
WGCX 27.5 kW
WJLQ 27.5 kW

LOADSTAR TOWER PROJECT
Ft. Lauderdale, Florida
2 OF 2 STATIONS

WJQY 40 kW
WKQS 50 kW

GANNETT TOWER PROJECT
Miami, Florida
8 OF 10 STATIONS

WEDR 50 kW
WHQT 25 kW
WLVE 25 kW (2)
WPOW 25 kW
WQBA 21.5 kW
WSHE 25 kW
WTMI 25 kW (2)
WZTA 25 kW (2)

BITLOW TOWER PROJECT
Orlando, Florida
3 OF 3 STATIONS

WHTQ 50 kW
WSSP 50 kW
WSTF 50 kW

LOADSTAR TOWER PROJECT
Orlando, Florida
3 OF 3 STATIONS

WJHM 25 kW
WJYO 55 kW
WOCL 55 kW

LOADSTAR TOWER PROJECT
Jacksonville, Florida
3 OF 4 STATIONS

WAIV 40 kW
WFYV 27.5 kW
WQIK 35 kW

SENIOR ROADS TOWER GROUP
Houston, Texas
7 OF 12 TRANSMITTERS

KFMK 27.5 kW (2)
KIKK 27.5 kW (2)
KKBQ 27.5 kW (2)
KLOL 27.5 kW

SUMMIT TOWER PROJECT
Atlanta, Georgia
2 OF 3 STATIONS /
4 OF 5 TRANSMITTERS

WSTR 35 kW (2)
WVEE 40 kW

LOADSTAR TOWER PROJECT
New Orleans, Louisiana
4 OF 4 STATIONS

WEZB 35 kW
WLNG 35 kW
WMXZ 35 kW
WQUE 35 kW

SHOREVIEW TOWER PROJECT
Minneapolis, Minnesota
6 OF 8 STATIONS

KDWB 25 kW
KEEY 25 kW
KLXK 25 kW
KQRS 25 kW
WLOL 25 kW
WLTE 25 kW (2)

MONTGOMERY TOWER PARTNERS
Montgomery, Alabama
4 OF 4 STATIONS

WBAM 35 kW
WHHY 35 kW
WLWI 35 kW
WSYA 35 kW

WEST TIGER MOUNTAIN TOWER SITE
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KMPS 50 kW
KRPM 50 kW

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Continued . . .

becomes a part of the motor. These systems are always electronically controlled and driven due to the very low speed of rotation required.

When installing or maintaining a turntable, a number of considerations must be observed. The surface of the platter must be perfectly level in all directions. If it is not, the motor will have an uneven and excessive load placed on it and may run off speed. If you look around, you can still find a few places that sell turntable levels. A turntable level is a small bubble level that you place on the center spindle of the platter. There is a circle on the top of the level and you adjust the levelers on the turntable until the bubble is centered in the circle. If you do not have a turntable level available, a small torpedo level (available in most hardware stores) can be used, just be sure to check in all directions.

In addition to being level, the turntable must be stable. It cannot rock, even with large amounts of pressure, or the tone arm will tend to skip. If possible, the turntable should be isolated from the floor or surrounding furniture. Remember that any vibrations picked up by the turntable will be translated into noise while listening to a record. Also, make sure the turntable is not too close to speakers. The vibrations from the speakers can actually set up a feedback loop through the turntable system.

As we mentioned before, the belts, pulleys, and rubber tires must be kept clean. Also, the bearing surface at the center of the platter must be kept clean. Lubrication in these systems is equally important, since the steadiness of rotation is dependent on the free movement of all parts. Be sure to only lubricate those areas that should be lubricated, and use only the lubricant recommended by the manufacturer. If you no longer have any service information on your turntables, lubricate only the center of any idlers and the bearing surface of the platter. Use a light, non-gumming oil such as that used for model trains. A good hobby shop will have a selection of lubricants that will be usable for this purpose.

While the turntable is usually a simple electronic system, especially the older ones that used synchronous motors, some maintenance is required. Switches must be kept clean to work reliably. I have seen some turntables that have a pushbutton start and stop that become very flaky. While the switch contacts are sealed, the problem with these is that the actuator becomes sticky and will not move freely, causing the switch contacts to not open and close fully.

The motors on most turntables require only that they be kept free of dirt. Many of these motors were not to be oiled (according to original instructions), but if the turntable is old and the motor is not moving freely, that may be your only hope. The electronics in the servo controlled and direct drive turntables are fairly reliable, but sometimes a transistor or integrated circuit will fail in these. If it does, good luck finding the proper replacement parts. There are very few turntables still being manufactured, and parts (even replacement parts) may be hard to find. To make this more complicated, many of the integrated circuits used in these turntables are special-purpose ones that were even hard to find when they were new. A service manual will help some, but can't do a thing about the parts problem. A caution about servicing direct drive turntables -- NEVER turn on power to a direct drive turntable with the platter removed. You can cause permanent damage to the motor and the driving transistors.

As we mentioned before, the purpose of the tone arm is to hold the cartridge in the proper position to play the record. That sounds simple enough until you remember that the proper position is constantly changing as the record plays. Every tone arm is a little different in the adjustments available and the way they are executed, but the principles are the same with all of them. (We will not discuss the straight-line tracking tone arm, since this is not really a practical product for broadcasting.) Usually the adjustments are made with the aid of some simple gauges and templates. Many times they will come with the cartridge, but they are easy to lose, especially if you have an older system that has not be used for some time. However, there are some simple ways to work around these.

The first thing you have to be concerned with is the height of the tone arm. The height of the arm at the pivot actually determines the "rake angle" of the stylus. With most modern cartridges, the stylus tip should be vertical with respect to the record surface. This is usually achieved when the tone arm is parallel to the record surface with the stylus resting in a groove. Careful measuring and a "calibrated eyeball" will help with this. Make sure the stylus is vertical when viewed from the front as well as from the sides.

The second factor in adjusting the tone arm is tangency. When a record is mastered, it is done with the cutting stylus perfectly tangent to the groove. When playing back the record, if the stylus is not tangent to the record, you will get excessive wear on the sides of the stylus and the groove walls. However, since the stylus is pivoted from a point at the end of the tone arm, it is only possible to have it perfectly tangent to the grooves at one point. This is usually chosen for the best compromise at the center of the playing surface of the record. You can make a simple gauge to check this by gluing a piece of graph paper on a 3 x 5 file card. Using a hole punch, punch a hole at the center of one end of the card at a point where two lines cross. Using a straight pin poke a small hole 2-3/8 inches away from the center of the other hole on the same grid line. You can then place this gauge over the spindle on the turntable and set the stylus tip in the pin hole. Adjust the position of the base of the tone arm and the mounting position of the cartridge so that the edges of the cartridge are parallel with the grid lines.

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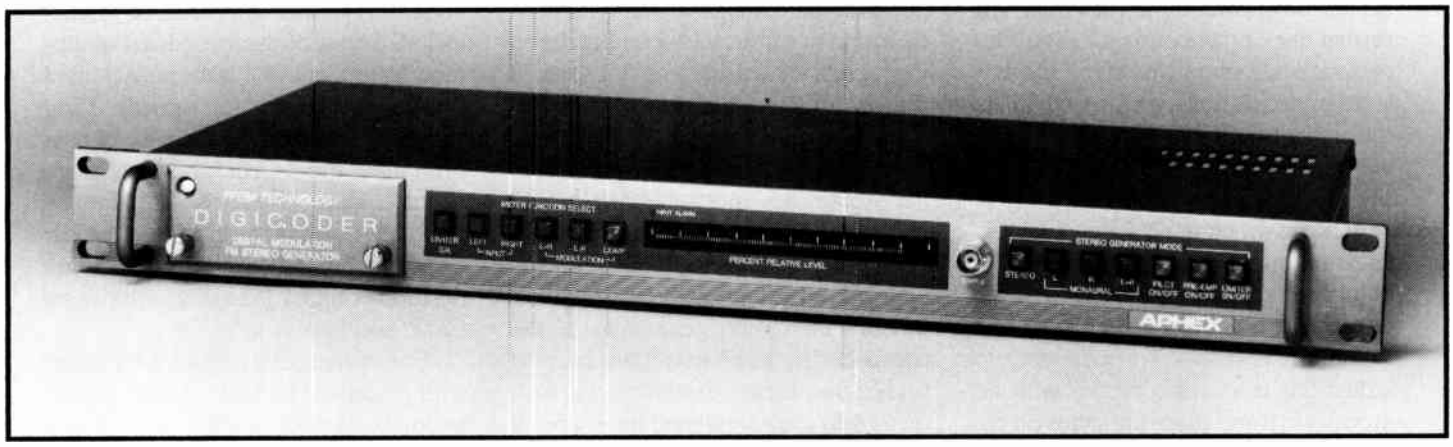

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Continued . . .

When the height and tangency are correct, you can then set the tracking weight of the cartridge. This is usually done with a counterweight on the back end of the tone arm, but some arms use a spring arrangement to achieve the same results. Some tone arms have calibrated markings on them to assist with this adjustment, but many do not. Those that do are sometimes wrong. The best way to make this adjustment is with a stylus pressure gauge. If you do not have one, try to find one. The proper tracking pressure will save your records and your stylus life. If the arm is calibrated, set the counterweight so the arm is balanced. Then set the reference marker and adjust until the desired weight shows on the weight.

The final mechanical adjustment of the tone arm is the anti-skating. This adjustment is not included on some arms, but is helpful to reduce wear and to make life easier. The best way to adjust this is to use a record with no grooves in it and place the stylus on the record with the turntable turning. When the anti-skating is properly adjusted, the stylus will not move toward or away from the edge of the record. I like to set for a very slight amount of skating toward the edge of the record. In this way if the stylus skips it will not slide across the surface of the record.

After you have gone through all of this mechanical set-up, you may want to check out the electronics of your system. The output of the cartridge should be properly terminated, since the cartridge is usually an inductive device. The cables going to the pre-amp provide some of this termination, but the pre-amp provides most of it. Most broadcast pre-amps have a fixed termination that seems to work well with a variety of cartridges. The data sheet for the cartridge will tell you the proper termination to use.

Before attempting to play a record, be sure to check the stylus on the cartridge. Make sure it is not bent or excessively worn, either of which may damage the records played with the stylus. You can check for any bending of the stylus by visually comparing it to a known good stylus. If you do not have one available, look to be sure that the shank, from the cartridge to the stylus tip, is straight. There may be a slight bend at the very tip to allow the stylus to be vertical to the record, but there should be no other bends on the shank. Stylus wear is usually checked using a special microscope. These are a bit difficult to obtain, as well as being expensive, so you may have to use a good magnifying glass. The tip should be round or elliptical (depending upon the type of stylus), with no flat spots. If you see any signs of damage, the stylus should be replaced.

To check the frequency response of the system, use a special test record and measure at the output of the pre-amp. At one time these test records were made by a number of companies, but the increasing popularity of the compact disc has made them hard to find. If you have a friend who is seriously into stereo, he may have one. If you find the frequency response is not correct, check the equalization adjustment of your pre-amp and the termination of the cartridge.

While you are checking things you may want to check the speed of your turntable. Some turntables have a strobe system built in to check their speed. If yours does, use it. If not, you will need a strobe disk. This is a special disk, usually made of cardboard, that has lines on it. When the turntable is operating at the correct speed, holding a neon or fluorescent light over the disk will make the lines appear to stand still. Most broadcasters are not that concerned about the absolute speed of the turntable, but any errors will make a difference in the timing of the music. On the other hand, some classical radio stations (yes there are a few of them left) may have some listeners who will call to complain that the turntable is "off pitch". They may describe it in musical terms, such as sharp or flat, but it is a direct result of the turntable running at the wrong speed. Some turntables provide speed adjustments, but many of the older ones do not.

Another speed related problem is wow. If you listen to a steady tone being played on the turntable, you may hear a variation in the pitch of the tone. This is usually due to some problem with lubrication or cleanliness in the mechanical system of the table.

Finally, a few thoughts about the records themselves. Records must be kept clean, and the best way to keep a record clean is to store and handle it properly. Records should be stored on edge in a proper inner sleeve in their jacket. Some of the broadcast equipment suppliers still sell replacement sleeves and jackets for records. They should be supported so that all records on a shelf are vertical, none of them should lean. Records should be handled by their edges and center only. Fingerprints on the grooves can be more deadly than fingerprints on CD's, and harder to remove.

Static electricity is also a problem with records. The vinyl in the records builds up a static charge and attracts dust like a magnet. While there are many ways to deal with this, I have found the most convenient is a specially treated brush that should be used to wipe the record before each play. You can still find these in better stereo stores. Try to avoid the sprays that you apply to the record. Some of these can do more harm than good, and some can actually damage your records, especially if they are not used strictly according to the instructions.

Yes, many radio stations have retired their turntables and tone arms in favor of CD's, DAT, or carts. However, not all music is available in these newer formats, especially some classical music and obscure "oldies." Your station may not be using them now, but the day may come when, like the engineer at the beginning, you are faced with having to make a turntable work. If you are still using turntables, perhaps this will take some of the mystery out of it for you. Who knows, in a few more years broadcast engineers and dyed-in-the-wool analog nuts may be the only ones left who know how to set up a tone arm.

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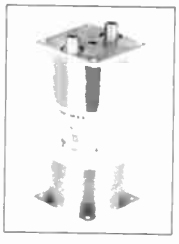

Model #	Tunable (MHz)
6367-0	22 - 35
6367-1	30 - 50
6367-2	50 - 108
6367-3	108 - 216
6367-4	216 - 450
6367-5	450 - 900

Bandwidth Adjustment
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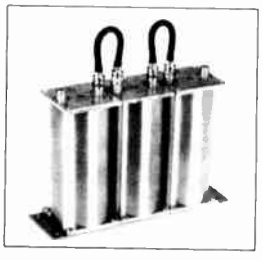
Notch 20 dB approx. for Bandwidth=3 MHz
Standard:
75 ohm F conn.
50 ohm BNC



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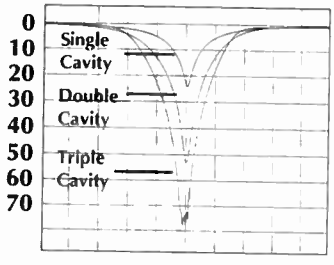

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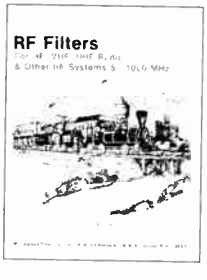
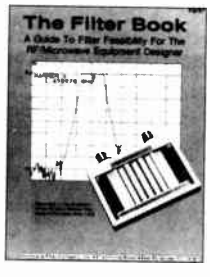


RF/88: RF Filters 0 - 1000 MHz

Also, ask for FREE catalog The Filter Book - FB/87, a guide to specifying microwave filters.



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By W.C. Alexander - Crawford Broadcasting
Garland, Texas - (214) 445-1713

Calculating RF Radiation Power Density

Almost ten years ago, regulatory agencies and others began raising the issue of the effects of non-ionizing radio frequency radiation on the human body. In 1982, the American National Standards Institute (ANSI) developed a standard (ANSI C95.1-1982) by which such exposure can be gauged.

In 1986, the FCC amended its rules to identify human exposure to RF radiation as an issue for consideration when determining the potential environmental impact of a particular FCC-authorized facility. From that point, most of us have had to learn at least a little about exposure to high RF fields, the ANSI standard, and ways to stay legal when working in or near these high fields. By the time all stations have gone through a post-1986 renewal cycle, each licensee will have had to examine his facilities to determine whether or not it complies with the ANSI standard and FCC rules. Those stations that do not comply will have to take steps to limit both public and occupational exposure to the high field areas.

In the past five years, I have been called upon to do a number of RF radiation studies on tower sites in different parts of the country. During my travels, I have been surprised time and again by the lack of knowledge on the part of engineers and owners alike with respect to this important issue. In this article, I will discuss the principles and mathematics of RF radiation exposure and power density levels.

The ANSI Standard

ANSI's RF radiation guidelines are actually a set of recommendations drafted to prevent possible harmful effects in human beings exposed to electromagnetic fields from 300 kHz to 100 gHz. These recommended limits are intended to be the upper limits of exposure. They are as follows:

Frequency Range (mHz)	Electric Field Strength (V^2/m^2) or E^2	Magnetic Field Strength (A^2/m^2) or H^2	Power Density (mW/cm^2)
0.3 - 3	400,000	2.5	100
3 - 30	4,000 ($900/f^2$)	0.025 ($900/f^2$)	$900/f^2$
30 - 300	4,000	0.025	1.0
300 - 1500	4,000(f/300)	0.025(f/300)	f/300
1500-100,000	20,000	0.125	5.0

f = frequency in mHz
E^2 = electric field squared
H^2 = magnetic field squared
V^2/m^2 = volts squared per meter squared
A^2/m^2 = amperes squared per meter squared
mW/cm^2 = milliwatts per centimeter squared

The limits of primary concern to radio broadcasters are those for the 0.3-3 mHz (AM) and 30-300 mHz (FM) ranges. Note that the power density limits for these ranges are 100 and 1.0 mW/cm^2, respectively. These figures will become the yardsticks by which compliance with the guidelines and FCC Rules are measured. In the text of its published guideline, ANSI states that the limits listed in the above table result in energy deposition averaged over the entire body mass for any six-minute period of about 144 joules per kilogram or less. This is apparently the level above which adverse effects on the functioning of the human body begin to occur.

(continued on page-17)

Transmitter Site

Continued . . .

This six-minute time frame takes on some importance in the real world and implementation of these guidelines. According to the ANSI guideline, the limits set forth in the table can be exceeded, provided that the average over any six-minute period does not exceed the limit.

For example, John Engineer needs to read the base current at his 10 kW AM tower. Assume that the doghouse where the base current meter is located is three meters from the tower base, and the RFR level at this point is 3.5 times the ANSI limit. Mr. Engineer can enter the high RFR field and read the base current safely, so long as he is in and out in less than 1 minute 42 seconds (6 min./3.5). Granted, this is an oversimplified example. In reality, he could remain a bit longer because he would not cross a line where the field changed from below the ANSI limit on one side to 3.5 times the limit on the other side; the field would build up on a curve as he moved closer to the tower. This is intended as a worst-case example. According to the ANSI guidelines, John engineer would be safe if he were in and out in a minute forty-two.

The bottom line is that the ANSI limits are time-averaged; these limits can be exceeded so long as the average over a six minute period does not exceed the limit.

FCC Requirements

1.1307(b) of the FCC Rules addresses the issue of the exposure of workers or the general public to excessive levels of radio frequency radiation. Specifically, this particular rule requires the preparation of an Environmental Assessment (EA) if a proposed new or modified facility authorized under Parts 5, 25, 73, or 74 will cause exposure of persons to levels of RFR in excess of the limit. It's probably a safe bet that an application for a facility that doesn't make the grade with regard to RFR would not be granted.

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Further, Question 7 on FCC Form 303 (license renewal application) sets forth the same requirements as 1.1307(b). This particular question has resulted in a lot of grief for station owners and engineers. At license renewal time, each licensee must evaluate his antenna site and answer Question 7 on the form. Are the RFR levels at the tower site below limits? Good question.

Finding the Answer

The only absolute way to find out what RFR power densities are in the vicinity of a tower base is by on-site measurement. Special instruments are available for rental and purchase from a number of sources for such measurements. Field strength meters will not work.

The good news is that measurement is not necessary in the majority of cases. FCC OET Bulletin No. 65, Evaluating Compliance With FCC-Specified Guidelines for Human Exposure to Radio Frequency Radiation, goes into great detail in explaining how to calculate RFR levels in the vicinity of FM and TV antennas. This document is a "must-read" for radio engineers, and it is available from the FCC's copy contractor.

Tables and charts are provided in the appendices of this bulletin (OET 65) that give worst-case examples as a quick check for compliance. These tables only apply to single radiators; if more than one station is operating from the site, the tables won't work. And remember, you are looking to make sure that RFR power density limits are not exceeded at any point on the ground, including the closest point on the ground to the antenna. The closest point is usually at the base of the tower, but that's not necessarily the case, particularly in extremely rough terrain.

Here's an example. WRFR operates from an antenna center of radiation of 100 meters above ground with a ten-bay antenna and 100 kW ERP H & V. Using the appropriate table in OET 65, we can quickly see that a station with 200 kW total (H+V) power and ten bays of antenna will exceed the ANSI limit at distances closer than 81.7 meters. Since the WRFR antenna center of radiation is 100 meters above ground, WRFR is A-OK.

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Transmitter Site

Continued . . .

These worst-case figures assume that all of the radiation from the antenna is directed straight down (or toward the nearest point on the ground). If this were truly the case, the antenna wouldn't work very well for transmitting, but it is a good place to start.

FM Formulas

The power density produced by an FM station at a given point can be calculated by using the following formula:

$$S = \frac{(0.64)(1.64)ERP(1000mW/W)}{\pi R^2}$$

Where:

S = power density in mW/cm²

0.64 = ground reflection coefficient

1.64 = gain of a half-wave dipole relative to an isotropic radiator

ERP = power (H+V) in watts

R = distance (cm) from center of radiation

The example the FCC gives is as follows: An FM station is transmitting with a horizontal ERP of 100 kW and using a circularly polarized antenna. The height to the center of radiation is 100 meters above ground. From the above formula, what would the calculated worst-case power density be at ground level 20 meters from the base of the tower?

First, find the slant distance from the center of radiation to the point on the ground. Simple trigonometry (is this an oxymoron, or what?) yields a figure of 102 meters. Convert this to centimeters by multiplying by 100.

Next, work the numerator of the equation. Remember to add the horizontal and vertical power for the total ERP. Assuming the vertical ERP is the same as the horizontal, 200,000 watts is the total ERP.

The denominator of the equation is the good old pie-are-squared (Granny said they were round) that you no doubt remember from eighth grade geometry. R is the radius, or distance from the center of the antenna.

Your result should be 0.64 mW/cm^2 or thereabouts. Is this below the ANSI limit? The limit for the VHF region of the RF spectrum is 1.0 mW/cm^2, so the answer is yes.

If there are multiple antennas operating from the same tower, use this formula for each and add the resulting power densities. Remember, the total power density is what we are interested in.

Some of you are thinking that this does not take into account the vertical plane radiation characteristics of your super-duper whamo "SATURATOR" antenna. That's right, it doesn't; the

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results of these calculations give worst-case results. To find the power density produced by a particular antenna at a given point on the ground, you will first need the manufacturer's vertical plane relative field graph. Find the angle from the center of radiation of the antenna to the point on the ground at which you want to determine the power density. Using that angle, find the relative field in that zenith for your particular antenna and use it in the following slightly modified equation:

$$S = \frac{(0.64)(1.64)F^2ERP(1000mW/W)}{\pi R^2}$$

Where:

S = power density in mW/cm²

0.64 = ground reflection coefficient

1.64 = gain of a half-wave dipole relative to an isotropic radiator

F = relative field at zenith

ERP = power (H+V) in watts

R = distance (cm) from center of radiation

This will give a much more realistic figure for power density. However, should the worst-case calculation show the RFR over the limit and you have to use the vertical plane radiation characteristics of the antenna to get a result that is within the limit, you had better be ready to make a showing to the Commission on how you arrived at this result. The manufacturer's graph and tabulation of the relative field in the vertical plane will generally be required (as opposed to something you calculated or whipped up on your handy PC).

If there are multiple antennas on the same site, remember to calculate the power density produced by each station and add the results together to get the total.

TV Formula

Because many FM stations share their sites with TV stations (the TV guys say it's the other way around), we had better take a look at the formula for calculating TV power density:

$$S = \frac{(2.56)(1.64)(100)F^2[(0.4)(VERP)+AERP]}{4\pi D^2}$$

where:

S = power density in mW/cm²

2.56 = ground reflection coefficient

1.64 = gain of a half-wave dipole relative to an isotropic radiator

100 = conversion factor (to mW/cm²)

F = relative field at zenith

0.4 = converts peak visual ERP to an RMS value

VERP = total (H+V) peak visual ERP in watts

AERP = total (H+V) aural ERP in watts

D = distance from ground to center of radiation in meters

What about AM?

Because the power density limit for AM stations is so much higher than for facilities above 30 mHz, a person has got to get pretty close to the radiator to reach a point where the power density exceeds the limit. Trouble is, we get close to AM radiators all the time. After all, John Engineer has got to read those base currents.

The bad news, as far as this article is concerned, is that far field techniques won't work when calculating power density near the base of an AM radiator. For a quarter-wave tower, for instance, the E-field near the base is relatively low while the H-field is very high. The opposite is true of a half-wave tower. The scope of this article does not accommodate a discussion of the near-field prediction methods necessary to calculate AM power densities.

The good news is that OET 65 contains a table listing the distances at which fields from AM radiators are predicted to fall below the ANSI limit. Here is an abbreviated list:

TX Power (kW)	Distance (meters)
50.0	12
25.0	9
10.0	7
5.00	5
2.50	4
1.00	3
0.50	<2
0.25	<2
0.10	<2

Transmitter Site

Continued . . .

This makes prediction and evaluation pretty easy. Just look up the power level and find the corresponding distance. Anything farther away is okay; closer distances will exceed the limit. You can extrapolate from these values (or interpolate between the values in the OET 65 chart) for percentage of the limit; the constant seems to be 0.677. For example, for a 50 kW station at a distance of 25 meters, the power density would be about 32% of the limit (12/25 x 0.677 = 32%).

Of course, these are worst-case figures. If in doubt, measure.

When answering Question 7 on the renewal form, AM operators must consider how close the public can get to the radiating elements of their antenna systems. FCC rules have always required that tower bases be fenced and locked; the question now becomes, how far from the tower base must the fence be? The answer is easy. Find the distance corresponding to the power level in the OET 65 chart and be sure your base fence is no closer than that distance to the tower base. Directional stations should fence at the radius for the overall station power, not the specific power in the individual element towers; something could go wrong and put all the power from the transmitter into one tower. However unlikely, this is the safest way to go.

If in doubt ...

Although the majority of stations will find proving RFR compliance relatively painless, particularly if only one or two stations use the tower site, there will be cases where simple calculations will show the limit is exceeded. This will usually occur in "antenna farm" situations, on mountaintop sites, and combinations of the two. There are a couple of ways to go if this is the case.

First, hire a consulting engineer to study the situation. He can do a study of the entire site, finding the combined power density of all stations at each of hundreds of points.

However, if even such a detailed study cannot show compliance, actual measurements will have to be undertaken. There are several organizations that will divide the site into grids, make detailed scientific measurements, and submit a report. The owners of the site will have to determine in what areas the ANSI limit is exceeded and construct fences, place warning signs, and otherwise restrict people from entering these areas. This is a big job, but the cost of such a study and remedial measures is usually divided among all the users of a site, thus reducing the cost to each party considerably.

So before you check NO on Question 7, first use the tables, then calculate, then call for help.

AM Signal

By George Whitaker - KSSA-AM/FM
Dallas, Texas - (214) 528-1600

More On Synchronous AM

In last month's article a method was described for setting the time delay. It appears that some further experimentation may be in order.

When I began reviewing the data for this article I noted that we had used a 1,000 Hz tone for setting the time delay. Now I realize that we should have used pink noise.

Just for the fun of it, I calculated the time delay based strictly on the distance difference between the two transmitters. The difference being 27.28 miles and using the figure of 186,000 miles per second as C you come up with a calculated delay of 146.6 microseconds. This does not take into account the delay introduced by the STL audio circuitry or the processing, since these would be identical for each transmitter and would cancel. There would be a difference for each transmitter. But, it should be very slight.

After all was said and done we wound up with a time delay setting of almost a millisecond. This suggests to me that we set the 1,000 Hz tone to the point where the X-Y display would show "in phase," but, in reality we were 360 degrees or 1 millisecond off. One millisecond too much delay.

The delay unit we are using has a minimum delay time of 160 microseconds and apparently we needed a number smaller than this. The only solution I see for getting the time delay truly correct is to add time delay (at least 160 microseconds) to the more distant transmitter, and then use pink noise so that you could see all frequencies at once. By adding the 160 microsecond delay to the distant transmitter, you are then cancelling out the minimum delay time of the Eventide unit so that you can effectively start from zero time difference.

Now, lets look at frequency determination. Due to the fact that the transmitters are distant from each other, and a frequency counter of the required accuracy is not available, you can not just measure the frequency difference between the two transmitters. This is calculated using the time between beats. The FCC requires that you keep the transmitters within a half cycle of each other. This is actually very easy to do and the actual difference will more likely be on the order of 0.03 cycles or less.

The frequency difference is the reciprocal of the time in seconds between beats. If the time between beats is 30 seconds, the frequency difference is 0.033 cycles. If the time between beats is 4 minutes, then, the frequency difference is 0.0041 cycles. From this you can see that a very, very slight change in frequency will result in quite a bit of change in the time between beats. A frequency difference of 0.0041 cycles will give you 4 minutes between beats. However, if you change only one one/thousandth of a cycle to 0.0051, you then have only a minute and a half between beats.

During the recent round of experiments, several questions were posed and investigated (besides how to set the time delay and frequency experimentation).

One of the questions posed was: "What is the effect if you are on the opposite side of the sync site, but, still have enough signal from the main site to consider?" Some of us thought that we would have a zone of interference of some sort on the back side of the sync transmitter. However, the only interference is in between the two transmitters - where they are opposing. On the back side, where the signals are from different transmitters,but moving in the same direction, there is no interference.

Once you are where the waves are traveling in the same direction they are completely compatible in the radio even though they are coming from different transmitters and would arrive at the radio at different times.

Another question posed was: "Does the interference from each other have an effect on the interference sustained from other stations?" The answer here is a resounding YES. A very noticeable decrease in interference from other stations was noted with each improvement made to reduce interference between the two transmitters. In some of our test locations we had tremendous interference from distant stations when we started. By the time we had the system tweaked, the distant stations were hardly detectable in the same locations. I am convinced that, in our next round of tests, we will be able to even further reduce the effect of distant stations.

Bob Weirather of Harris Corporation in Quincy has written a report of our activities in answering these and some other questions. If anyone would like a copy they may contact me or Bob.

At this point I would like to acknowledge the following persons who contributed ideas and/or labor to this project:

Ed Pryor, Broadcast Technologies, Inc., Arlington, TX.

Grant Bingham, Continental Electronics, Dallas, TX.

Doc Masoomian, Northeast Broadcast Labs, Plano, TX.

Paul Strickland, KKDA Radio, Dallas, TX.

Bob Weirather, Harris Corporation, Quincy, IL.

George Whitaker, Jr. (father of my grandkid), Arlington, TX.

Again, I would like to invite anyone interested to visit our sites and hear what we are doing. All they need to do is let me know when they are coming and we will arrange a tour.

Doing something with your AM site? Let our readers know about it!

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- ☐ Long range

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- ☐ Call me

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- ☐ Ideas or help

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Station Stories

By George Whitaker - KSSA-AM/FM
Dallas, Texas - (214) 526-1600

A Couple of Odds 'N' End

Odd #1: Safety

One of the first things they taught me when I started learning to work on transmitters was, "Keep one hand in your back pocket." Fortunately for me, the advice stuck.

Back in December we completely disassembled, cleaned, and rebuilt a 5 kW transmitter. My assistant, who shall remain nameless to avoid further embarrassment, was in charge of re-wiring the high voltage supply. Unfortunately he failed to follow the rule that, "Before you put the voltage to a new wiring job, go back and follow it through again."

He had confused two wires and had left 8 mFd charged with 6,300 volts on the plate cap even if you hit the usual discharge points with the lightning rod. Obviously the transmitter didn't come up and we had some strange meter readings.

I opened the back door, hit what should have been the discharge points with the grounding stick, and then proceeded to remove the plate cap. As I usually do, I was working with one hand as much as possible. The charge entered through my index finger and exited the thumb on the same hand. Had my other hand been grounded, the charge would have gone right through my heart and very likely stopped it. A Voice of America engineer was killed recently in an almost identical incident. The power supply was off, but, the caps were still charged. As it was, the pain was intense enough to actually make me nauseous for a time.

In fairness to Gerrard, (oops, I said I wouldn't name him), I found that I might have made the same mistake. As soon as the pain had subsided enough, I began to go through the power supply wiring. When I had completed followed the path through with my eyes and found nothing amiss, I really was wondering where the bite came from. Then I followed the path through by actually running my fingers along the wires. This time I found that, because of the way the harness lay, the two wires that changed sides inside the harness looked like they didn't.

I relate this story to point out that, no matter how long we've been doing this, the safety rules should always be followed. Admittedly, I have sometimes gotten overconfident and bent, or ignored some rules because, "I know what I'm doing." This incident has certainly made me less cocky. And also very glad that, this time anyway, I was following the rules.

Odd #2: RF Radiation and License Renewal

A number of stations are finding their license renewal held up by the question about RF radiation hazards. OST 65, the guidelines for compliance, tells you quite plainly in the examples how to handle each situation.

However, there are a couple of points to keep in mind about the RF radiation warning signs. Basically, all AM's must have fences around their towers at the distances specified in OST 65 for each power level. They also must have RF radiation warning signs posted on the fences. FM's, on the other hand, do not have to have signs posted unless the ANSI standard is exceeded at ground level. At least that's the way I read it. I'm not a lawyer, and I certainly don't intend to be offering legal advice.

Anyway, I have found, in my travels, that some stations are posting signs where they are not required and are actually inaccurate. On the door to the transmitter room for instance. In tests done at the Sears tower in Chicago and also at some multi-tenant towers in the Dallas area it has been shown that the shielding on transmitters is such that, unless you have something wrong, a transmitter room will not exceed the ANSI standard.

Now, as I understand it, if you post the sign you are admitting liability and admitting that a hazard exists. By this I mean that, if some jerk files a suit that says working around your transmitter caused his naughty bits to fall off, the sign itself is an admission of the existence of a hazard. In other words, if a hazard does *not* exist, don't say it does. Of course, if it does exist, (under the FCC's interpretation), then you *must* acknowledge it.

Again, I am not a lawyer and, before taking any kind of action regarding these points, you should run them by your own counsel.

End: You're Kidding

There are benefits to being in a major market. But, there are also many benefits to being in a small market. I make no secret of the fact that I anxiously await the day that I can go back to a small market. I've always felt funny wearing a .38 to go do an all-nighter, but, don't dare go without it here. Right now, though, I need the bucks.

At any rate, one of the other small market benefits, besides personal safety, is the freedom to do a project like you darn well want too.

When we did our Dallas transmitter site a couple of years ago I learned how frustrating and stupid the bureaucracy can really be.

For instance, our 160 foot tall, one foot face tower was 600 feet from the nearest dwelling. But, according to the City, it would *cast a shadow over the residential area*. Therefore, it had to be 1,000 feet back. Although the site is unattended, there must be *two* paved and properly striped parking places.

We had planned on a central air conditioning unit. But, you can't drain the condensate from a central unit onto the ground. For $20,000 we could get the sewer extended to our site.

I could go on for a couple of more pages, but, you get the idea.

Next time you start grousing about being stuck in a small market remember that all is not rosy in the land of traffic jams and junkies.

Foul Weather Friend

By Ed Dulaney - KZOR/KYKK
Hobbs, New Mexico - (505) 397-4969

Spring is upon us, and that means our friends are planning their return! Now this wouldn't be bad if the only friends that plan to return were clear blue skies, warm temperatures, and barbecues! However, we can all look forward to visits from thunderstorms, tornadoes, hurricanes (for the coastal dwellers, not us land-locked desert eaters!), and power outages.

Though we can't do much to combat the elements directly, we can minimize their effect on our stations by using some of our engineering budget for preventive measures.

Wait a minute, Ed, what budget? Hey ... don't worry if you don't have an engineering budget. Just express these few ideas to your manager, and you should some out ahead. If you are a manager reading this, then take notes when your engineer comes strolling into your office. After all, you can learn something here!

The first thing that you should do is go to your favorite hardware store and pick up 4 or 5 of those AC spike protectors. Not the $4.99 bargain basement ones, but the good quality units. Put one on your station computer(s), on your remote control units (both transmitter and studio), and on your audio consoles ... especially if those consoles use CMOS I.C. technology. (Managers, ask your engineers what CMOS I.C. technology is!)

Don't be afraid to put those spike protectors on anything that may get zapped by the lightening storms that hit your area. I've seen these things eliminate the "down-time" on our station computer system. They do work, and are some of the cheapest insurance you can buy.

Next step is to put an auxiliary generator at your transmitter site. That way if the power company's AC service decides to take a trip south, you'll have some way of getting your transmitter going again.

"You've got to be kidding," says the manager, "we don't have that kind of money to spend!" My obvious question would be "How much money would you lose if you went off the air for 2 or 3 days due to a power failure?" A generator can pay for itself easily within one storm season.

In some cases it may not be necessary to buy a full size generator. For instance, here at KZOR we only need to run about 150 watts to cover the city. Of course it would be nice to have our

(continued on page-26)

Foul Weather Friend

continued . . .

full 100kW available, but it is not necessary. All you have to do is power your STL's, limiters, exciter, and maybe a small amplifier. If you think it is necessary, you can even run your remote control system, although I figure that you will probably want somebody at your plant in the event of bad weather anyway, so why bother with remote control. Most of them don't work after the telephone company gets hit by lightning.

"So how does that save me money," barks the manager. Hey, do you have a trade account with a hardware store, or a Honda motorcycle dealer? If so, then you don't have to spend a cent! All you need is a 5,000-7,000 watt portable generator. Most of the hardware stores carry them, and if they don't, check the Honda dealer. Engineers: calculate how much power you need to run the the items I mentioned above. In my case, the power consumption came to about 3,400 watts. I can even run a couple of lights on my 5,000 watt generator, great for reading while waiting for your power to come back on.

Now, for those stations who have their transmitters and studios at the same location, you'll need at least a 10,000 watt generator. That way you can power all the necessary equipment for keeping on the air. If you can't get a portable 10,000 watt generator, read the next paragraph.

For those stations who have a separate studio and transmitter, and want to power them both, you may be able to get away with only a 1,500 watt generator at your studio if you are only interested in the bare essentials. All most stations need anyway is a small 5 pot console, 2 cart machines, 2 CD players (you are using CD's aren't you?), and a microphone. Couple that with your studio limiter and STL's and you should get away with 1,500 watts if your STL's don't guzzle much power. If they are the power hungry type (like my STL's), then go with a 2,500 watt unit. Now you are prepared for anything that can happen.

Some things to keep in mind for those times that you will rely on the generators: First, keep plenty of fresh gas on hand. A couple of 5 gallon cans should last you at least 8-10 hours. If the power is off in your city, the gas pumps don't work! That is just a fact of life, folks!

Another thing you'll need to think about is how to distribute the power to your equipment. My suggestion is to use a couple of 50 foot extension cords to go from the generator to the console, and to the STL's at the studio. Then use another 50 foot cord at the transmitter. At the business end of the cord, plug a spike protector in your console, STL's, and whatever else.

If you would like more information about preventing spring down-time at your station, call me at this number listed above between 9:00 a.m. and 1:00 p.m. mountain daylight time. I'll be glad to help you get ready for the elements!

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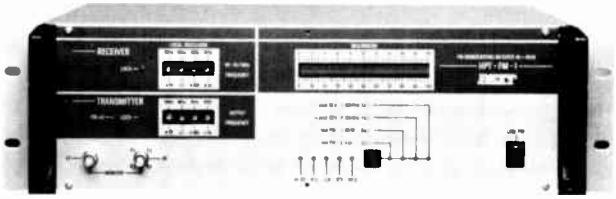

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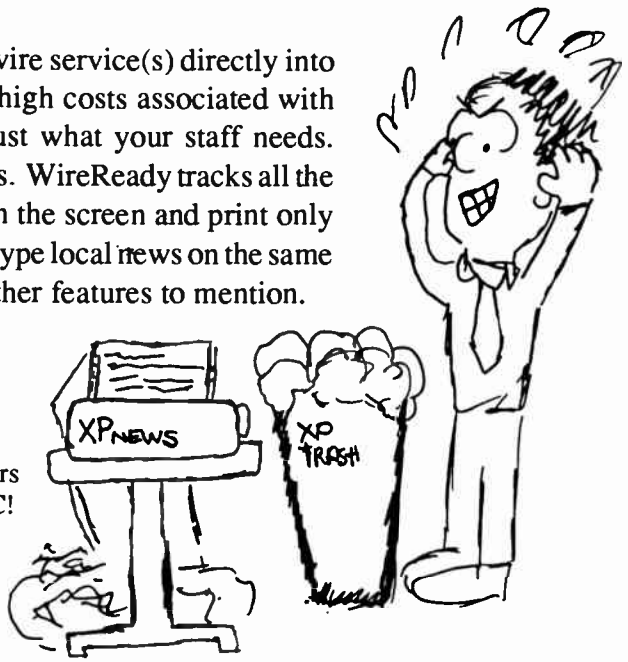

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BBS Listing

Broadcast Oriented BBS Listings

Special thanks to Mark Leff of CNN/Atlanta for the original list.

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: 3/12/2400
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

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

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

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 Coordinating Committee (CBFCC)
SysOp: Jeff Brothers
Aurora, CO
BBS Type: OPUS - Speed: 2400 Baud

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
Harris-Allied Bulletin Board
Sysop(s): Bob Groome
Richmond, IN - Company: Harris-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 Argendell
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

414 873-7807
Second Opinion
Sysop(s): Terrance Baun
Milwaukee, WI
BBS Type: Wildcat - Speed: 14.4 HST
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

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

BBS Listing

Broadcast Oriented BBS Listings

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: RemoteAccess - 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

614-766-2162
Radio Link
Sysop(s): Steve Craver
Columbus, OH
BBS Type: Quick BBS - Speed: 300-2400
FidoNet: 1:226/140

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
BBS Type: Yellow - Speed: 300/1200
PC-Pursuit Code: MABOS

619-268-9625
Radio-Active BBS
Sysop(s): Steve Asaro
San Diego, CA
BBS Type: WW4 - Speed: 300/1200/2400

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
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.

713 284-1090
SBE Chapter 105
Sysop(s): Frank Rainey
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

801 266-2426
Planet Vulcan
Sysop(s): Chuck Condron
Salt Lake City, UT
BBS Type: Paragon - 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

If you have a BBS, and it's not listed here, call Radio Guide at (507) 280-9668 and we'll get it on the list.

Computer Connection

By Kelly Klaas - KEZJ
Twin Falls, Idaho - (203) 733-7512

I ran into something recently (no, I wasn't hurt) that I thought was very interesting, yet understandable for whom it involved. The on/off power switch on our old IBM PC-AT recently decided enough was enough. It turned on the old computer for the last time. When the secretary who uses the computer told me about it, I thought no big deal. I'll just call up the local IBM dealer and order a new switch, and she would be back computing in no time. Actually, the switch would work intermittently, but you had to be patient and turn it on and off several times before it finally kicked in.

Needless to say, my plan of a new switch was not what the great computer guru's in White Plains, New York (home of IBM) had in mind. I called Kelly at the IBM dealer and said, "Hey Kel, order me a new on/off power supply switch for our old 6 mHz IBM PC-AT ... you know, the one Chris Columbus brought over on the Santa Maria." His reply was, "Sorry, no can do ... and it was the Pinta, you idiot."

Of course my first reaction was that of horror, disgust and embarrassment ... I knew good and well it was the Pinta on which our IBM PC-AT was transported around the Cape of Good Hope and to the West coast. How could I have forgotten such an integral part of American history? My next reaction was that of wonderment and confusion. "Why" I brazenly asked, "can't you order me a new on/off power supply switch for our old, original 6 mHz IBM PC-AT ... did our last check bounce or something?" "Nay Nay Dartanian," was his reply. "Your check was as good as the toilet paper on which it was written."

Then, in a rather dominating overtone, I demanded a reason forthwith as to just why he could not order me a new switch, and if the reply was not to my satisfaction, I would take my business (toilet paper checks and everything) and traverse elsewhere.

His reply to me was simply (in a sheepish voice), "You can't get just the switch ... you have to buy the whole power supply!"

I gulped, gasped and withered in pain at his reply. The first thing I saw was dollar signs flying in front of the Boss's (yes, it is capitalized in this case) face. How could I explain to the Boss that, for the want of a $2 power switch on our old original 6 mHz, 512k memory, IBM PC-AT, an entire power supply was lost? I couldn't, I concluded.

"How much is the power supply?" I asked in a low, unassuming voice. After "a short pause and half of a Rap Song while on hold," he returned to triumphantly announce the cost was only $139.

At that point, I began to come to a slow simmer. I thought, "How dare IBM demand that I buy a whole power supply just to replace a $2 (if that!) on/off switch. I told Kelly I was going to try an idea first, and if that didn't work I would get back to him about the $139 (plus shipping, handling, tax) power supply.

To make a short story long, by the time you read this I will probably have the switch replaced. But as I sit here in front of my computer, my idea is to go to Radio Shack, purchase a $2 (if that!) on/off switch and replace the ailing switch in the PC-AT. It may take some remodeling of the computer cabinet but I figure what the heck ... the warranty expired some time ago, didn't it? If nothing else, it is some comfort to know that the power switch is hidden from view, so if my remodeling job isn't up to standard, it will at least be hidden! The Boss will never see it. If he does, I can always tell him it's been like that "since I can remember." With a little bribery and coercion, I can convince the secretary to validate my claim.

Come to think of it, I could use a spike-protector power strip with the PC-AT, so I could probably just leave the power switch on all the time and turn it on and off with the switch on the strip. That's the way it should be done anyway, right? I might not even have to open the computer and change the switch at all.

The Boss never trades in any equipment to be upgraded ... we just run it until it won't run anymore, then beat it with a hammer and run it a little while (few years) longer. Therefore, I don't have to worry about some poor sucker getting it after us and finding a bad switch. I can just see him calling the IBM dealer to order a new on/off switch for his original 6 mHz IBM PC-AT with 512k memory.

"Hello, Kelly ... order me a new switch for my 6 mHz IBM PC-AT with 512k memory."

"Sorry, no can do."

"Why ... wasn't my last check any good?"

"Say, you didn't happen to buy that from Kelly Klaas did you?

On to another subject. I recently played around with some software from the Society of Broadcast Engineers (SBE). It is a program to assist you in studying for your Broadcast Technologist rating on your SBE certificate. It is an interesting piece of software, and very easy to run. I copied both the diskettes to a hard disk and typed MGUIDE to start it.

There are several categories to choose from. You can brush up on rules and regs relating to a given level of rating, or you can study the theory and take a quiz.

The quiz is multiple choice. You simply read the question and choose the letter corresponding to the answer of your choice. If you get the correct answer, it will say CORRECT. If you guess incorrectly, it will tell you the correct answer and, if an explanation is not to lengthy, it will explain the answer. Otherwise, it refers you to a particular study text.

When you are finished with the quiz, you can get the statistics - How many you missed and what percentile you acquired. It is fun to play with and would be very handy as a study tool if someone wanted to acquire that rating.

The software is available from SBE at a nominal charge. My latest brochure mentioned nothing about software for the higher levels, but I understand from the rumor mill that software is being prepared. That would be a great.

Remember to send me your tips, tricks and ideas for this column.

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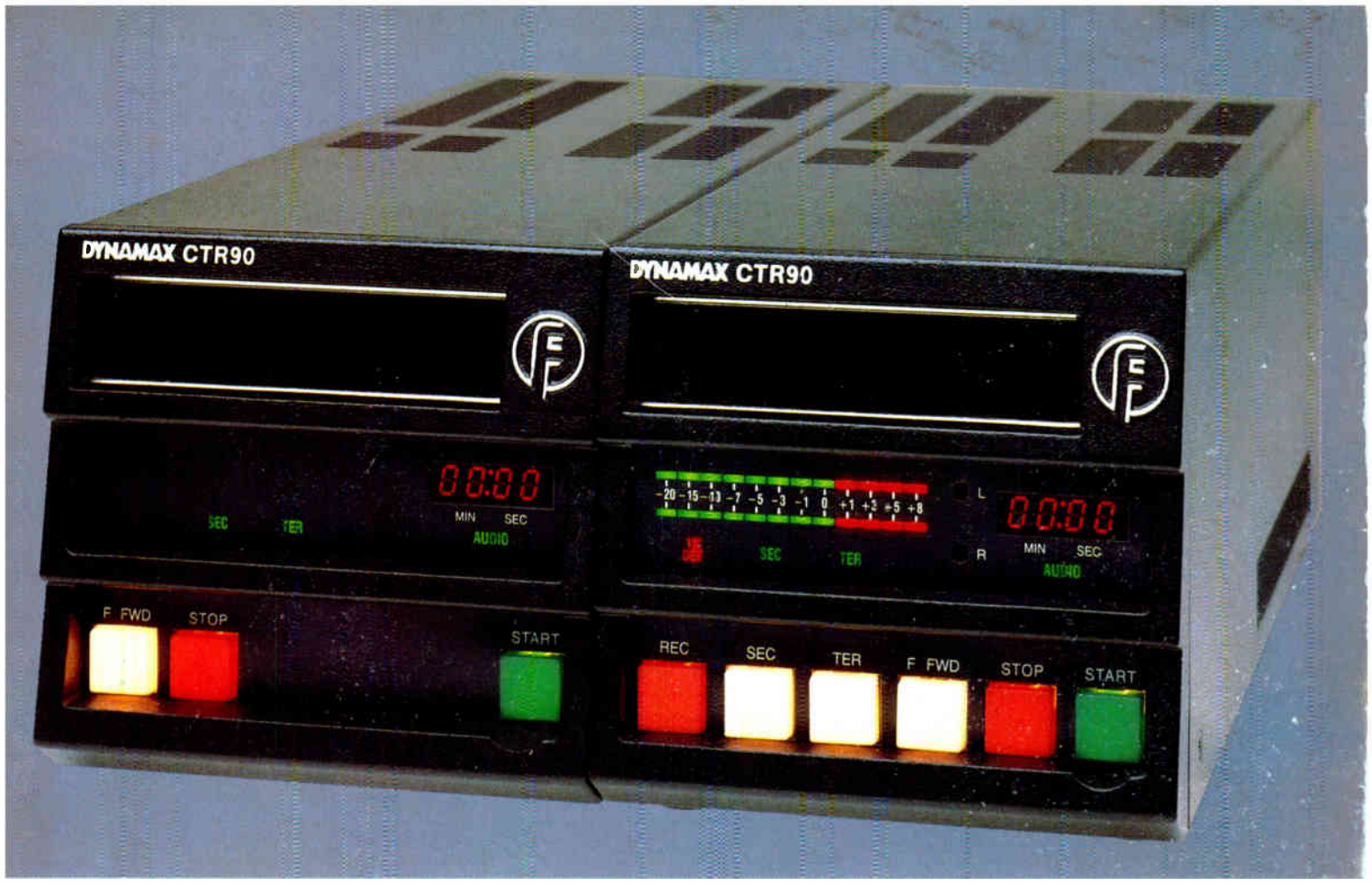

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