Radio Guide

Radio's Technology Magazine

Year-End 1992

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Year-End 1992

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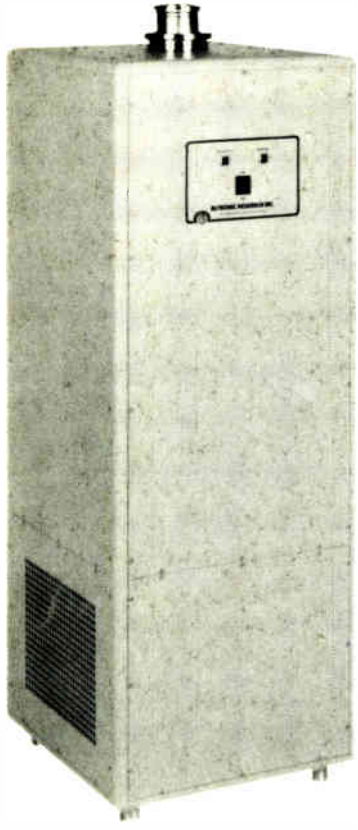

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Publisher's Page

This is The Last Issue of Radio Guide

We gave it our best shot. For the last four years, we've attempted to deliver solid and useful technical editorial to our readers. Judging from your response, I believe that we've accomplished that goal.

However, as a "free" publication, **Radio Guide**'s existence is dependant upon manufacturers' tangible support, in the form of paid advertising. We have not done as well in that area. I must add that we don't blame them for this, given the state of the economy. When times are tough, most advertisers will usually go with what's conventional and comfortable. Unfortunately, **Radio Guide** just didn't qualify.

A Few Good Companies

George Yazell (of Noise Free Radio), Systemation, Kahn Communications, Moseley, Holaday Industries, Tom Jones Recording Studios, Accurate Sound, Hallikainen and Friends, Northern Magnetics, Advanced Broadcast Consultants, and Dorrough Electronics. On July, 1988 these companies took the plunge. Their initial commitment to the **Radio Guide** concept helped to launch this publication. Without their support, **Radio Guide** would never have happened.

We also salute those companies who subsequently joined **Radio Guide** in an attempt to bring you sound, effective technical editorial. However, as we tallied up the numbers, the commitment just wasn't there. What some advertisers knew (and the others have yet to learn) is that there are tremendous numbers of conventional and contract engineers out there who have direct responsibility for the selection and purchase of technical equipment.

And until this industry wakes up to the fact that it is the technical personnel who make these decisions (no matter who approves or pays for it), then publications such as **Radio Guide** will never have the advertising support system they need. No sour grapes here -- that's just the way it is.

But there's more to the life of a publication than just ad dollars. I have always believed (and still do) that the primary task of a publisher is to create a loyal readership. Judging from your comments by phone, by letter and during conversations with many of you at radio conventions, we have more than accomplished our mission. You have my gratitude and thanks, for your support, constructive comments, and editorial contributions throughout the last four years.

Even though our future is not clear, **Radio Guide** has been, for the past four years, a useful tool in the pursuit of technical excellence. My only regret would be in not being able to continue to supply this industry with the technical information that I believe it needs. However ...

It's Your Decision Now

Do you want **Radio Guide** to continue or should we close up shop? That decision is, quite literally, up to each of you.

We will continue **Radio Guide** as a subscriber-paid publication. But only if each of you (or your station) is willing to pay for it. Because we will be relying on your paid subscriptions (instead of advertising) to support this publication, we will need to have a response *unheard* of in this industry.

If you believe that **Radio Guide** has value and potential, and would like to support it's continued development, then this is the time to do something about it. This is a one-shot deal. The vast majority of you will have to make a financial commitment. There's just no other way to put it. We are ready to continue to publish **Radio Guide**, but we are now relying on your support. We won't get a second chance at this -- it must be done now!

In our conversations with readers, we've found that hard nuts-and-bolts technical information and tech tips are most often mentioned as an editorial priority. In 1993, that will be our editorial target. If it deals with how to repair, install and maintain equipment, it's in -- if it deals with news, gossip and press releases, it's out! From now on, we won't be talking about equipment -- we'll be talking about how to work with it.

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In the center of this issue, you'll find a subscription card. Fill it out and send it back to us. No postage necessary -- we'll take care of that. Just let us know if you wish to sign up. Don't send any money; if there's enough response, we'll invoice you and start your subscription as soon as we receive payment.

Thanks for your continued input and support. It kept us advancing -- and learning. We hope that we have done the same for you. Have a safe and happy holiday season, and next year, we'll be back ... we're relying on you.

Ray Topp -- publisher

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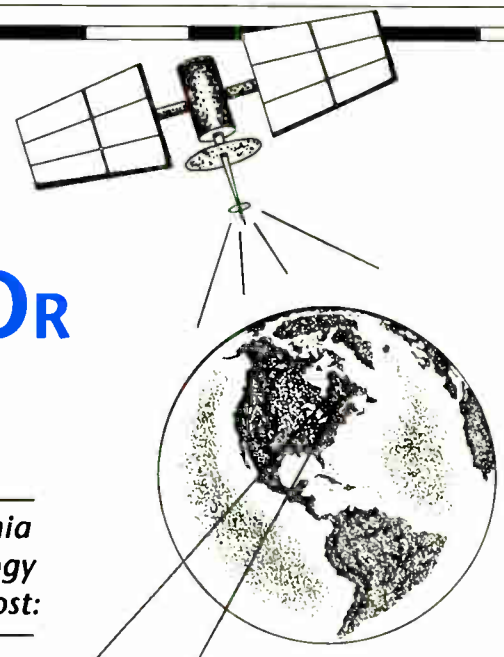

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Electrical Power From the Source

By John Bredesen, P.E.

I want to remind you of the deadline coming up July 1st, 1993 which requires that STL transmitters meet certain technical standards. These were to have gone into effect on July 1, 1990, but broadcasters put up a strong objection. The claim was "we didn't know about it," even though it was adopted as part of the Rules several years before that. And therein lies the rub. The changes were simply forgotten by many stations because it had been in the Rules for some time, and July 1, 1990 seemed so far off. "No need to worry about it today," was the thinking. So the claim was logical in many cases because the new requirements lay there as a sort of time bomb, buried in the Rules. Many stations simply had forgotten about their existence by the time July 1, 1990 rolled around.

The FCC listened and extended the deadline three years to July 1, 1993. Common sense says there will not be another extension. Now is not too early to make sure you have acceptable equipment, or else you need to start planning your acquisition. Refer to section 74.550 of the Rules and Regulations as a jumping off place to see what you need to do. You will be able to meet the new requirements by only replacing the STL transmitter. However the existing receiver may not be set up for the correct deviation, which would compromise the integrity of the aural signal. The manufacturer of your STL should be able to tell you if you're OK with your present transmitter, and whether you can continue to use the present receiver if you have to purchase a new transmitter.

Let's get on with our discussion of electrical power which we began in the last issue.

Peak Demand

Any generation and distribution system runs most efficiently when the load is constant, or at least is predictable. As an end user, the utility has installed for your station an electrical service of a certain capacity based upon information supplied before installation. Undoubtedly there will be other customers on the same primary supply lines. The utility will base the size of its transformers and supply lines upon predicted usage of the total connected load. When additional loading occurs because a customer or customers exceed the stated loads, it will ultimately force the utility to install greater capacity if it continues.

The utility doesn't mind if the load is relatively constant and growing over time because the additional kilowatt/hour billing will pay for the necessary rebuilding of facilities when the time comes. However, if a customer (say you) tests the standby transmitter for 15 minutes in a particular month, and then turns it off for six months, the utility must still be able to supply the demand for that period. However it can't derive much revenue because of the short period of time the load was connected. Because this very thing can and does happen, and not just in the broadcast industry, the electrical utility will adjust your demand charge upward if your load exceeds the normal level and exceeds it for a certain time, usually 15 minutes. It's a way of telling whoever is paying the bill that more attention needs to be paid to when and how unscheduled loads are connected.

Your home electric bill is quite simple. There is a basic service or meter charge which doesn't change month to month, plus a variable portion which reflects the number of kilowatt/hours used multiplied by the rate per kilowatt/hour.

Commercial users of electrical energy have an additional item called a demand charge or peak demand charge in addition to the

(continued on page 7)

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. . . continued

two listed above. The demand charge is essentially a penalty which the electrical utility adds to a bill, and is a charge based on the rate at which power is delivered. The charge is X dollars per kilowatt, not kilowatt/hours. If your main transmitter draws 40 kilowatts at rated TPO, and the demand charge is $4/kilowatt, your monthly demand charge is $160. ($4/kw x 40kw) This is in addition to the normal kilowatt/hour charge. Thus your monthly bill will consist of the demand charge, the charge for the number of kilowatt/hours used, plus the meter charge. This will remain reasonably constant month to month if the connected load remains equally constant.

However, let's say you run the standby transmitter one hour into a dummy load for testing. If it draws 25 kilowatts (assuming for purposes of illustration, that electricity costs 6 cents per kilowatt/hour) then you will have used all of $1.50 worth of electricity. *But,* an additional demand charge of $100 will be added to the bill. (25 kw x $4/kilowatt) An additional danger with some utilities is this: once that additional demand charge has been incurred, a percentage of that charge can remain on the recurring monthly bill for up to a year (depending upon the tariff of your utility), *even if you don't turn the standby transmitter on again in that period.* If we use an arbitrary retention figure of 75%, then you will have an additional charge of $925 over the period of a year. ($100 x 75% x 11 plus the original $100) This makes that short test period very expensive over time.

Power Factor

Most broadcast equipment uses a power transformer or other inductive device across the power line. In a transmitter there will be many of these devices such as filament and plate transformers as well as cooling blowers. All of these have an inductive component to them. From basics, you will recall that any inductive reactance will cause the current in a circuit to lag and be out of phase with the voltage. This indeed occurs in all of these devices mentioned above. The cosine of this difference angle is the power factor, which will always be a number between 0 and 1. If the load were totally resistive, the power factor would be 1. A perfect capacitor or a perfect inductor would yield a power factor of zero.

If the main transmitter has a power factor of 0.91 and requires 40 kw of energy from the line, then dividing 40 kw by 0.91 gives us an apparent load of about 44 kw. The current being drawn from the power line is equivalent to a resistive load of 44 kw. This higher current must be supplied by all the transformers and transmission lines involved in supplying power to your transmitter site, and it causes extra power losses in those components for which the utility isn't paid because the standard kilowatt/hour meter responds only to energy actually supplied to the load which in this case is 40kw.

The utility will correct poor power factors by installing capacitors on some primary lines because most customers present an inductive load. Just think of your own home and count the number of motors there. However if a commercial customer has a poor power factor, a second meter will usually be installed to measure the reactive load, and the customer will be billed accordingly. Fortunately, the power factor of most broadcast transmitters is such that additional metering usually isn't deemed necessary by the utility company. The utility with which I deal defines a poor power factor as anything less than 0.9. This figure will vary from utility to utility, however.

I'd like to thank the Eugene Water and Electric Board, and especially Chris Webb for her knowledgeable help, in getting some facts straight for both this article and the one last month.

John may be reached at 503-747-4501. Ext. 2478

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Engineering Data

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Frequency Designation of FM Broadcast Channels

Freq. (MHz)	Channel No.	Freq. (MHz)	Channel No.
88.1	201	90.9	215
88.3	202	91.1	216
88.5	203	91.3	217
88.7	204	91.5	218
88.9	205	91.7	219
89.1	206	91.9	220
89.3	207	92.1	221
89.5	208	92.3	222
89.7	209	92.5	223
89.9	210	92.7	224
90.1	211	92.9	225
90.3	212	93.1	226
90.5	213	93.3	227
90.7	214	93.5	228
93.7	229	97.3	247
93.9	230	97.5	248
94.1	231	97.7	249
94.3	232	97.9	250
94.5	233	98.1	251
94.7	234	98.3	252
94.9	235	98.5	253
95.1	236	98.7	254
95.3	237	98.9	255
95.5	238	99.1	256
95.7	239	99.3	257
95.9	240	99.5	258
96.1	241	99.7	259
96.3	242	99.9	260
96.5	243	100.1	261
96.7	244	100.3	262
96.9	245	100.5	263
97.1	246	1090.7	264
100.9	265	104.5	283
101.1	266	104.7	284
101.3	267	104.9	285
101.5	268	105.1	286
101.7	269	105.3	287
101.9	270	105.5	288
102.1	271	105.7	289
102.3	272	105.9	290
102.5	273	106.1	291
102.7	274	106.3	292
102.9	275	106.5	293
103.1	276	106.7	294
103.3	277	106.9	295
103.5	278	107.1	296
103.7	279	107.3	297
103.9	280	107.5	298
104.1	281	107.7	299
104.3	282	107.9	300

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Tech Tips From the Field

Practical Solutions to Practical Problems

ITC Mods and Recyled Preamps

By George Whitaker

First off this month, I want to share a "slapper" that I learned from one of the speakers at the S.B.E. convention in San Jose. Unfortunately, I failed to note from which speaker this tip came. Therefore, I am unable to give due credit and offer my apologies for this oversight. I like to give credit where credit is due.

Anyway, he gave me a solution to the problem of the car radio overloading when out at the transmitter. Many, many times I have jumped into the car and driven a mile or so down the road to see what the latest changes had done to the sound.

It turns out that all I really needed to do was take a clip lead and fasten it to the rain gutter, or other convenient place on the vehicle, and then to the antenna. This, of course, desensitizes the front end and allows normal reproduction even in the heavy field.

Speaking of the convention, I want to say that, in my personal opinion, the papers were the best ever. I learned a lot of things that I have already been able to put into practice. I believe that, if you don't do anything else, you should attend the S.B.E. National Convention.

Dr. Dave (that's Dave Graves) with KHYS in Houston has picked up some information for altering the response on the "cart machine that never dies." I, for one, still have about 12 of these decks in service and they all have the original boards in them. Therefore, I was glad to learn about:

Modifying Low End Response On The Old ITC

A lot of us still have ITC premium series cart machines around. It seems they were built so "bullet proof" they never seem to die.

However, one of my complaints has been that the low frequency "bump" was about 3 db too low. You can, of course, buy "wonder boards" for these machines. However, Dave Neal at ITC gave me this tip which I would like to share with you all.

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Tips From the Field

Continued from page 10

All you have to do is install a 200-250 ohm pot in the second audio driver emitter circuit. This will increase low end response by 4 or 5 dB. There are two play amp boards used in the premium series machines. If you have the 831-0027 board, replace R107 (left) and R126 (right). On the 831-0094 board, replace R107 (left) and R131 (right). Connect the wiper and one end of the pot in place of the resistor. You will now be able to adjust the low end at around 100 Hz. Start with maximum resistance and adjust so that your low end is where you want it.

I have modified several machines in this way, and believe me, it works. The difference in sound is quite remarkable.

One of the few things I find enjoyable about living in the Metroplex is, because so many companies are located here, information and parts are very readily available. I have, on occasion, dropped by the Continental Electronics field service office just to ask questions and learn things, even if what I was asking about did not directly relate to Continental. The folks there are always very helpful. The other day I called to get some information on something and wound up getting an excellent tech-tip from John Hutson. I don't remember the original purpose of the call, but I found out about:

Using A Scanner To Tune Receivers

If you have ever had the need to change frequency on 2-way or RPU gear, you may have thought you needed a synthesizer or communications monitor to do the job. It is possible to do an acceptable job with nothing but a scanner, a wattmeter, and a VOM.

The first step is to get the receiver local oscillator and its multipliers working. Most high band units multiply a receiver LO crystal by 3 and UHF units multiply by 9 or 12. (Example: A 161.7 receiver which has a 10.7 IF needs a 151.0 injection frequency. 151/3=50.3333 which is the crystal frequency). Put the scanner on 151.0 and peak the oscillator and multipliers in the receiver for the strongest signal on the scanner. You may also have to adjust the crystal trimmer until the LO signal is on frequency.

Next, we are going to use the local oscillator in the scanner as a signal generator to tune the RF stages in the receiver. My scanner (A Regency R1080) has a 10.7 IF and uses high side injection on low band and low side injection on high band and UHF. So, to get a signal on 161.7, add 10.7 and set the scanner to 172.4 mHz.

Lay a wire over the scanner and stick it in the receiver's antenna connector. Then tune the receiver RF stages for maximum signal, moving the scanner farther away as necessary to reduce the signal, as the receiver is tuned. Some receivers use very sharp cavity resonators in the front ends and will not pass a signal very far off in frequency. I have been successful in this case by removing slugs part way through the filter and putting the wire laying

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Radio Corporation of America - A division of Commercial Radio Company: RCA transmitter, phasor and antenna tuning unit parts.

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Tips From the Field

Continued from page 11

over the scanner through the hole and tuning the filter a little at a time.

After peaking everything, connect the receiver to the antenna and fine tune everything with an off-air signal. This is necessary because the piece-of-wire antenna we are using does not present a good 50-ohm source.

Transmitters are usually much easier. Just put a dummy load and wattmeter on it and tune everything for maximum. (Just make sure you are *not* turning any harmonic trap slugs!) If you are changing frequency so far that the transmitter will not put out any power at all, try putting an ammeter in the 12 volt B+ lead. Then start with the oscillator and first multiplier, and simply tune everything for peak current. Before long you should see output.

If this doesn't work, set the scanner on the desired transmit frequency and, starting with the transmitter oscillator, tune for maximum the same way you did with the receiver's local oscillator. Even if only the oscillator is working, you should be able to see its harmonic on-frequency.

The last step is often ignored. It consists of tuning the modulator coil (which you have already peaked for RF) for best symmetrical audio. Put a tone through the transmitter and a scope across the scanner speaker, and tune for best looking audio.

A word of caution is in order. *Do not* depend on the local oscillator in the scanner to zero-beat the transmitter's frequency. It isn't accurate enough. A base station on 450 mHz is only allowed a bit more than 1100 Hz frequency error. FCC rules aside, with 12.5 kHz channel spacing, if you are outside limits, you can seriously interfere with your neighbors. Use a known accurate counter or communications monitor for this.

Glenn P. Smith of WEOL-WNWV in Elyria, Ohio has come up with a "slapper" we call:

Recycle Turntable Preamps

Have you ever needed to match a -10 dB output to your console +4 or +8 input? We had several unused Ramko Research model SP-BE turntable preamps on hand that I found would easily do the job. Other similar turntable preamps might also be easily converted.

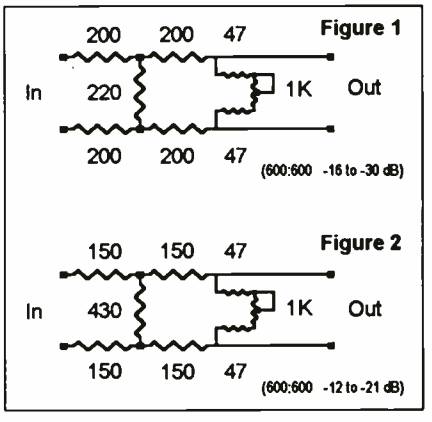
The SP-BE has a high gain first stage, which also provides the RIAA/NAB equalization for turntable use. If you bypass this stage by connecting the input to the second stage amplifier, you have a flat response audio amplifier.

In the Ramko preamps I did this by removing the jumper from the sensitivity adjustment trim pot and pin 13 (+input) of the second audio stage. Then I connected pin 2 to pin 13, to connect the input to the second stage. Since these units are stereo, I had to convert both left and right channels.

Measured results showed a maximum gain of 30 db with excellent response and distortion figures.

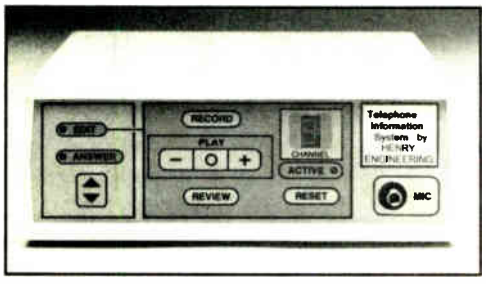
I have already made use of the following Tech-tip from Cliff Glascow of KROP-KSIQ in Brawley, CA. A variable pad can be a very handy thing to have around. It is also refreshing to find that I am not the only one who has trouble getting pots in correctly. Cliff tells us about a 600 To 600 Ohm Variable Pad.

There are two versions of this variable pad. The first (fig. 1), is the original design that I believe was "stolen" from something that Pacific Recorders built, although I am not entirely sure of its true origin.



It is very stable, impedance-wise, but has a lot of loss. The second version, (fig. 2) has less loss but is not as linear. However, with audio, it often isn't that critical. I've seen some pretty weird pads with "wrong" values that seem to work

(continued on page 14)



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Tips From the Field

Continued from page 12

with no adverse effects. The advantage to these is, of course, that you have considerable range to adjust in the event you need to change output level or equipment.

The trick is remembering which end of the pot to tie the tap to, so that CW yields a higher output and CCW less. I never can remember, so I just tack solder and check with my meter on the bench, then complete or change as necessary. (I honestly believed that I was the only one who ever had to do that.)

And a tip is a tip no matter what part of the station it refers to. Stu Englke of WZZD in Philadelphia says that, if you take the aluminum hub that comes from a 10-inch reel and lay it on the burner, it will keep the coffee from burning.

Well, that's it for this month and this year. Going into 1993 you will see some changes in Tech-Tips as this column will be expanded in the forthcoming issues. If you enjoy this information, I think you will find the upcoming changes to your liking.

Please note that **Radio Guide** has now opened an office in the Dallas-Ft. Worth Metroplex. The new mailing address for this column is:

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Grand Prairie, TX 75051

Editor's Note: I have been asked to prepare a paper on "STL Interference -- Horror Stories and Fixes." If you have anything you could contribute to this paper, please send it to me ASAP, as I will readily admit that my experience in this area is limited. This paper is to be presented on SBE day at the April NAB convention in Las Vegas. All contributors will be given credit at the presentation.

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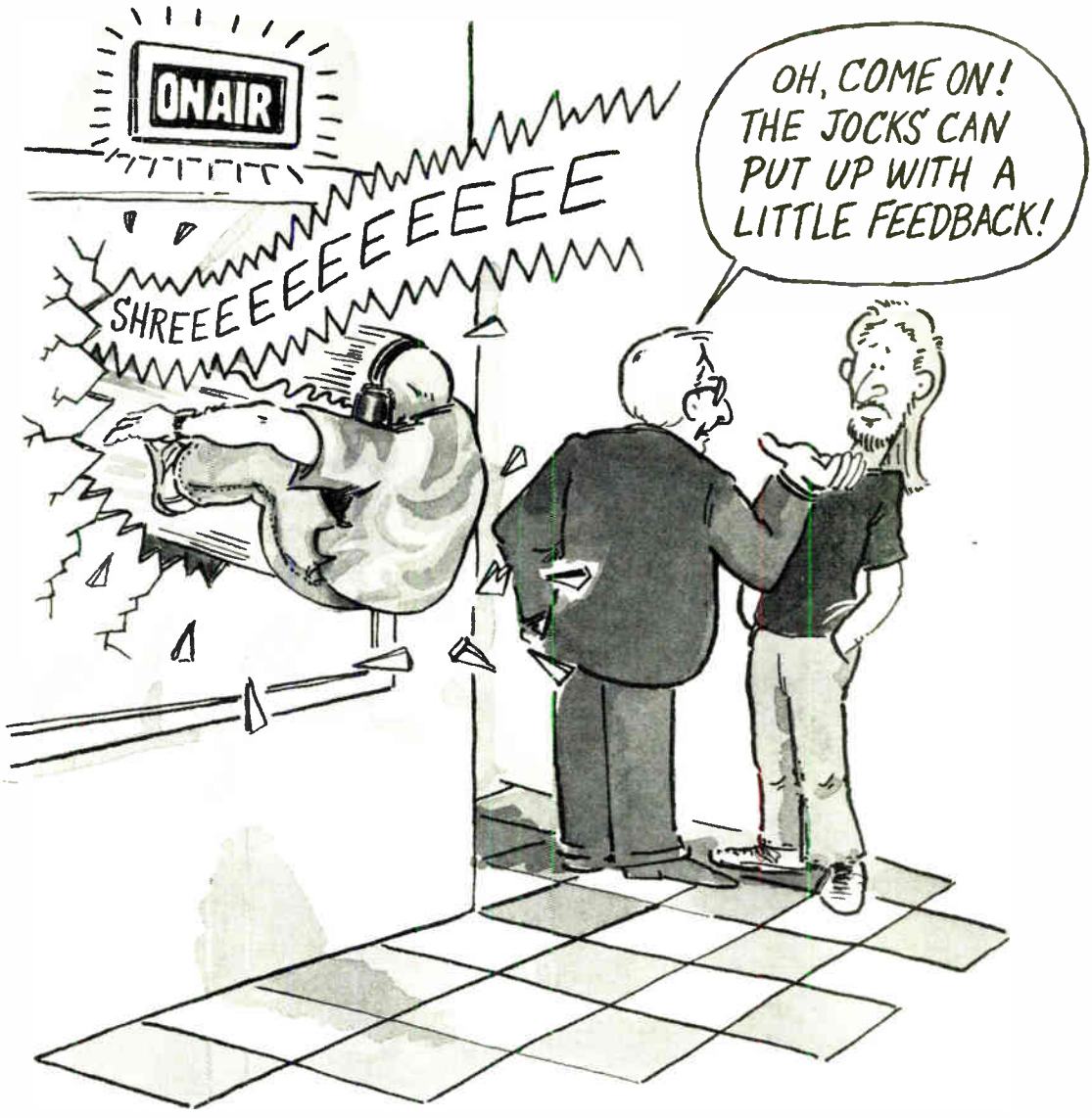

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Designing Your Studios

By Gordon Carter

We are finally to the point of designing our studio space. We have assembled our moving team, assessed our needs, and picked the space we will move into. The studio design phase of the project brings together all of the disciplines of the audio engineer. Designing a good studio space requires some knowledge of acoustics, electronics, ergonomics, architecture, structural engineering, air handling systems, and more. Fortunately you don't have to know all of this yourself if you have assembled a good team.

The first thing you have to look at is the space required for each room. To determine the size of each room you will need to know what equipment will be used in the room and how it will be used. This will, to some extent, determine the layout of the equipment in the room. As you look at various ideas, be sure to get feedback from the people who will be using the room. Remember that not everyone has an easy time relating to room layout drawings, so other techniques may be required to communicate the design. Depending on the resources available to you, you could use perspective drawings, models, full-size mock-ups, computer modelling, and more. As you lay out the equipment, be sure to allow adequate room for the people who will be using it, to get around and don't forget to allow adequate room for service access. I have seen many radio stations designed with all of the equipment pushed up against a wall so it requires a strong furniture mover just to plug something in.

While you plan the dimensions of the various rooms, be sure to allow for the necessary wall thickness and ceiling drop to conceal such things as conduits, air ducts, sound proofing, and structural members. Your studio designer and architect can help you with this.

As your layout takes shape, the necessary size of the room will become apparent. Be careful with the room dimensions if you want the room to sound even the least bit good. If the dimensions of the various sides are close to multiples of one another, standing waves could result that will make the room boomy or have other problems that will be difficult or impossible to tame. Various acousticians have come up with "ideal" room ratios to avoid standing waves in rooms, but reality may dictate a compromise. It is best to have your studio designer check the dimensions for possible

(continued on page 17)

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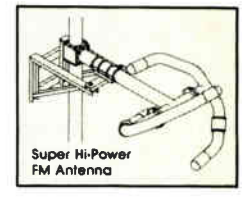
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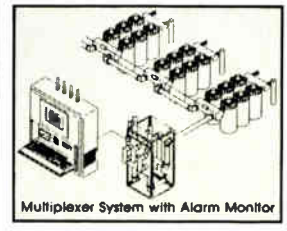
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Studio Site

Continued from page 16

interactions, with a computer program. You may want to move a wall a few inches to improve the sound, and it is easier to do now than later.

There are a myriad of concerns to be addressed with the mechanical design of your studios, relating to isolation and noise control. Your studio designer can discuss these with you in more detail and help work out the combination of techniques that is best for your situation and budget. Some things you may want to consider are floating floors, separate walls for adjoining studios, lead-lined walls, acoustic doors and windows, sound locks, and more. Each of these items has its own set of advantages and disadvantages, so you will want to weigh each one carefully.

If you are even the least bit concerned about noise in your studios, you will want to pay some special attention to the air handling system. For minimum noise transmission you will want any air handling devices (air conditioners and fans) located as far from your most critical room as possible. They should be mounted on properly designed isolation pads to reduce vibration transmission. An improperly designed isolation pad may actually increase vibration transmission and may fail prematurely.

The routing and design of the ductwork is very important to reduce rumble and air noise. The ductwork should be large enough to allow for adequate air flow to each room (determined by heat loading calculations) with as little velocity as possible. Any turns in the ductwork should be large sweeping turns, not sharp corners. When the duct enters the room it should do so in such a manner that the air is dropping into the room instead of blowing through it. Avoid corners near the air baffles and make sure the baffles are the low turbulence type. Any dampers that are necessary in the ductwork should be as far from the baffle as possible to avoid turbulence. If you have more than one room being served by the same air system, put as much ductwork as possible between rooms. This will help reduce sound leakage between rooms.

As you design your studios, be sure to allow for the necessary electrical systems. Your architect and local building codes will probably require some exit signs and emergency lighting. You will also need lighting for your operations. If your people like to work in low light (like Venus Flytrap on WKRP) that is fine. Just remember to have enough light available when it comes time to sweep the floors or work on the equipment. You really don't want to fight with a work light every time you need to clean some tape heads, do you?

Many designers like to use fluorescent lights for their low cost and

(continued on page 25)

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World Radio History

Network Radio That Is Really Local

By George Whitaker

Rocky Mountain Radio Applies New Technology To Create A Revolution

In my 30 plus years in radio, I have seen very few things come along that were really revolutionary – things that truly changed the way we did the business of radio.

The introduction of the ATC cartridge machine changed the business considerably. The Marti RPU certainly opened the door to economical remotes, and when SMN came along with satellite delivered programming, it made a tremendous impact on the thinking of small market stations.

Now, a couple of gentlemen from Colorado, working with several manufacturers, have developed what I believe to be the next real revolution: a local radio station that is, in reality, programmed from miles away with a system in which the capital equipment and recurring costs make it extremely economical. It could have been done before, if you had unlimited funds. But the real revolution is the system that makes it economically feasible.

Rocky Mountain Radio consists of seven stations in Colorado. All of these are owned by the network. The central studio is in Avon, and it is from this point that all of the programming, traffic, and billing originates. During a stop-set the spots, local weather information, and/or local news are sent down the network to the down-link stations with each one storing the information in its AUDISK for replay either minutes or hours later. The local listener only hears information tailored for his town. This is done via the ability of the AUDISK to be playing back a local ad at the same time it is recording one for use at a later time.

Looking at an example of how this works, lets follow a spot from production to playback.

In the production room the announcer, having completed the ad, will call up on a computer screen the files of the Network AUDISK. Then he will store the ad in the file assigned by the traffic program along with a code that tells on which down-link station this ad is to run. The ad is then held in "ready to send" by the Network AUDISK until the next stop-set. When the announcer pushes the "stop-set start" button in the control room, the Network AUDISK will first send a data burst that will tell the down-link station's AUDISK that the next ad coming next is for that station and where to store it. Then the actual ad is sent and stored in the local station's AUDISK.

The program log information is also sent to the individual stations each hour, in the form of data packets, so that each down-link station's AUDISK knows which announcement to play at what time.

At KZYR, the originating station, the programming is actually from the satellite feed in order to keep it operating exactly like the other down-link stations. The announcer has two computer screens in the control room. One of them is the network AUDISK and the other is the KZYR AUDISK. By observing the screens, the annoucers can keep up with what is going on at the network level, and they can hear the station in which they are located operating just like the other down-link stations.

Cliff Gardiner, a long-time radio man and investment banker, took the idea of programming stations from a central location using satellite delivery as his starting point. This concept was, of course, in place all across the nation.

He then added the following criteria: local ads would be run at each station, as well as local weather, news, and time. But all of these would originate at the central studio. All traffic and billing would be handled at the central studio location.

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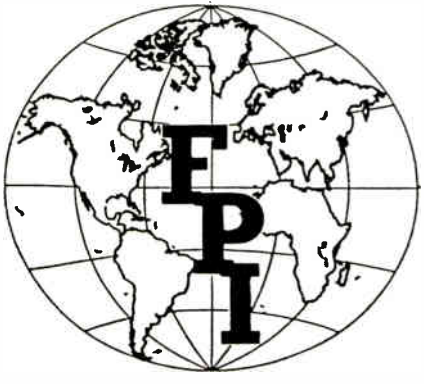
"Serving the World With Quality"



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World Radio History

Station Stories

Continued from page 18

If these items could be accomplished, it would allow for operation of the down-link stations with nothing more than a person to maintain the office during business hours and a sales staff.

As Cliff tells it, "I determined that I wanted to have a way to run local radio stations from one location and not give up *anything* that makes them local.

Our first priority was to make the radio stations sound local. This means that you have to have local weather, local news, and the ability, every hour, to easily interject local comments and local talk. But yet we had to find a way to save all that operating cost."

At first, the economics would just not work. Then Cliff met up with Marty Hijmans, an area engineer working with National Supervisory Network and others. Through his experience with NSN, Marty was familiar with VSAT (very small aperture terminals), and also with the MUSICAM compression system, which would allow them to put stereo audio and a data channel in a bandwidth small enough to become economically attractive.

Marty came to work with Cliff at Rocky Mountain Radio, which is located just about a half a mile from National Supervisory Network in Avon, Colorado. The two of them then set about to assemble a system that would meet the criteria that Cliff had established.

As Cliff tells it, "When I first started looking at doing this, which has been about two and a half years ago now, the only way that I could find to deliver this kind of programming to radio stations was to use an audio subcarrier on a video transponder. An uplink to do that would have cost us about $120,000 and the satellite time was going to be $22,000 a month. Then I discovered that we could lease an SCPC. Even then, the uplink would have been about $60,000 and the satellite time about $7,000. And, of course, these would have been analog instead of digital.

Marty Higman, in Rocky Mountain Radio Technical Operations

As Marty got into it he discovered that we could use the VSAT technology with the MUSICAM

(continued on page 20)

A Point-To-Point Audio Transmission Problem Solved

WGUC FM is the University of Cincinnati's prestigious classical music NPR station. It is located adjacent to Music Hall which hosts the Cincinnati Pops and Symphony Orchestras. Its audio quality is scrutinized by listeners who have come to expect a tradition of excellence. When WGUC chose two of T-TECH's Pro-Audio Fiberoptic STL's, one from studio to transmitter, and the other from transmitter to studio, its expectations of sonic transparency and freedom from code compression delays were fully met. WGUC's chief engineer, Brent Reider, describes his experience with the system:

"I was impressed with the ease of installation -- these are well constructed units. T-TECH has thoughtfully designed the system from the ground up. With four DC to 67 kHz circuits to and from our transmitter site, our remote and monitoring capabilities have multiplied. The link sounds great and is free of the encode/decode delays which our announcing staff had noticed with another digital audio link. I have utmost confidence in the link's performance and reliability. Most importantly, I am assured of full support from T-TECH."

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World Radio History

Continued from page 19

compression system. Now our uplink cost us $22,000 and our air time for a stereo channel, plus data, is $2400 per month. That's an amazing progression in 2-1/2 years."

The AUDISK was selected as the medium for storage, the MUSICAM based ComStream VSAT system was selected for up and downlinking and the BURK ARC-16 was selected for transmitter control.

Marty continues the story from his point of view, "Before I came to work with Cliff, I was working with Bill and Muffy at National Supervisory Network. That's where I was introduced to a lot of this equipment because NSN did a lot of pioneering on how to deliver digital audio on VSAT. NSN was very crucial in making this work.

As far as we know, we're the first to use the new ComStream equipment with MUSICAM encoding. They previously had an APT product that had been in use for several years. The new developments in ComStream equipment, however, gave us a lot more than just audio and a data channel. Built into the ComStream system was the ability to cause contact closures and to make the receivers agile by remote control so that we could switch to different carriers, if necessary. That was a quantum leap in features for a lot less money.

We knew then how we could get the signal from the network origination point to the affiliates. That was the first step.

Next was some kind of automation. In surveying all the automation manufacturers' products, that were available at the time, it was clear that AUDISK was way ahead of everybody else out there. They actually had experience in other countries networking their product and doing *some* of what we needed to do. So, they had a giant head start. And, I believe they still do."

Since they were starting out to do something with computer based systems that had never been done before, the big hurdle was software. At this point Tim Valley, with Gentner Electronic's AUDISK, became an integral part of the team and, working with Marty, wrote and rewrote the software as the hardware and software were being field tested at Rocky Mountain Radio.

The results of their efforts are now being marketed jointly by the three companies primarily involved with the development. The programming package by ROCKY MOUNTAIN RADIO, (303) 949-0140, the AUDISK and software package by GENTNER, (801) 975-7200, and the up-link, down-link and transmitter control package by NATIONAL SUPERVISORY NETWORK. (800) 345-VSAT, They have

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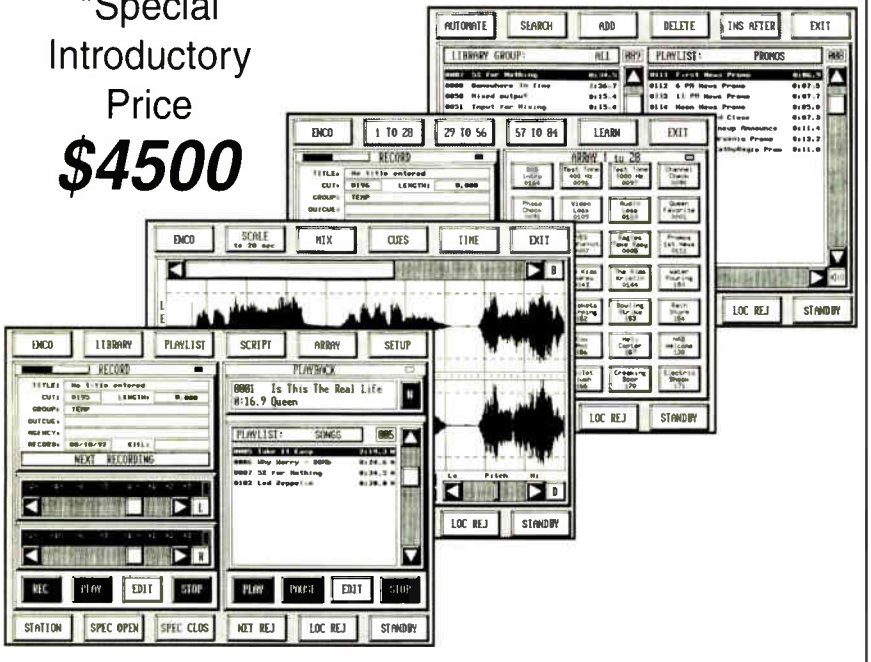

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World Radio History

Continued from page 20

Cliff Gardner, with up-link showing compact size dish requirements

a very cooperative effort going and any one of the three can help you with tailoring a system to meet your specific needs.

During my visit, I could feel the excitement as the concept continues developing. The first affiliate station not owned by the parent company is due to go on line in January. A dedicated channel for feeding the local information will be in operation by the time this article goes to press. And, negotiations are in progress with several stations in Colorado and California to become affiliates or network O & O's.

A lot has been said and written about Rocky Mountain Radio as the development process has been going on. However, having visited Avon and seen the operation, (or more importantly, *heard* the operation), I think that it is safe to paraphrase Colonel Pickering and say, "By George, I think they've got it!"

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World Radio History

The Second Effort

By Mike Patton

We've talked in this column before, about what I feel is important to check when I go to a seldom-visited radio station; that is, "engineering triage," the life-and-death problems a station is likely to have and how to stop the worst "bleeding." But what about the station that you see regularly?

At stations that choose to spend enough money on engineering to allow you to make a second effort, you need to be on the ball to stand out from the next contract engineer. In this month's column we will look at making that second effort.

You can and should always give your clients an extra effort, but you have to keep your priorities straight. It doesn't make sense to worry about how clean the top of the transmitter is when the transmitter itself is a smoking ruin. But you might be surprised at how some simple things can make your job easier and make your client's station work and look better. Here are some examples:

Manuals:

Make a list of all the equipment the station owns. Don't forget items like remote broadcast and sports equipment, plus the equipment at the transmitter site. Note the serial numbers and give a copy of this list to the G.M. as an equipment inventory, while keeping a copy in the engineering files.

Check your list off against the manuals at the station. Order any manuals that are missing, or make a copy of one from another station (I'm not actually advocating that you violate the copyright laws, you understand). Many times equipment comes in pairs or sets (STLs, phono preamps, audio processing, etc.), including a manual for each unit. You can take the extra copy to another site or station where it is needed (with the owner's permission, of course). Make sure that the manuals are really at the site where they are needed, e.g., the exciter's book does you absolutely no good at the studio.

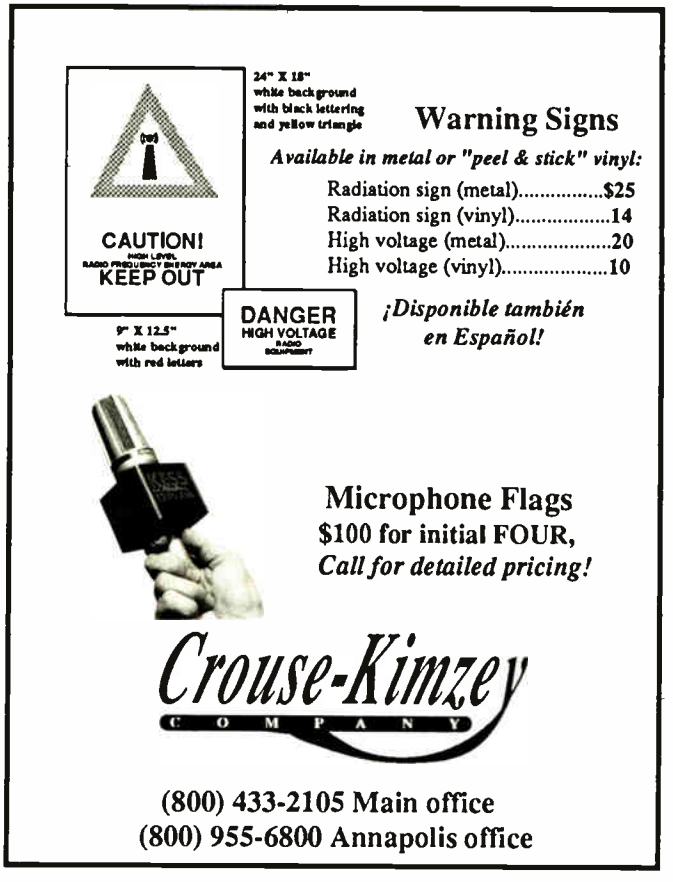
Equipment like remote controls and STLs that have a studio end and a transmitter end often come with only one manual that covers both units. Theoretically this equipment should come with two books, but over the years one is likely to have been misplaced or lost. To be useful, you must have a copy of this book at each site. (I think that you can safely copy for your own use a book that you already own without running afoul of the copyright laws.) If you work at it, you can even locate manuals for consumer gear the station might own, like cassette machines and CD players. A side benefit of making sure that you have all the books is that they end up in one place and in some semblance of order.

Fuses:

While you're going through the manuals, make a list of all the fuses that should be in all the equipment. Add up the totals, but keep a list of which equipment takes which fuses. Go and get the right fuses (at least a box of five for each value needed). Then, go around the station and check the equipment for proper fuse types. I have been amazed at how many times I have found a 20 Amp "No-Blo" in place of a 1/2 Amp fuse. You may find a piece of equipment that has been working but blows the correct value fuse because of a hidden problem. Presto! You have found a problem before it was a problem, hopefully a very impressive feat.

Unless you've laid the proper ground work with management, you may catch hell for "breaking" the equipment. So don't pick a bad time to play musical fuses (e.g., don't "fix" the RPU transmitter the

(continued on page 23)



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Contract Engineer

Continued from page 23

Friday before the state football championship game). As with manuals, make sure that the right fuses are at the right site.

Parts:

Take a day and dig up all the spare parts scattered around the station and gather them in one place. Go to Wal-Mart and buy a cabinet of drawers or other organizational device and put your parts in order (as opposed to on order). Get what spare parts are needed.

Many manufacturers have recommended spare parts kits for their equipment. If you know from experience that a particular part is prone to fail, stock several. If you're not familiar with a piece of equipment, talk to an engineer who is, or ask for opinions at the next local SBE meeting, or talk to a field service person at the factory (if they are willing to admit that their equipment fails).

Make sure that there is a good stock of common parts like light bulbs, pinch rollers, capacitors, and air filters. Be sure that alcohol and q-tips are on hand in each studio. As with any engineering expense, before you spend any money (particularly your own), make sure that management knows, approves, and has agreed with you on how you will be reimbursed.

Transmitter Site Supplies:

The three topics discussed above obviously apply also to transmitter sites. There are some special considerations for these sites, which are usually remote and not visited very often – and not very hospitable, either. A list of things I have found indispensable at transmitters includes: toilet paper, paper towels, rags, solvents and hand cleaner; spare overhead light bulbs, flashlight (and spare batteries); wasp spray, first aid/snakebite kit; emergency hand tools and test gear (an old Simpson 260, maybe); a garbage can and extra bags, shelves for the parts and supplies, chairs (at least 2), and a workbench/table (even a card table beats troubleshooting something sitting on the floor); station license and posting statement copies, pen and paper, a blackboard for making notes, phone books for the city of license, the community where the transmitter is located, where the studios are located (if they are different), and the nearest big city. Also include a phone number list which should have key station employees' home, car and pager numbers, studio hot line numbers, your (the contract engineer) numbers and those of your employees (in case a station employee has you walk him through some simple repair to save you a trip), parts house numbers, police and fire department numbers, and the nearest pizza delivery service (very important). I am always adding to this list, so I'm sure that it is still very incomplete.

Next month we will examine the care and feeding of that most unusual species, the general manager.

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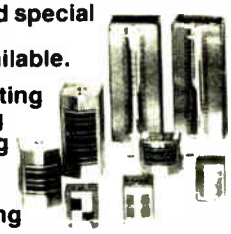

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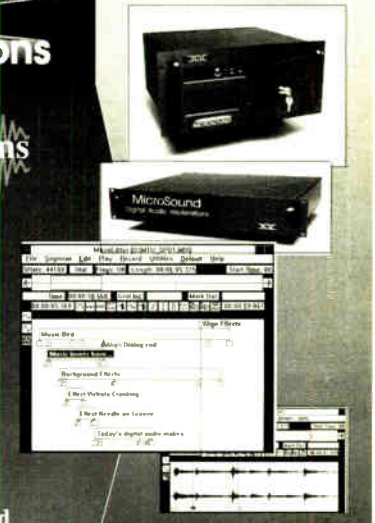

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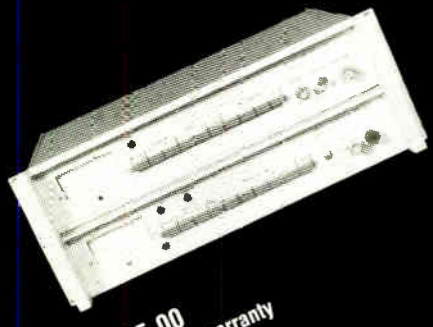

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Studio Site

Continued from page 17

high efficiency. If you choose to have fluorescent lights in your studios, have the ballasts for the lights located outside the studio itself. Ballasts hum, especially as they get older, and this can be a real annoyance to your people and your listeners. Another popular item is dimmers on incandescent lights. If you use dimmers, be sure to get the "zero-crossing" type which greatly reduce the electrical noise generated by the dimmer. I have seen complete control rooms rendered useless by one improper dimmer at the other end of the building.

While on the subject of power, be sure to put all of your technical equipment on the same phase of the AC power. If possible, have a special transformer installed that steps down to a true single phase. If this is not available, make sure the phases are balanced to prevent line-induced problems. Also, take whatever precautions are necessary to insure that your power is clean. Dirty power can create noise and operating problems with some equipment and may even shorten its life. ■

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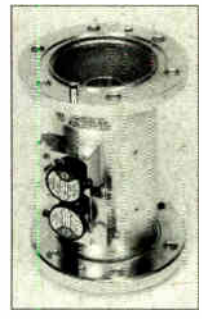

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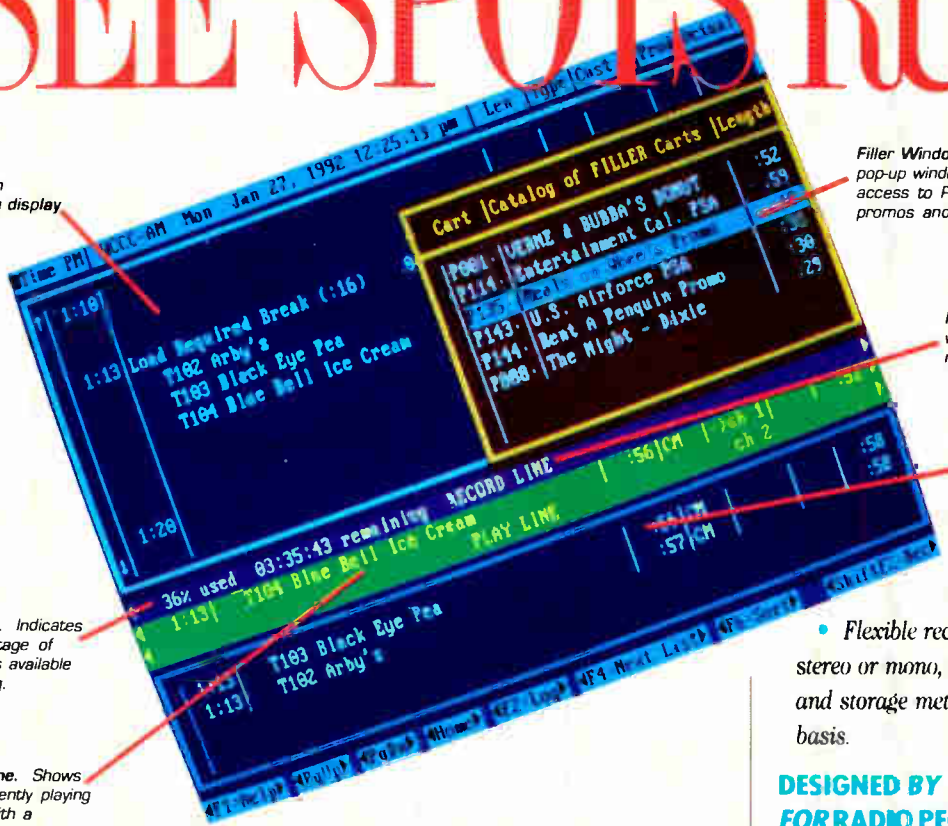

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