May 1987

KFXX Radio
3222 S. Richey
Tucson, AZ 85713

BULK RATE
U. S. POSTAGE PAID
Permit No. 11
Winneconne, WI 54986

COMMON POINT®

A MONTHLY NEWSLETTER FOR BROADCASTERS

50 cents per copy

Out-Of-State 800-558-0222 Distributed by Electronic Industries Inc., 19 E. Irving, Oshkosh, WI 54901 In-State 800-445-0222

SPECIAL ISSUE
THE NRSC VOLUNTARY STANDARD

After two years of continuous research, planning, and development, the National Radio Systems Committee AM Quality Voluntary Standard has gone into effect. The Committee's efforts in developing this three-part Standard were focused on producing a better AM transmission system, resulting in a better—sounding AM band. *Michael Rau of NAB's Science and Technology Department answers questions about the Standard in this issue of Common Point as reprinted from the April issue of Radioactive, an NAB Publication.*

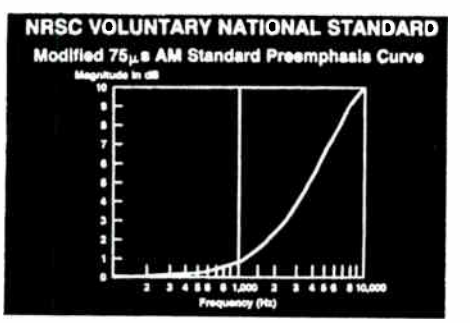
AM... Tomorrow's Sound Wave

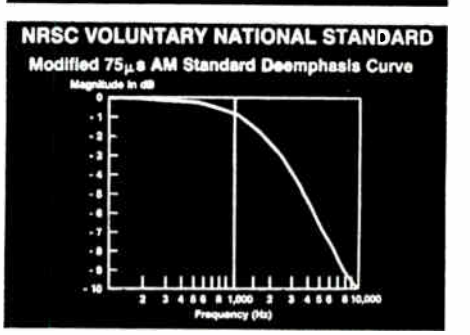
On January 10, 1987, the NRSC AM Quality Voluntary Standard went into effect, the culmination of nearly two years of continuous research, planning and development that has become the key prong of an intensive industry-wide movement to improve AM radio.

The Committee's efforts, focused on producing a better AM transmission system resulting in a better sounding AM band, bore fruit at NAB's "Radio '86" convention last September. The NRSC proposed a three-part voluntary standard specifing AM transmission preemphasis, AM receiver deemphasis and a 10 kHz AM system bandwidth. Questions about the Standard, which was first detailed in the December 1986 issue of RadioActive, are answered in this special NRSC section. For more information, call the NRSC Hotline: (800) NAB-NRSC. NAB will keep track of all relevant information about the NRSC Standard. Additionally, every AM station should receive in the mail an "NRSC Package" from NAB. This package will include material to help you in deciding how to comply with the NRSC Standard.

What is the NRSC?

The NRSC, or National Radio Systems Committee, is a joint committee sponsored by NAB and the Electronics Industries Association (EIA). The EIA represents the manufacturers of television and radio receivers. Membership in the NRSC is open to any interested party; at present, NRSC membership exceeds 170. Originally, the Committee was formed in the late 1970's to perform technical research for submission to the FCC. Some NRSC work was submitted in the FCC's FM Docket 80-90. In 1985, however, NAB and EIA reactivated the NRSC to explore ways to improve AM quality. Now, the Committee is focusing on ways for AM stations and AM receivers to cooperate with each other to improve AM quality. The principal participants in the NRSC are: 1)engineers or major broadcast groups; 2) engineers of domestic and off-shore AM receiver manufacturers; and 3) engineers that represent broadcast equipment manufacturers. NAB and EIA jointly administer the NRSC and provide a forum to conduct research and analysis.





(Cont. to page 3)

Editor's Notebook

Hope you enjoy this special issue dedicated to the improvement of AM radio. It's about time we stop talking about it and start doing something about it, don't you think? It even looks like the F-CC is ready to move on AM Stereo! Well, I'll end my comments short, so we'll have more for information. Hope you enjoy!

Bob Stroebel

EI SPOTLITE ON NEW PRODUCTS

AM Protector - Enhancer

Energy - Onix has brought out an add-on unit which inexpensively permits AM broadcasters to conform with voluntary recommendations of the N.R.S.C. Its connected in the program line and will enhance audio quality by introducing pre-emphasis to the transmitting system. Also has low pass filter and de-emphais for feeding to mod. monitary.

COMMON POINT READINGS

NRSC

(cont. from pg. 1)

What are the goals of the NRSC?

To increase the quality of sound available for AM radio listeners. Technically, the NRSC knows this is possible. The NRSC's goal is for a full 15 kHz high fidelity AM service. Our current system of broadcasting AM is so complicated that it is not practical to implement an industry-wide 15 kHz AM service today without massive restructuring of AM station allocations, and a great expense. Instead, the NRSC has proposed a voluntary interim standard that is a necessary first step toward a 15 kHz system. This standard is practical and inexpensive to implement.

How do I benefit from using the NRSC Standard?

There are two significant benefits to implementing the NRSC Standard: 1) the increase of interference-free AM coverage area on wideband AM receivers; and 2) the establishment of standard high-fidelity sound characteristics of AM receivers. These benefits are more fully discussed below.

What is the NRSC Voluntary Standard?

There are three parts to the NRSC Standard. Part one specifies AM transmission preemphasis, part two specifies AM receiver deemphasis and part three specifies a 10 kHz standard AM bandwidth. These parts are individually discussed below. In addition, the Standard contains a five year review stipulation intended to allow the NRSC to review progress toward improving AM quality, take note of new technology and make changes as may be necessary.

I. The NRSC Preemphasis/Deemphasis Standards.

What is AM transmission preemphasis?

AM preemphasis is the boosting of high frequencies prior to the entry of these frequencies into your station's AM transmitter. If you were to hear preemphasis, it would sound much like the effect you get when your home stereo's "treble" is increased.

Is AM preemphasis something new?

No. Most AM stations use preemphasis today. It is used to compensate for the propensity of AM receivers to reduce the stength of high audio frequencies that are transmitted. In other words, because AM receivers detrimentally affect the high audio freqencies that are broadcast, AM stations must compensate for this effect by boosting high frequencies prior to transmission. Without preemphasis, AM stations would sound lifeless and dull.

What is AM deemphasis?

AM deemphasis is the inverse of AM preemphasis. It is inevitably present in AM receivers. As mentioned above, the presence of AM deemphasis in AM receivers requires that broadcasters use AM preemphasis in order to avoid sounding unacceptably dull.

Why do we need a standard preemphasis curve?

We need a standard so that engineers who design radio receivers will know how AM broadcasts are being preemphasized. Today, AM stations all use preemphasis to varying extents and, as a consequence, a receiver manufacturer has no guideposts with which to design radio receivers. The NRSC discovered that an established standard will facilitate receiver design because receiver engineers will know how AM broadcasts are going to sound. The Standard itself is approximately described by a 75 microsecond curve, similar to the preemphasis curve used in FM broadcasting.

What is the function of a standard deemphasis curve?

A standard deemphasis curve used

(cont. to pg. 5)

MEMO FROM METZ

by David L. Metz

"BUILDING A SKIMMER" Part I

By David L. Metz

Last month we finished discussing how to remote control a modern microprocessor controlled cassette deck. The deck is the heart of our skimmer. Our design problem to solve this month is how to automatically control it.

We want our skimmer to do three things. One, start every time the D. J. turns on the microphone. Two, keep recording for a certain amount of time after the microphone is shut off to catch the music played. And three, be able to start skimming at a predetermined time so only a certain operator is skimmed.

The design I came up with is triggered by a logic level low (zero volts). Many modern consoles have digital control circuits that you can tap right into. If you don't have this option, a simple interface can be made with a relay that's controlled by the studio on the air light.

The skimmer controller operates off regulated 12 volts borrowed from the cassette deck it controls. I found the deck I used short of filter capacitance. I had considerable ripple even without the extra load of the skimmer controller. I checked the ripple with my scope and added capacitance till I had smooth D.C. again.

The circuit is shown in Fig. 1. The 7555 (a CMOS 555) timer sets the time the recorder will run after the microphone shuts off. Grounding point "A" pulls the control pin of the 7555 to zero volts. This trigger the 7555's timing cycle and pin three of the 7555 goes high.

However NOR gate A1 (wired as an inverter) and transistor Q1 keeps the 7555 from finishing its timing cycle till the microphone is SHUT OFF. It does this by keeping the timing capacitor grounded through Q1. When the microphone is shut off, the output of A1 goes low, Q1 is biased off and the timing capacitor charges in the normal manner.

NOR gates A3 & A4 invert the output of the 7555 and gate the clock start signal on/off.

The SCR acts as the controllers "memory". When triggered by the digital clocks "alarm" output, it logic highs the inverter B1 that gates NOR gate A4 on allowing the 7555 timer to trigger the monostables that send the start/stop pulses to the cassette deck.

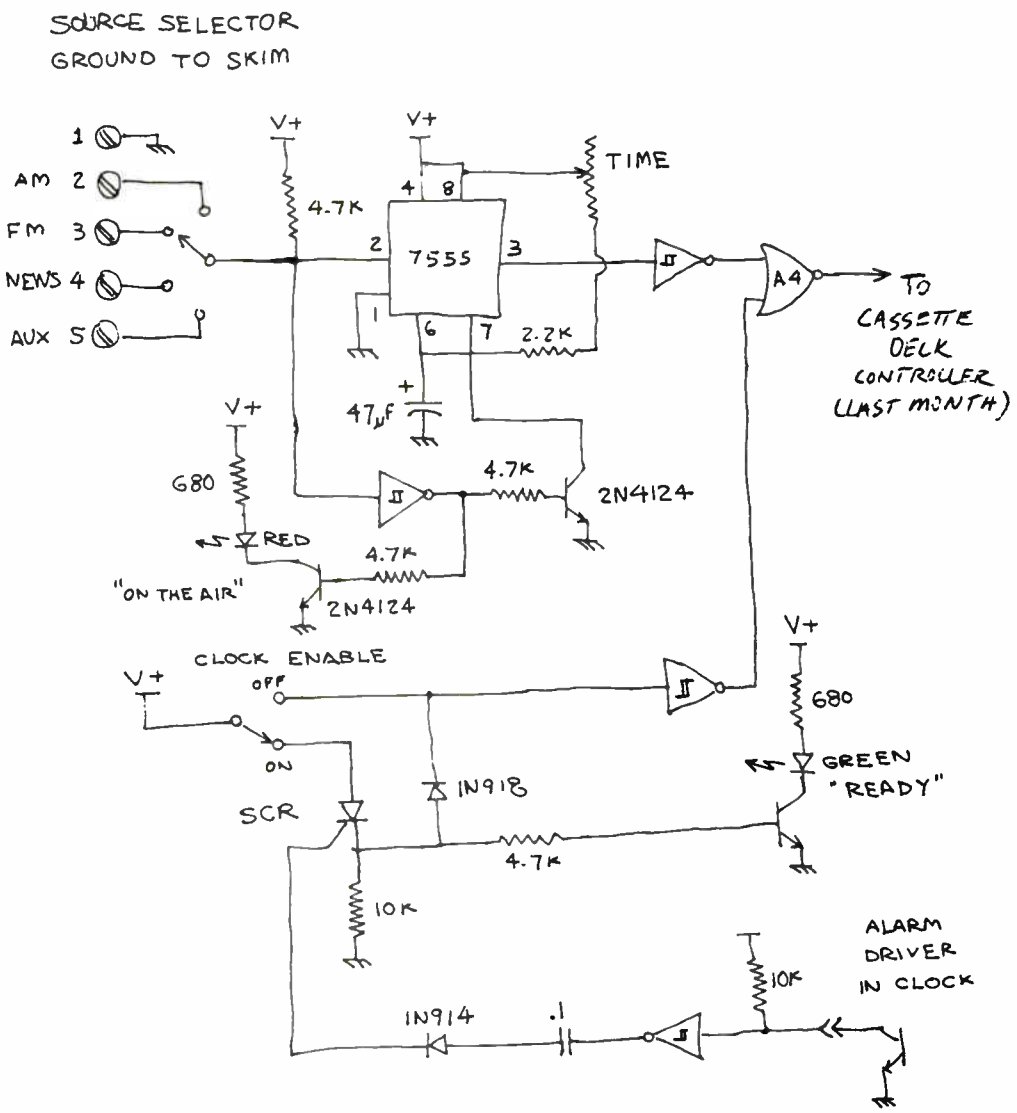
The monostables and cassette interface were covered in my last two columns.

Add a few L.E.D.s and their drivers so you know what's going on, and your done. The only problem you might have duplicating this circuit is the digital clock. I originally used the National Semi MA1032 clock. It is no longer made. For the reason I have deleted the MA 1032 part of the circuit. I am sure that any digital clock that has a open collector transistor output for the alarm will work just fine.

With a little head scratching, you might even come up with a better circuit then mine. For example, I've never come up with a way to get a linear time versus position dial on the 7555 "TIME ON" pot.

Next month the audio section of the skimmer.

*****



NRSC

(cont. from pg. 3)

in AM receivers will allow your station engineer to know how AM receivers are going to sound. Today; without a standard, AM receivers all sound different. As a result, a station engineer cannot be certain that the preemphasis being used is the correct amount for the average radio receiver (unless, of course, the engineer listens to a statistically valid sample of radios!). With a standard deemphasis curve, the response of radio receivers is known and station processing setup should be much easier and effective.

Why this particular preemphsis complementary deemphasis curve? Why not some other curve?

The NRSC chose this particular curve after a long series of listening tests and theoretical analysis. The NRSC's choice criteria were to: 1) produce no significant change in sound on existing receivers; 2) be compatible with AM stereo transmissions and receivers; 3) be easy to design a complementary deemphasis curve for radio receivers; and 4) control preemphasis in order to help control AM interference.

II. The NRSC Bandwidth Standard.

What is the 10 kHz AM standard bandwidth specification?

The 10 kHz bandwidth is a limit on the extent to which your station transmits audio frequencies above 10 kHz. It is a very precise bandwidth characteristic developed after many NRSC meetings.

What is the purpose of the standard AM bandwidth?

To reduce AM interference between your station and nearby stations operating on second-adjacent channels (i.e., if your station is on 1410, the second-adjacent stations operate on 1430 and 1390). Another purpose is to encourage the production of 10 kHz wide-bandwidth AM receivers. The NRSC found that a major reason why such high fidelity receivers have not been produced in the past is 1) excessive AM preemphasis and 2) second-adjacent channel interference. Participating receiver manufacturers realize that, if such interference is reduced, 10 kHz AM receivers become technically feasible.

Will using a 10 kHz bandwidth adversely affect my station's sound on today's receivers?

On most receivers there will be no adverse impact. This is because today's receivers have such limited fidelity that they are not responsive to audio frequencies above 10 kHz. In other words, your listeners on today's receivers will never know that your station has switched to the NRSC standard. On a few existing wideband receivers, however, there may be a noticeable change in sound. How this change is perceived by your listeners will depend on the kind of audio processing your station is doing and the particular radio used. Also, on wideband receivers, the treble/bass con-

(cont. to pg. 6)

NRSC

(cont. from pg. 5)

trol can be adjusted to "resore" the original station sound. Many of your listeners will probably do this without even realizing that there has been a change to the NRSC Standard.

III. Implementing the NRSC Standard.

Why is the Standard important?

Compliance with the standard is strictly voluntary, but there are, of course, significant benefits for the AM industry if everyone complies. Every effort will be made to attain industry-wide voluntary compliance. Essentially, consider the NRSC Standard as an agreement between broadcasters and receiver manufacturers that, if implemented, will benefit both industries by bringing increased AM quality to AM listeners. In this respect, the Standard is much like other popular voluntary standards such as the ubiquitous electrical wallplug and socket. The "plug" industry to establish a voluntary standard. Both groups knew that, if implemented, the standard would benefit both industries and make life a lot easier for consumers. Imagine if plugs and sockets were not standardized; on purchasing an appliance or lamp, you'd have to check to see if the wallplugs on the appliances matched the sockets in your home! With the existence of a voluntary standard, plug manufacturers know what the sockets will look like, and can feel secure enough to invest money in plug manufacturing according to the standard. Here, with the NRSC Standard, the situation is very similar-the motivation for implementing the Standard lies in the knowlege that both the broadcast and receiver industries will benefit. The broadcast/receiver system will work much better with the NRSC Standard.

Will receiver manufactures build NRSC receivers?

Many receiver manufacturers voted for the NRSC Standard: Delco; Ford; Chrysler; Matsushita; Sony; G.E.; and many others. These companies all have an economic interes in producing quality sound for AM listeners.Each company built a prototype NRSC receiver for the NAB Convention. Additionally, implementing the NRSC Standard is not very expensive for a receiver company (new integrated circuits, for example, are not required). The NRSC standard was carefully formulated to be inexpensive—it has to be or else the Standard would not be successful.

How do I implement the Standard?

Most stations need to spend just $400-$700 to purchase and install an NRSC-compatible "modification kit" for its audio processor. Contact your station's audio processor manufacturer for details (or your broadcast equipment supplier). Many manufacturers had NRSC-compatible equipment at the NAB Convention.

What if my audio processor manufacturer is out of business?

Some companies are manufacturing NRSC modifications for older audio processors. These, too, cost $400-$700 and allow you to keep using your existing audio processor. Additionally, NAB is exploring the cost feasibility of building our own inexpensive "NRSC" units. It is sometimes possible for a station's engineer to modify an existing audio processor himself in accordance with the Standard's specifications. The most expensive way to implement the Standard is to purchase a brand-new audio processor (or, alternatively, a second-hand processor plus an NRSC modification kit).

*****

Interim Voluntary National Standard

1. Modified 75 uS AM Broadcast Transmission Preemphasis
2. Complimentary 75 uS AM Receiver Deemphasis
3. 10 kHz AM Transmission Bandwidth
4. Five-year Review Provision

NRSC CO-Convenors
Charles T. Morgan
Susquehanna Radio Corp.
York, PA

Bart Locanthi
Pioneer North America
Duarte, CA

Alan Boyer
Sony Corp. of America
Kansas City, MO

NRSC Subgroup Co-Convenors:
John Marnino
NewCity Comm.
Bridgeport, CT

William F. Gilbert
Delco Electronics
Kokomo, IN

Shepler Says. .

by John Q. Shepler
Technical Consultant

STEREO TAPE CAN SOUND GREAT

By: John Shepler

The #1 audio problem at most stations is tape equipment, not processing. If your station uses mono carts or reel tape decks, you may notice that the tone quality and levels vary from source to source. Even songs recorded in your own production studio can sound very different from the original records.

When you switch from mono tape equipment to stereo, you wind up with three times the trouble you had before. There are two channels to keep aligned instead of one, and there is also an interaction between the right and left channels. This interaction can destroy the stereo separation or make the music sound dull on mono receivers.

If you suspect that you are having cart or tape problems, there are a couple of quick tests that will confirm this. These tests are valid for all tape equipment. The key point is that what plays back from a tape machine should sound exactly like what was recorded.

When you switch from mono tape equipment to stereo, you wind up with three times the trouble you had before. There are two channels to keep aligned instead of one, and there is also an interaction between the right and left channels. This interaction can destroy the stereo separation or make the music sound dull on mono receivers.

If you suspect that you are having cart or tape problems, there are a couple of quick tests that will confirm this. These tests are valid for all tape equipment. The key point is that what plays back from a tape machine should sound exactly like what was recorded.

The first test is an A/B listening test. You record a fairly hot song on the program channel and listen to the tape playback on the audition channel. The levels have to match exactly for this to work. Listen for clarity and especially high frequency notes like cymbals and crispness in the vocals.

If you hear any difference when switching between record and playback, you have a bad cart, bad tape head, or an alignment problem.

Next, switch between mono and stereo while listening to your station. The music will sound less lively in mono, but the tone quality should be the same. If not, you have a phasing problem in your machines.

Stereo alignment can be a tricky process. You must use a scope for this. Unfortunately, most tape equipment develops enough flutter that the highest frequency tones will not produce a stable scope pattern. The job is a lot easier if you align the response of the two channels with the tone tape and set phasing with a sweep tone or noise tape.

A sweep tone very rapidly runs through all the audio tones from low to high and then repeats. A fast sweep will sound like a chirping or buzzing. On a scope, you will see a fuzzy oval that will become a straight line when the head is phased properly. Some test carts have a sweep tone at the end and you can buy sweep tone generators to make your own tapes.

An alternate alignment tool is a pink or white noise tape. A noise cart consists of all audio tones at once and sounds like a loud hiss. If you have a spectrum analyzer available, the noise playback will paint an exact picture of the frequency response on the display.

One advantage of noise carts is that they are easy to make. If you have an FM DAP-310 processor, a pink noise generator is included for alignment. You can record the processor output or simply tune an FM receiver between stations and record the hiss. Adjust the receiver's tone controls for the amount of crispness you desire.

(cont. to pg. 10)

AM stereo and C-QUAM®: Superior performance is the Delta difference

Like more than 40 dB of channel separation for a purer, cleaner sound your listeners can hear. But we didn't stop there. We engineered our improved C-QUAM* system for all around excellence:

The Delta Difference is applied technology:

- More than 45 dB* channel separation for a purer stereo sound, guaranteed 43 dB* at 1 kHz and 40 dB* at 5 kHz.
- Transformer-less, active balanced input/output circuits for excellent frequency response, distortion, and modulation peak control characteristics.
- Dual high level RF adjustable and dual logic level (TTL) circuits and dual L + R audio circuits for faster installation and versatility in transmitter interfacing.
- Day/night and stereo/mono capability remotely controllable.
- Dual transmitter interlock protection circuits.

The Delta Difference is longer life:

- Chassis mounted heat sinks at critical points.
- Improved high-efficiency power transformer for cooler operation.
- Multi-board construction for simplified maintenance and trouble-shooting.
- Zero insertion force card edge connectors assure longer contact life.

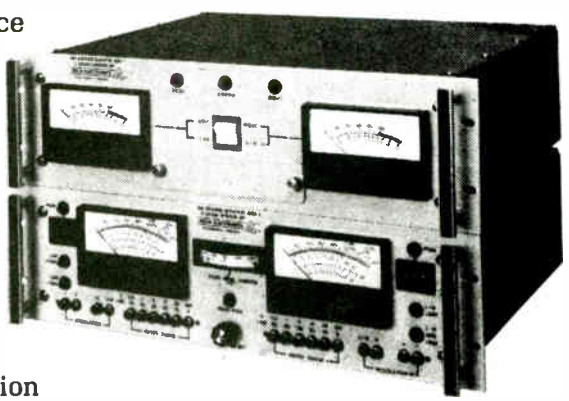
The Delta Difference is economy:

- Day/night or main/auxiliary audio equalization is a no-cost option.

The Delta Difference is experience and commitment to your industry:

- More than 23 years serving the broadcast industry.
- More than 60 operating installations of Delta C-QUAM AM stereo systems in the U.S., Canada, Australia and Africa. (And the number continues to grow.)
- A highly experienced installation team ready to serve your needs.

When you're ready to bring AM stereo to your listeners, check on the Delta Difference.



For complete information on ASE-1 AM Stereo Exciters and ASM-1 AM Stereo Modulation Monitors, contact Delta at (703) 354-3350.

Delta Electronics, Inc.
5730 General Washington Drive
P.O. Box 11268
Alexandria, Virginia 22312
(703) 354-3350
Telex: 90-1963

• C-QUAM is a registered trademark of Motorola, Inc. Manufactured under license from Motorola, Inc.

* 50% single channel, closed loop exciter monitor

DISTRIBUTED BY

ELECTRONIC INDUSTRIES INCORPORATED

19 E. IRVING, OSHKOSH, WI 54901

OUT-OF-STATE
800-558-0222

800-445-0222

orban

OPTIMOD-AM 9100A: THE CHOICE FOR VOICE

From coast to coast, people are talking through OPTIMOD-AM Model 9100A—and dominating the lucrative adult demographics with full-service news and talk formats in mono or AM stereo. OPTIMOD-AM has literally no competition when it comes to creating crisp, intelligible, authoritative voice quality on the air.

Its six-band limiter with steep-slope crossovers pulls poor-quality actualities or phone calls "out of the mud" *automatically* in real time. And its adjustable, statistically-designed receiver equalizer pre-emphasizes high frequencies to assure comfortably intelligible sound from even the worst of the narrowband radios.

Loud, clean, crisp, and consistent—OPTIMOD-AM's natural, low-fatigue sound captures the adult audience like no other processor. And the choice for voice sounds great on music, too!

AM IMPROVEMENT MONTH SPECIALS!

Optimal AM Mono 9100 A/1 . . . . . $3475.00
Optimal AM Stereo (Kahn) 9100 A/2 . . . . . $4770.00
Optimal AM Stereo (C-Quam) 9100 A/2c $5250.00

Offer Good Only Until June 1, 1987

ELECTRONIC INDUSTRIES INC.

IN WIS. 800-445-0222

OUT OF STATE 800-558-0222

Shepler

(cont. from pg. 7)

Remember, the crisper the noise, the sharper but touchier the alignment will be.

Be sure that the recorder you use to make the tone or noise tapes is in perfect alignment before you start. This machine will be the standard for the rest of your station.

*****

WILL THE WORLD'S FIRST MOVIE STAR PLEASE STAND UP?

by Bill Braggs

Who was the first Movie Star, and what became of that person? We must first define what is a "movie" and what is a "star". Thomas Edison first began experimenting with moving pictures in 1894. These experiments took place in the Edison Laboratory, and later at "Black Maria", the world's first movie studio. In 1908, Edison spent $100,000.00 to build a bigger and better studio, this one located in the Bronx section of New York City. Some of Edison's first moving pictures were "A Sneze", "Cock Fight", "Children's Toilette", President McKinley Taking the Oath", and the list goes on and on; over two thousand in all. The movies were very short, and had no plot. Edison Simply pointed the camera and turned the crank. Actors were employees, family, or anyone who walked in front of the camera. For our purposes, we will define a "movie" as a filmed story with a plot, and a "star" as one who had the lead role and received a salary for acting.

Most people think the first movie was "The Great Train Robbery", copyrighted in 1903. Backtracking to March 13, 1902, a young girl called Rachael Acton (a stage name) was attending The American Academy of Dramatic Arts in New York City. The students practiced by staging afternoon matinees at the Empire Theatre. On March 13th, at 2:00 p.m., Thomas Edison entered the theatre to watch the performance Rachael Acton had the lead role. Attracted by Rachael's beautiful voice and her diction, Edison returned a few days later and made arrangements to film the play.

The actors themselves built the set, "somewhere in the Bronx", with the help of two of Edison's technicians. Upon arrival, Rachael acted out the play. Then, with Edison at her side, she recorded the sound. The old man was "very picky", saying "that's not right little girl, do it again". They made 10 discs, until Edison got what he wanted. The picture and sound were then "hooked together", and the movie played all over the country. There was one problem however; the sound did not syncronize with the picture, and Edison was not satisfied, so the film was never copyrighted, and there is no record. Apparently Edison was so disappointed that he temporarily gave up on sound movies. The film was probably lost in the 1914 fire, which almost completely destroyed Edison's Laboratories.

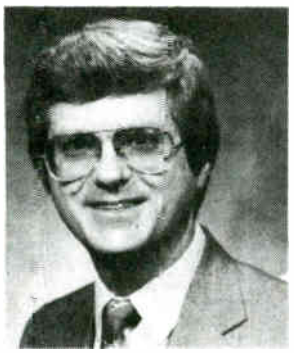
Rachael Acton was a stage name for Rhea MacAdams, who is alive and well and living in Dallas, TX. Rhea rememebers her experience with Thomas Edison as one of the most exciting times in her life. She can describe the primitive equipment used to record her voice, and says of Edison, "he was kindness personified".

After making the Edison movie, Rhea loaned a friend in St. Louis

(cont. to pg. 12)

PERSONS' POST SCRIPTS

by Mark Persons



The NRSC AM audio pre-emphasis and bandstop standard is here. It works and is the best news AM radio has had in a long time. The potential for cleaning up interference on the AM band is tremendous. Second adjacent channel splatter will drop to nil. Day and night reception will noticeably improve.

The standardized AM audio preemphasis curve will make possible the production of compatible receivers. The transmitting pre-emphasis and receiver de-emphasis curves will match so that the resulting sound is free from embarrassing peaks and dips in frequency response. The resulting sound is very much like FM. Most listeners can't tell the difference. This fact was demonstrated at the NAB Convention in Dallas last month.

Making the "System" work depends on each and every broadcaster. Audio processing must be modified or replaced to comply with the new standard. The cost starts at $195.00 and goes up depending on the audio processing now in operation.

As an example, a station using a CRL (Circuit Research Labs) AM System Two or Four should add a CRL SPF-300 Standard Pre-Emphasis/Filter. List price is $495.00. The SPF-300 interrupts the audio input to the station's Peak Modulation Controller and inserts the correct audio-emphasis. The other half of the SPF-300 is a bandstop filter and it goes between the Peak Modulation Controller and the transmitter.

(cont. to pg. 12)

Persons

(cont. from pg. 11)

An SPF-300 could be used around a UREI BL-40 modulimiter or around the limiter card of a Dorrough DAP310. However, the CRL PMC-400A would go after the BL-40 and before the transmitter. The same applies to the DAP310. However, the peak limiting function of the DAP310 should be bypassed.

If your station is still using a CBS Audimax/Volumax combination, the SPF-300 should surround the Volumax or you could replace the Volumax with a new PMC-400A. Better yet, replace the CBS gear with a complete new CRL System 4 at $3,450.00 mono or $5,950.00 stereo. The same applies for a Harris MSP-90 and others. In essence, the audio pre-emphasis is usually put before the peak limiter or clipper and the bandstop filter goes just before the transmitter.

I'll be glad to field questions on specific processing situations. The phone number is 218-829-1326. Mornings are best Monday through Friday.

*****

Braggs

(cont. from pg. 10

twenty dollars. The friend gave the money to her brother Billy, who used it to go to New York. He then made a movie for Thomas Edison called "The Great Train Robbery", and BRONCO BILLY ANDERSON became a star. "I never saw that $20.00 again" says Rhea.

At ninety four, Rhea's voice is strong, and her diction is as beautiful as ever. She rememebers the entire script of "Forest Flower" and will recite it at the drop of a hat. "My biggest problem" she says, "is trying to remember where I put my pills."

Editors Note: Bill Braggs is Founder/ Director of The National Broadcast Museum, Inc., a non-profit tax exempt organization. For more information please write or call The National Broadcast Museum, 2001 Plymouth Rock, Richardson, TX 75081. Phone 214-556-1234.

*****

YOUR HEADQUARTERS FOP

RE18
Shock-mounted
Variable-D® Cardioid
$204.00

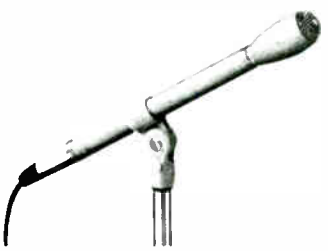
RE20
Variable-D®
Cardioid **$360.00**

644
SOUND SPOT®
DUEL-Z
DYNAMIC
$188.00

RE15
VARIABLE-D®
SUPER-CARDIOD
$189.00

RE50
Omnidirectional
Noiseless, Hand-held
$108.00

RE55
Omnidirectional **$179.00**



RE85
Noiseless Lavalier
$109.00

635A
Omnidirectional
$74.00

PROFESSIONAL CONDENSER MICROPHONE SYSTEMS

CO15P
Omnidirectional System
$219.00

CS15P
Single-D Cardioid System
$190.00

658L
CARDIOD DYNAMIC
WITH SWITCH
$47.69

PROFISSIONAL
MICROPHONE
MIXER
$374.00

Features
- 4 mic or line inputs
- Phantom power
- Peak Limiter
- AC/DC power
- Headphone amplifier
- 1 khz tone oscillator
- balanced inputs/outputs

10% OFF With 3 Mikes Or More

ELECTRONIC INDUSTRIES INC.

IN WIS. **800-445-0222**

OUT OF STATE **800-558-0222**

TALKBACK

LIBBY, MT — Metz and Shepler do a good job - keep it up. AM needs stereo - FCC should mandate receivers tune both Kahn and Motorola, just as they mandate TV's to tune VAF - OHF or existiny radio's to tune AM and FM - Kahn is "the" system - just doesn't have Motorala's $$$$.

MADISON, WI — I bought (and returned) a Radio Shack AM Stereo Tuner, that was on sale. Ugh! that's all it was, a low fidelity tuner that decoded the stereo. I am not invovled with AM Stereo at work. From what I've heard of it, it's not worth bothering with. I'll concentrate on TV Stereo.

DANVILLE, IL — Less than a year ago we purchased an RPU unit, hoping it would help reduce the phone bill. It did that. At 10 to 20 remotes a month, the system paid for itself in less than 6 mo. It's great fun, we hunt excuses to use it.

BOISE, ID — Found that the N.A.B. R.F. Radiation signs make great targets. Had signs up on 50 kw tower fence for 4 days and already had 4 shots through sign.

BEREA, OH — Metz is great! Lots of good tips and ideas in training students at this college radio station.

DANVILLE, IL — Keep things squeaky clean and thumb tight, but once in awhile they still get irratic. This requires a less subtile approach to it's troubleshooting and subsequent repairs. A tug, twist, tap, or yes, a bang is needed to find some of them. I don't care how good your P.M. schedule and techniques are.

KLAMATH FALLS, OR — Another great newsleeter - I'm never disappointed. The articles by Metz and Persons, as usual were interesting. Thanks.