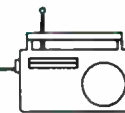


# Radio Guide



Radio's Technology Forum

April 1996

## Radio Reply Cards

You'll notice a change in the Radio Guide this month. Instead of integrating the equipment advertisements with the editorial copy, as we've done in the past, the Radio Guide will now consist of 100% editorial copy.

To make it easier for you to respond, and receive information from our advertisers, we've created new postage-paid Radio Reply Cards. Every month, in your Radio Guide envelope, you'll receive these new equipment information request cards.

You'll find product information from our supporting advertisers on each card. Please take a look at them. Then fill in your name and address on all the cards that you'd like more information about. Drop the postage-paid cards in the mail, and we'll take care of the rest.

## FCC Audio Service Webpage

The FCC has created a new Webpage at:  
<http://www.fcc.gov/mmb/asd/asd.html>

You can find phone numbers to call for application status and information. You will also find status reports listed for AM, FM, and FM translator modification applications. Also available, is an FM query form, and selected public notices.

## FCC Daily Updates On Line

Elliot Broadcast Services has available the daily FCC Actions and Applications on line at its website:

<http://www.radiostation.com/fccdaily.html>

They also have AM/FM searchable databases on line. Check it out. This is a not-to-be-missed site on the WWW.

*Ray Topp*

## Here's How to Reach Us . . .

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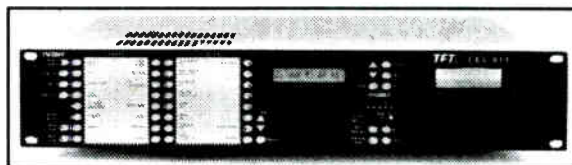
WEBSITE: <http://www.radio-guide.com>

TELEPHONE: 507-280-9668

24-HOUR FAX: 507-280-9143

## TFT EAS from ABG

*You Gotta Have It!*



The clock is ticking ... Deadline to meet  
FCC EAS compliance is January 1, 1997.

Don't wait until the last minute - call now for free  
information on rules and regulations,  
products, pricing and delivery.

**EAS EMERGENCY ALERT SYSTEM FROM TFT & ABG**  
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Next Month: *More FCC Information*  
*More Satellite Radio Guide*

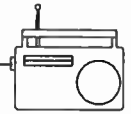
# Radio Guide

April 1996

Volume 8, Number 4

## The SBE Forum

From the SBE National Office



### Radio Guide Publication

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## EAS Equipment Available

The only manufacturers to submit designs to the FCC for certification have been awarded that certification in late January. TFT and Sage Alerting say they will have plenty of product for sale at the April NAB Convention in Las Vegas. Both companies have pricing available if you contact them or one of their distributors. With certification coming this early in the year, the January 1, 1997 EAS implementation date appears attainable by broadcasters.

The EAS Committee has a few tips for you as you begin to shop for EAS equipment.

We urge you to purchase equipment with more monitoring inputs than the two that are mandated by the rules. We feel that the full utilization of the system for local emergency alerting purposes will evolve over years. If and when your local system is developed or expanded, and your station participates in it, you will find a need for additional monitoring inputs of local emergency sources. It will be less expensive to purchase them up front with the equipment now than to add them later. We feel that four audio monitoring inputs will be adequate for most stations.

The FCC will allow for addition codes to be added to local systems with proper approval. This brings concern that the equipment you purchase will allow adding codes in the field. It would be wise to check with the equipment manufacturer to see if you can add codes to the encoder and decoder yourself, or if it will require factory intervention. If so, get an idea of how much additional cost will be incurred at the time. Make sure to factor this into any price comparison you do.

Once you have been assigned your new monitoring sources, determine if you will need to purchase receiver modules with your EAS equipment. Remember, you are only interested in the demodulated audio from these sources which you can get from any good receiver/antenna. However, if you feel more comfortable with a fixed tuned factory module to provide this audio, factor in this cost before comparison.

If you need to service more than one station with the same encoder/decoder, you will need to shop carefully. Each manufacturer has a way to do this, but costs vary depending on how many stations are involved. Also consider the need you may have to remotely control the equipment from multiple studios. Again, both manufacturers have different ideas and costs on how to accomplish this. Shop carefully!

If an entire area purchases equipment from the same manufacturer, there can be large discounts involved. Each manufacturer offers such discounts but you will need to get together with your fellow broadcasters and cable systems before you shop.

Your State Emergency Communications Committee (SECC) is making decisions now that will affect your station in the new EAS. Some of the decisions being made now include: 1) Your station's monitoring assignments. 2) Your station's EAS designation and responsibilities. 3) Your state's relay infrastructure. 4) Your monthly testing schedule.

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# Going in Circles Again

Gordon Carter — C.E., WFMT, and Owner, Professional Audio Services [312-565-5032]



A number of years ago I wrote an article for Radio Guide (April, 1991) about turntable maintenance. I concluded that article with the following statement: "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."

If you're reading this and thinking that this has nothing to do with you, read on. This may affect every broadcast engineer in the country.

The radio station I work for is one of the few left which regularly uses LP's. We are a classical format, and some of the older recordings have not been re-released on CD. As a result, we are forced into keeping some turntables around. In fact, we even use 78's regularly. Now I know that the classical broadcasters are few and far between, but many stations do have a turntable or two around for playing "oldies" that have not been re-released. You may only be playing them enough to transfer to tape, but that is enough.

We recently moved our radio station (which is partly responsible for the absence of this column over the last few months), and one of the more interesting challenges was relating to turntables.

As we investigated the possibility of new equipment in all areas of the facility, it became painfully obvious that we were going to have trouble with turntables. Most of the more common turntable models have been discontinued. For instance, as near as I can determine Technics only has one model available. Many others have simply quit making turntables all together. There are a few "purist" turntables available, but they are just too expensive for most radio stations (some cost as much as \$10,000). As a result we decided that we had to keep our old SP-15's going for a few more years. We need fewer turntables in our new space than we did in our old, and were offered quite a bit for our old turntables, but they're not for sale. They may become our primary parts supply in a few more years.


The next part of the puzzle is the tone arm. Again we decided that the only practical approach was to keep our old tone arms. Fortunately we were able to get the manufacturer to completely refurbish our tone arms so they should be good for a while.

Phono cartridges and styli are yet another problem. We have been informed by one of the major manufacturers of cartridges that they will be cutting back on the variety of models available. This is partly due to demand and partly due to the escalating cost of industrial diamonds in the diminishing quantities they are using. Unfortunately, the lines they will be keeping are not necessarily the ones we

need, but the ones that sell the most. At this point we are talking about styli for LP's. 78's are another story. They have informed us that they have already discontinued the 78 styli for the cartridge we use. In another year or so the only 78 styli you can buy may be from specialty manufacturers at greatly inflated prices.

We found a similar story as we looked at phono preamps. It appears that there are only one or two on the market for broadcast use. If you want to pay for it, you can buy a "purist" unit (maybe even one with vacuum tubes) but the price will be up in the stratosphere. We opted to build our own using some Analog Devices IC's. The circuit is an update of one found in their 1991 Audio Applications Guide.

Now that I've told you all of this, what does it mean to you? If you are currently using turntables and plan to continue to use them, you may want to stock up on parts and supplies. You may want to consider the possibility of transferring all of your black vinyl to some other medium for air play. Be sure to keep your tone arms adjusted properly to minimize wear on the stylus and the record. If you aren't using turntables, just file this away in the back of your mind somewhere. When the Program Director decides to pull out the "oldies" from black vinyl, you may have quite a search to find the means to play them back.

Black vinyl is not dead yet, but it sure isn't healthy. Just ten short years ago we thought that nothing would replace it, but the CD has. How long will it be until something comes along to replace the CD? 

## Radio Guide Quick-Tip

*From SBE Chapter 17 Newsletter*

***Everyone knows about Radio Shack, but here are a few more parts companies that may be of help:***

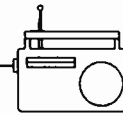
**Palomar Engineers**  
PO Box 462222, Escondido, CA 92046  
Phone: 619-747-3343

**C. Crane and Company**  
558 10th St., Fortuna, CA 95540  
Phone: 800-522-8863

**Ramsey**  
793 Canning Parkway, Victor, NY 14564  
Phone: 716-924-4560

**Grove Enterprises Inc.**  
300 South Highway 64 West, Brasstown, NC 28902  
Phone: 800-438-8155

# FCC Proposes Minor Mods Without CP's



Obtained from the FCC website at: <http://www.fcc.gov>

## ACTION IN DOCKET CASE, March 22, 1996 (MM DOCKET NO. 96-58)

### Commission Initiates Rule Making Proceeding to Allow Broadcast Stations to Implement Certain Types of Minor Modifications of Licenses Without a Construction Permit

The Commission has adopted a Notice of Proposed Rule Making to modify portions of Section 73 and 74 of the rules to permit broadcast stations to implement certain types of minor modifications of their facilities without first obtaining a construction permit authorizing the modifications. The Commission's Rules generally require that modifications of broadcast licenses and permits may be accomplished only through a two-step process: first, the station files an application for a construction permit, and second, after the facilities are modified, the station files an application for a license for the modified facilities.

However, because certain types of minor modifications are unlikely to have any impact on other stations, the requirement of prior review and authorization of the change by the Commission staff often involves redundant analysis and unnecessarily delays the implementation of such changes.

Pursuant to a request from the Commission, Congress included in the Telecommunications Act of 1996 a specific provision (Section 403(m)) that authorized the Commission to allow certain types of minor modifications without the need for a construction permit. With this new authority, the Commission, in the Notice of Proposed Rule Making, has proposed that the types of minor license modifications discussed below be permitted without first obtaining a construction permit.

In addition, in the Notice, the Commission explicitly seek suggestions from the public and the broadcast industry as to additional types of minor modifications that could be effectuated through a one-step licensing process without prior approval of the Commission. The Notice also proposes some additional changes to relevant rule sections to make clarifications and to conform the rules to existing policy.

The Notice proposes that the following types of minor license and permit modifications would be permitted to be implemented without the prior authorization of the Commission, provided that the licensee or permittee file a modification of license application, using FCC Form 302, within 10 days of effectuating the change:

1) Commercial FM stations would be permitted to increase effective radiated power up to the maximum level for the class of station;

2) FM and television stations would be permitted to replace one directional antenna with another;

3) FM stations would be permitted to delete contour protection status under Section 73.215 of the rules where the stations they are providing contour protection move to fully spaced locations;


4) FM stations would be permitted to use formerly licensed main transmission facilities as auxiliary broadcast facilities;

5) FM and television stations would be permitted to change vertically polarized effective radiated power (ERP); and

6) FM and television stations would be permitted to make slight changes in antenna radiation center height.

In addition, the Notice proposes that requests for waiver of the main studio location rule be made by letter with supporting documentation rather than by filing a construction permit application; and that commercial stations seeking to change to noncommercial status file a one-step modification of license application rather than a construction permit application followed by a license application. In both of these cases, prior Commission approval would still be required before the proposed change could be implemented. In addition, the Notice proposes that directional FM stations would be allowed to commence automatic program tests at reduced power upon completion of construction without the prior approval of the Commission.

Comments on the proposed changes to the rules are required to be filed by May 16, 1996. Reply comments are due by June 17, 1996.

Action by the Commission March 19, 1996, by Notice of Proposed Rule Making (FCC 96-118). Chairman Hundt, Commissioners Quello, Barrett, Ness, and Chong. 

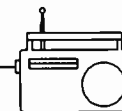
### Radio Guide Quick-Tip

*From Dave Young — KTLE-FM, Tooele, Utah*

*I use a weather "radio" to get local weather from NOAA, but in our computer-rich environment, I was unable to use the radio, due to interference.*

*I connected the radio to an external antenna, but I still had interference. Finally, I covered the radio with foil and grounded the foil to the shield on the antenna coax. Problem solved!*

# FCC Revises Multiple Radio Ownership Rule



Obtained from the FCC website at: <http://www.fcc.com>

## MASS MEDIA ACTION

March 8, 1996

### FCC Revises National Multiple Radio Ownership Rule and Local Radio Ownership Rule in Accordance With the Telecommunications Act of 1996.

The FCC has revised its national multiple radio ownership rule and local radio ownership ("radio contour overlap") rule, thereby conforming these rules to provisions of the Telecommunications Act of 1996. The revised national multiple radio ownership rule will eliminate caps on the number of AM or FM broadcast stations which may be owned or controlled by one entity nationally. The revised local radio ownership rule will increase the number of commercial radio stations an entity can own in a local radio market.

With regard to the national multiple ownership rule, commercial radio ownership on a nationwide basis generally has been limited to no more than 20 AM stations and no more than 20 FM stations. An additional 3 AM and 3 FM stations has been allowed if they are small business-controlled or minority-controlled. The Commission has eliminated these national limitations in accordance with Section 202(a) of the Telecommunications Act.

With regard to the local radio ownership rule, Section 202(b)(1) of the Telecommunications Act directs the FCC

to revise the permissible number of commonly-owned commercial radio stations in a local radio market as follows:


(A) In a radio market with 45 or more commercial radio stations, a party may own, operate, or control up to 8 commercial radio stations, not more than 5 of which are in the same service (AM or FM);

(B) In a radio market with between 30 and 44 (inclusive) commercial radio stations, a party may own, operate, or control up to 7 commercial radio stations, not more than 4 of which are in the same service (AM or FM);

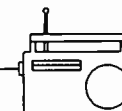
(C) In a radio market with between 15 and 29 (inclusive) commercial radio stations, a party may own, operate, or control up to 6 commercial radio stations, not more than 4 of which are in the same service (AM or FM); and

(D) In a radio market with 14 or fewer commercial radio stations, a party may own, operate, or control up to 5 commercial radio stations, not more than 3 of which are in the same service (AM or FM), except that a party may not own, operate, or control more than 50 percent of the stations in such market.

Action by the Commission March 7, 1996, by Order (FCC 96-90). Chairman Hundt, Commissioners Quello, Barrett, Ness and Chong.

News Media contact: Rochelle Cohen at (202) 418-0500. Mass Media Bureau contact: Alan Aronowitz at (202) 418-2130. 

## Tower Maintenance



From *Broadcast Communication's*, Tower Communication publication.

The minimum standards set forth by EIA are that guyed towers should be inspected once in three years, and that self-supporting towers should be inspected once in five years. Conditions at each site, like high winds, salty air near oceans, or regular icing, can place undue strain on tower components, requiring more frequent attention.


Many insurance carriers now require yearly inspections before a policy is renewed. This is due, in part, to the increasing occurrence of collapse in older towers.

An initial inspection of a newly erected tower should take place within six months. If the tower is guyed, tensions will need to be taken due to stretching of new guy wire. After that, tensions should be taken every two years and kept within the EIA standards.

1. Have your tower inspected within the first 6 months after initial installation, including tension of the guy wires.

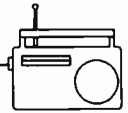
2. After the first year, have your tower inspected yearly, especially if you have a lighting system.

3. After the initial tensioning of guy wires, have them checked and re-tensioned every two years. If you find a problem sooner, have an inspection and tension done as soon as possible.

Data compiled during an inspection is extremely important and can help catch potential problems. Maintenance companies use different methods and documentation during inspection. If you change companies frequently, problems may not be detected before major damage to the structure occurs. 

# A Do It Yourself FCC

Andy Butler — B&G Consultants, Annandale, Virginia [703-739-5474]



A do it yourself FCC? Before you laugh, let me share some thoughts from Mass Media Bureau Chief Roy Stewart. Stewart recently told a group of consulting engineers that he's actively seeking creative ways to meet the Commission's future workload. The problem is money. The FCC doesn't buy big ticket physical items like submarines or bombers. Nearly all of the Commission's budget goes to pay personnel or meet their direct support costs. If the budget gets cut, people have to go.

The future looks challenging. Right now the Commission is taking about four months to process basic mass media filings. In addition to routine business, the attorneys and engineers have to deal with rules changes and regulatory maintenance in response to new technologies and congressional edicts. Implementing the Communications Act requires some sixty separate rule makings. Each of these must include the full cycle of soliciting and reviewing initial filings followed by reply comments and then the final rulemaking. At present staff levels, the added work will delay routine processing significantly. Add the very real probability that staffing will be cut by 20 to 30 percent, and it gets really scary.

A number of possible solutions are being considered. One scenario would move some additional tasks from the commission staff to volunteer industry groups. One example is contracting with an outside service or group to conduct all commercial operator license exams. Another would be sanctioning industry groups modeled after the National Frequency Coordinating Council to coordinate main facility licensing and resolve interference allegations between licensees. A less radical approach would assign specific routine application processing matters to outside contractors. Stewart noted that Washington's present cadre of Consulting Engineers might be logical choices to assume such tasks.

Setting up such radical new approaches will obviously require careful study and informed input. The commissioners are likely to direct a majority of the staff's attention to new technology and regulatory revision. Such a policy would relegate the activities that most directly affect your daily business, to the contractors or volunteers. This is an opportunity and a risk. The opportunity is that Stewart is seeking our informed input. The risk is that he won't receive good strong direction and commitment from the industry. It benefits each of us to think seriously about how to meet the challenges the changes present.

The Washington consulting community is excited by the revenue opportunity of providing the routine process-

ing services. As the primary "customers" we need to suggest appropriate safeguards to insure that any out-sourcing of services yields good results. Be watching for opportunities to offer your opinions.

While out-sourcing license processing sounds dramatic, the real challenge is likely to be dealing with technical matters in the field. Who are you going to call to resolve an interference complaint when the nearest field office is several states away? Is there a practical way for local licensees or contract engineers to effectively police their own regions? Many people are suggesting that the only practical recourse will be the civil justice system. If a station causes interference that damages your business, you may be forced to hire your own experts to document the situation then file for an injunction to stop the practice followed by a lawsuit to recover damages. This is a good revenue opportunity for some engineers and lawyers, but it will certainly put an additional burden on station operators. As an alternative, is it possible for such conflicts to be resolved by a volunteer group without creating a system of vigilante justice? At the very least it will require a lot of dedicated work by well-intentioned and knowledgeable people to handle this new situation.

A key regulatory challenge will be resolving competing facility applications. Do we agree to live by chance lotteries? What kind of group could be empowered to decide among competing applicants? Perhaps we could borrow a page from labor relations practices and ask all parties to agree to binding arbitration. The arbitrators would be recognized industry experts and their decisions would be accepted by the Commission and the Licensees. The competing parties would share the cost of arbitration. Perhaps the existing state and national broadcaster associations would provide the logical underpinnings for such a system. Are there better models to consider from other industries?

It is tempting to throw a party when controls that have seemed to choke us are removed, but this time the hangover from the celebration could be fatal. The Federal government is changing the rules and eliminating the referees in a game we all know. How will this affect the play? If we want to keep playing on a familiar field, we have to create practical ways to replace some of the functions that FCC watchdogs used to perform. If we as an industry fail to act decisively, the goal posts we know how to hit may vanish from view. **RG**

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# The Twin-T Notch Filter

Jim Somich — Radio Engineering Services, Broadview Heights, Ohio [216-546-0967]



The Twin-T Notch Filter is an extremely versatile circuit for the broadcast engineer. It finds application wherever it is desirable to reject a specific frequency or narrow band of frequencies, while having little or no effect on all other frequencies in the band. The basic filter circuit is diagrammed in Fig. 1. A practical application of the Twin-T Notch filter is shown in Fig. 2.

Theoretically, this filter can have infinite rejection at its design frequency. Practically speaking, rejection is something less than infinite and depends on well matched components, a low source impedance and high load impedance. The filter can be trimmed for maximum rejection by making capacitors C1 and C2 variable.

Fig. 2 uses an opamp as a buffer after the filter to satisfy the need for a high load impedance. This circuit must be driven from a low impedance source, such as the output of an opamp, to achieve maximum rejection at the design frequency.

## Reference Formulas:

$$\text{Notch frequency} = 1/2\pi (R1)(C1)$$

$$R2 = \frac{1}{2} R1$$

(Note:  $\frac{1}{2}\pi = 1.571$ )

$$C2 = 2 C1$$

By lifting the ground at R2-C2, and bootstrapping it from the follower output, it is possible to control the notch width, or Q of the rejection filter. This allows extremely narrow notches (Q of 50) to be created.

Pot R4 acts as a notch depth control, which straddles the input and output. The pot arm is the variable depth output.

The Twin-T Notch filter can have dozens of applications around the broadcast plant. Let's look at just one.

## Subcarrier Protection Filter

If you are running a subcarrier, you know how vulnerable it is to spurious components falling on the subcarrier frequency. A heavily processed station will produce significant components at 67kHz, where most subcarriers reside. The filter should be designed for maximum rejection at 67kHz and inserted just before the exciter. The subcarrier should be injected in the exciter or after the filter.

Interference to the subcarrier will be reduced by the amount of rejection of the twin-t filter. The component values in Fig 2. are optimized for a 67kHz rejection frequency. The filter can be realized for any subcarrier frequency by scaling the resistors or capacitors.

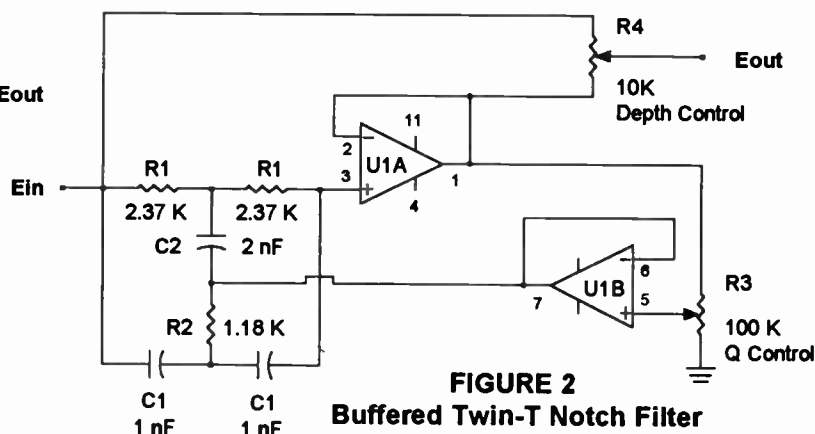
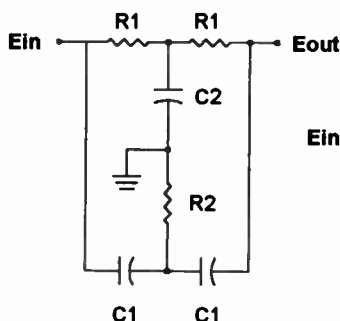
While the Twin-T notch filter does not materially affect surrounding frequencies, it does create some group delay about the design frequency. This group delay results in some peaks being created that are not present at the input. These peaks can reduce loudness but can be truncated with a simple biased-diode clipping circuit.

The Twin-T notch filter is essentially phase linear and will not materially affect separation. It is almost a straight wire until the design frequency is approached.

Similar applications can be developed for the Twin-T notch to eliminate hum and buzz in audio systems, or to reduce air conditioner noise in the control room.

The circuit in Fig. 2 can be constructed with almost any op-amp. A high performance FET-input device will produce the best results. RG

**FIGURE 1**  
Basic Twin-T Notch Filter



**FIGURE 2**  
Buffered Twin-T Notch Filter  
(with variable Q)

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