

CHAPTER 24

SOCIETY of BROADCAST ENGINEERS

MADISON, WI

PAGE ONE

AN AWARD WINNING NEWSLETTER

November 1990

Edited by: Leonard Charles
Articles Welcome!! Send them to:
Chapter 24 Newsletter
5714 Modernaire St.
Madison, WI 53711
(608)-274-0041
(608)-271-4321
(hard copy or ASCII text message
on BBS at 608-274-7776)

Contributors this month:
Doug McDonell
Doug Smith
Tom Weeden
Kevin Ruppert

MEETING ANNOUNCEMENT

DATE: Nov 14, 1990

We will not meet for dinner this month. Instead, we will have a business meeting in the main meeting room of the Broadcasters Clinic at the Holiday Inn Southeast just prior to the Night Owl Session of Wednesday evening. You need not be registered at the Clinic to attend this meeting and you may stay for the Night Owl session. The hat will be passed for the pizza and beer at the Night Owl session. Meeting will start promptly at 7PM.

UPCOMING MEETING DATES

(Revised) December 12, 1990 January 15, 1991 February 13, 1991 March 21, 1991 April 23, 1991 May 22, 1991

Panasonic

MII

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HERB VAN DRIEL midwest district sales manager

YOUR OFFICERS....

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VICE CHAIRMAN:

Jim Hermanson (WTSO/WZEE) W - 275-7130 H - 231-2005

SECRETARY:

Tom Weeden (WMTV TV) W - 274-1515 H - 276-7915

TREASURER:

Fred Sperry (WI Public TV/ W - 273-5500

TOC) H - 833-6074

COMMITTEE APPOINTEES

Past President - Denny Behr Membership - Dave Gerisch Sustaining Membership - Leonard Charles Strategic Plan Comm - Denny Behr (Chair) Newsletter - Leonard Charles Program Chairman - Kevin Ruppert Cert/Ed - Doug McDonell/Tim Trendt Frequency Coor - Chris Cain Chapter Liason - Doug Smith

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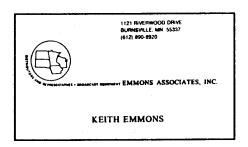
LAST MONTH'S MEETING....

OCTOBER 1990 MEETING MINUTES

Chapter 24 met on Tuesday, October 16, 1990 at Alexander's Restaurant in Madison. Present at the meeting were 19 SBE members and one guest. Of these, 15 were SBE certified.

Chairman Steve Zimmerman called the meeting to order at 7:01 PM. Secretary Tom Weeden read the minutes of the September meeting. Vice-Chairman Jim Hermanson then read the minutes of the October 11 officer's meeting. Frequency Coordination Chairman Chris Cain reported that for the November 6

elections, Madison will be the base for all candidates, and that the coordination for the Madison and Milwaukee TV stations is being worked on. Education and Certification Chairman Doug McDonell presented the fourth certificate from the June exam session, a Senior Broadcast Engineer certification to Doug Campbell. He also corrected a previous announcement,



saying that UW-Platteville students will be taking their exams in June 1991, not this November. Sustaining Membership Chairman and Newsletter Editor Leonard Charles reports 16 sustaining members currently, and that 105 newsletters were mailed out for October. Strategic Planning Chairman Denny Behr talked about a possible January meeting with the officers for 1991 planning. He also had a professional announcement, that Wisconsin Public Television is looking for a part-time operator for the overnight "VCR Semester" sessions. Chairman Steve Zimmerman announced the awards that Chapter 24 won at the 1990 National Convention. Leonard Charles won the awards for best newsletter and best newsletter editor. Chris Cain won the best local frequency coordination award. Best technical article was won by John Crooks for tower maintenance. Chapter 24 also won the award for best regional conference for the 1989 Audio Clinic held at WISC-TV. Treasurer Fred Sperry reported the chapter's account balance and announced that he has the complete array of SBE pins on display for sale.

There was no old business.

Don Borchert had a brief discussion on the upcoming Broadcaster's Clinic and the possibility of Chapter 24 sponsoring the annual clinic after his retirement.

Leonard Charles, who was sent to the

national convention by the chapter, presented a review.

The meeting adjourned at 7:47 PM. The program for the evening was a tour of Weather Central.

Tom Weeden, Secretary

CONVENTION STATS....

The final numbers are out for the 1990 SBE National Convention in St. Louis in October. There were 657 paid registered attendees, 919 exhibitors passes, and 2151 exhibit only badges were recorded for a total attendance of 3727. Next years convention will be in Houston.

CERTIFICATION....

The opportunity to apply for certification as a Professional Broadcast Engineer without taking a test will expire December 31, 1990. You must have twenty years of experience in the broadcast industry. After January 1,

Let us demonstrate the convenience of computer prompting in the lightweight C64 diskless Field Prompter by maney-logic.

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Field Prompter by maney-logic

Smooth scrolling 13 speed rotary control with recue. Non volatile storage Input via RS232 or built in editor.

1991, certification to that level will require that you first be certified at a lower level, which means taking a SBE Certification exam. For application blanks or more information contact Doug McDonnel at 222-1580.

THE LEGALS.... info by Doug McDonell

An application has been granted for the voluntary assignment of CP for VHF LPTV Channel 8 from the Identity Institute to Healthy's Inc. of Madison. WO8CK is authorized to the Madison market.

FCC NEWS....

info by Doug Smith

FCC news, November 4, 1990, from <u>Broadcasting Magazine</u>, <u>DX News</u>, the <u>VHF/UHF Digest</u>, and the <u>Chicago Tribune</u>.

Senators Al Gore (D-Tennessee) and

Timothy Wirth (D-Colorado) are trying to resurrect the seemingly-dead cable TV bill.

People for the American Way and the Media Access Project have filed a petition with the FCC for rules that would "insure viewers know who paid for television airtime used for political campaign commercials." The rules would require a picture of the candidate sponsoring an ad to appear for at least 4 seconds and cover at least 20% of the TV screen. Character titles identifying the candidate would have to be at least 4% of the total screen height. rules are intended to ensure that voters can identify negative ads with the candidates who placed them. Commercials not meeting these standards would not be banned from the airwaves, but they wouldn't be eligible for favorable "lowest unit charge" rates either. The NAB supports the concept, but feels there are some problems in enforcement.

The Supreme Court has agreed to decide whether the state of Arkansas has the right to charge a sales tax on cable TV services.

In its latest promotion, MTV is giving away a radio station.. MTV has obtained a revocable option to purchase WSTT, Thomasville, Georgia. The winner of their contest will, pending FCC approval, receive the station, several thousand dollars in cash, and the services of rock musician Billy Idol as first DJ. Commissioner Ervan Duggan considers the concept repugnant, but didn't say whether the Commission would approve such a transfer.

Wireless cable operators are no longer restricted to control of 6 of the 13 available Multipoint Distribution

Petrick Allichaon Service Manager

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Service channels; they may now control all 13. Along with 20 Instructional Fixed Television Service channels, a wireless cable operator can now control up to 33 channels. At the same time, the Commission voted to prohibit cable TV systems from owning wireless cable systems in their same service area; this provision was added to prevent cable systems from "warehousing" channels to

prevent wireless cable competition. The FCC has not decided what to do with cable systems that already own wireless cable systems.

President Bush has signed a bill that will require closed-caption decoders in all TV sets with 13" or larger screens, beginning July 1, 1993.

The Senate has passed a law that would clarify broadcaster's requirement to

JEFFREY N. CLARINE CENTRAL REGION SALES MANAGER



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sell political advertising at the lowest rate offered to regular commercial However, for several advertisers. reasons the bill has been stalled in the House. The NAB is opposed to the bill since it would require stations to sell political advertising at highly discounted rates if non-political a had been sold at those rates before the election; the Radio and Television News Directors Association is opposed since the bill would prohibit preemption of political spots (even for news special reports) except when beyond the control of the licensee.

The latest station to get into indecency trouble is KLOL-FM Houston. The station was fined \$6,000 over material broadcast in its morning show.

Seven other stations have received letters of inquiry regarding possible violations of political advertising rate regulations. Most have not yet been identified, however one is WFAA-TV Dallas.

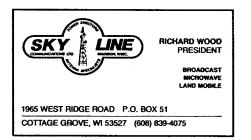
The Commission is expected to adopt an order restricting FM translators to their original purpose, filling gaps in the coverage of full-power FM stations. The NAB had feared that low-power FM stations might be authorized.

You may remember a few months back, when the first "DA-2" FM station was authorized? Well, now we have the first "N-1" (nighttime only) FM static WAMB-AM Donelsonville, Tennessee (n. Nashville) has received permission to operate with 75 watts ERP on 106.7FM, during nighttime hours only. WAMB operates on 1160KHz, a frequency subject to severe Cuban interference at night.

The 75 watt ERP signal was calculated to cover roughly the same area as WAMB's 1000 watt AM signal would in the absence of Cuban interference. (author's note-WAMB's 1kW AM signal is frequently heard up here in Madison!)

CHUM Ltd. of Toronto has purchased CHQM AM & FM in Vancouver. What makes this unusual is that they already own CFUN-AM in that city; they've been given 6 months to divest of one of the AM stations, but will be permitted to operate both for that period. Ownership of two TV stations in the same market, however, is common in Canada.

A rare advantage of the extremely low power PSSAs... MGRD Grand Rapids, Mich.



apparently had their main 1kW transmitter fail; they used their 48 watt PSSA rig for several months until repairs could be made to the 1kW rig.

RADIO....

by Leonard Charles

The FCC has issued its second Notice of Inquiry into locating spectrum for use in Satellite and terrestrial Digital Audio Broadcasting. Comment deadlines have not yet been set. The Commission needs to present a US position at the 1992 meetings of the World Administrative Radio Conference.

Preparations continue in the pending NRSC FM receiver tests to determine whether processing degrades performance. Discussions center on how to measure modulation during tests and how to define varying levels of processing. To be tested will be three grades of receivers, the yet-to-be produced Denon NRSC high quality tuner, a mid quality receiver and an auto receiver.

The \$100,000.00 NAB AM antenna project is over with less then desirable results. In the final analysis, the antenna did not effectively reduce skywave radiation in the direction it was tuned during testing. The structure is still standing at the test site in Beltsville MD., although the NAB has no

plans for further testing.

Mexico has joined Brazil, Australia, and Canada in adopting C-QUAM AM stereo as their National Standard. Japan and England are currently evaluating systems to select a National Standard in their Countries. The FCC has declined to adopt a system as the US standard but C-QUAM is considered the de facto standard due to its large number of users. 610 US AM stations now broadcast with the C-QUAM system along with another 200 stations throughout the world. Mexico currently has only one station broadcasting in AM stereo (Radio MIL, 1000KHZ).

The CBS and Capital Cities/ABC Radio Networks will begin broadcasting in full -20KHZ digital audio to their affiliates in August 1991. They will utilize the new Scientific Atlanta compression algorithm update to the DATS system which currently allows only 15KHZ audio bandwidth. The receivers will also be capable of decoding the new MUSICAM compression scheme utilized by the Eureka 147 DAB method developed in *Europe. In addition, the upgrade will expand the number of channels per transponder from the present 20 to 60 for the two Networks combined affiliate total of just over 3000.

(Excerpts from Radio World)

AMATEUR RADIO NEWS....

by Jom Weeden, WJ9H

A disturbing report for US hams concerning the preparations for the 1992 World Administrative Radio Conference

SONY

Kevin Peckhem Account Manager Broadcast Products Division

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was heard on "The Westlink Report" recently. There may be a recommendation at WARC-92 to shrink the amateur 2-meter band in Region 2 (western hemisphere) from the current 144-148 MHz to 144-146 MHz. In Regions 1 and 3, amateurs are allocated only 2 MHz, and there may be a move to standardize the allocation worldwide, giving the upper 2 MHz to satellite services. The 2-meter band is arguably the most popular amateur band in the US, and the upper 2 MHz is where

most repeaters on the band operate. (Sidenote - "The Westlink Report" can be heard Wednesdays at 9:00 PM CST on the WB9AER repeater in Madison, 147.150 MHz.)

The American Radio Relay League is going to court this month to fight the FCC's decision to reallocate 220-222 MHz to the land mobile service. ARRL says it hopes the US Court of Appeals will ask the FCC to explain several "mistakes" in its procedures for the reallocation. Oral argument is scheduled for November 16.

The FCC has issued a public notice stating that the newly-authorized unlicensed devices operating in the 900 MHz band are not protected from interference from licensed services,

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such as the amateur operations in the 902-928 MHz band. Consumer video transmission systems which use frequencies in the 900 MHz range ordinarily use a wireless transmitter and receiver for remoting devices such as VCRs, camcorders, and games. Customers who experience RFI are to "contact the manufacturer." (Try explaining that to an angry neighbor who hears you on the kids' Nintendo...)

FCC engineers conducted field tests of cable television systems around the country the week of August 20 to assess and improve compliance with leakage rules that went into effect July 1. Although the leakage rules are primarily concerned with interference to aviation services, amateurs on the 2-meter band can be affected by interference from cable channel 18. Ingress leakage from amateurs can also cause interference TO a cable system. FCC shut down Multivision Cable TV in Hermosa Beach, California, when found in violation of Other systems not the new rules. complying will be fined \$2000 or more.

Other news from the enforcement department: US Marshalls and FCC personnel seized \$6000 worth of illegal CB equipment from a California radio shop on August 16....The New York Field Office shut down an unlicensed FM station in Floral Park, NY, and fined

the operator \$1500....and, adding insult to injury, the FCC issued an Order to Show Cause to a ham convicted of mail fraud, ordering him to show why his amateur license should not be revoked. (From The Westlink Report and November 1990 UST magazine.)

AN AUDIO COMMENT....

by Kevin Ruppert

Have you LISTENED to yourself?

Maybe it's because I started in this business is radio, but the thing that I most worry about in television is audio. As many people have observed



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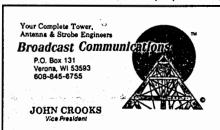
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over the years, audio has often been the "illegitimate child" of the visual medium. The story goes about those brave men at Ampex who some 35 years ago invented the first practical video tape recorder. After several trys and different versions of the quad video recorder, they finally got one that they felt they were ready to show the world. Then someone pointed out to them that it might be nice if they could also record audio. They then basically went to the shelf and got an Ampex 350, or whatever was the current vintage of audio tape deck, and added it onto the VTR. The point is, for too many TV engineers too much of the time, audio is an afterthought.

I'm not pretending to be one of those "golden ears" people. As a matter of fact, I have always been suspicious of those who say they can tell the difference between one type of speaker grill cloth and another with their eyes closed. Or that there really is a noticeable difference between a cd done with 20 bit recording as opposed to 16 bit. (I'd like to hear that one done in an A-B test!) Have you heard the latest audiophile hype? If you want "better performance*(better performance?!) from you old cd's, you're supposed to take a green Sharpie marker and draw a ring around the outer and inner edges. The theory here is that the early cd's were not tapered properly along the edges. The laser light can then reflect off of

the edges and bounce around inside of the cd. The scattered light then increases the need for error correction. A green marker is supposed to absorb the red laser light. I guess you could also use a black marker, but the purists insist that green sounds better. I suppose that high end stereo stores can sell you the right shade of green marker, although you can also go to an office supply store.

You can be more critical about audio if you really care to without taking it to an extreme. In the office of most TV station chief engineers, there is a video monitor or high quality TV set, usually tuned to the chief's station. But because it is often an annoyance, the sound is usually turned down. The set is really a sort of "video wallpaper". A discerning TV engineer will, however, notice when the video looks bad through the corner of his eye - when there is tearing in the chroma or the black levels are too high. But the sound is turned down! The audio can be missing and it will go unnoticed. Often it even goes unnoticed at Master Control. One evening at our station, we were performing "some rewiring to the audio mainframe. We thought we had the planned. iob well Improper documentation and Murphy's law, however, caused us to disconnect audio feeding the transmitter. No one at Master Control noticed for 20 minutes! The control room was busy with people doing



work getting ready for the newscast. The audio monitors were drowned out by all the noise in the room. I think they would have noticed, however, if the video monitor had gone blank.

Okay, you can't always give attention to everything in the control room or the engineering office. But one piece of test gear which I do think is helpful is the stereoscope. Any old scope will do. You don't have to spend thousands for one from a test equipment manufacturer. I have an old government surplus scope which I got at an auction on my desk hooked up in the "X-Y" mode, with left in one channel and right in the other. Even if you are not broadcasting in stereo, you can hook audio up to a scope. Then you can see the audio EVEN WITH THE SOUND TURNED DOWN. It tells you a lot more than VU meters. Don't forget that it is important to teach operators how to interpret the stereoscope. MC at our station now has the off air stereoscope right next to the air video monitor. It is just as important.

How many people in television really know what good audio is? Some news photographers I know think that "natural sound" is the noise that the head drum in their VCR makes when they are out shooting a story. Or that wind blowing in the microphone without a windscreen is the correct effect to accompany video



of trees in the wind. Do you know what the best way is to listen to the audic on your TV station? Turn off the picture, or simply look the other way. You'll be amazed what you will hear that you never heard before! And I'll bet that a lot of it will not please you. We have a policy at our station of always running a super on video that was shot by a home VCR user. The "home video" super is really more an apology for putting something on the screen that we generally think of as inferior quality. But we never add a super that says "bad audio" when something is aired that sounds like it was recorded in a bathroom. We just let it pass.

A few months ago, a radio station in our market began airing the audio from CNN headline News. I find that this is a useful service while driving, allowing you to be "given the world in 30 minutes." Remember that this is TELEVISION audio on the radio and not RADIO audio. There is a difference. The first thing I would expect to notice is that the audio doesn't always make sense without the video. That is understandable. What I REALLY noticed first was the poor quality of much of the audio. You don't usually notice that the acoustics in even the best TV studios is auful. Announcers ar wearing tiny lapel mics. They actually are designed to compensate for the fact that the chest is one of the worse places to try to pick up the human voice. Over the years, these condenser mics have gotten smaller and smaller and

are really designed more for their appearance then for audio. Perhaps we were better off acoustically when Walter Cronkite had an RCA BK-1 mounted on his desk. Today, TV directors don't even want to see a mic in the picture when they are doing a live news remote. They often request lavalier mics in a noisy environment when hand mics would have been a much better choice.

Another problem with the CNN newsroom is that it is full of glass windows. This makes for some nice camera shots, but is hollow sounding. Ventilation and air conditioning are very often given higher



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priority when designing a studio than acoustics are. I, for one, would like to see TV set designers consider acoustics more carefully in their designs.

Stereo broadcasting has done a lot for TV audio all around. If noting else, it has forced us all to listen more carefully to our audio and take action when something is wrong. Don't forget to also listen to the MONO product of your stereo broadcasts. When you come right down to it, stereo is relatively easy. It is the mono that is hard when you are trying to achieve stereo. There should be some easy way for the Master Control operator of every stereo station to switch between stereo and mono on the control room speakers.

The compact disc has made a much bigger impact on broadcast audio than most people expected. Starting as a consumer product, it is now the standard by which audio is measured. Everyone talks about achieving "cd quality audio". Radio has taken full advantage of the cd. Even though we cannot broadcast the full 90 db dynamic range, cd's still sound much better than the vinyl they have replaced on radio. The same technology is bringing us higher quality audio recording with D1 and D2 digital formats. How we deal with that audio before and after it gets to that recording format will be the real challenge. Remember to LISTEN. Audio in television IS important. Without it, the pictures just are not very interesting.

DAB....

As speculation continues for spectrum to accommodate DAB, new possible transmission methods continue to surface. The latest is called Power Multiplexing. Under the plan, a much lower powered digital signal would be combined with a stations analog signal in a combiner just before the antenna. Theoretically, a digital signal requires much less power than analog for similar The "capture effect" in coverage. current FM receivers would ignore the much lower powered digital signal and lock onto the analog signal. Meanwhile, in new digital receivers, a replica of the stronger analog signal is created 180 degrees out of phase with the received signal. The two are added and effectively cancelled leaving only the lower powered "digital" signal to be locked onto and decoded. The new receivers would also be capable of demodulating the analog signal if so selected. It should be noted that some sort of compression algorithm will be needed to enable the digital signal to fit in the analog channel space. Also, the effects of multi-path would not be known until over-the-air tests could be performed.

HIGH TECH COMPLAINTS....

It appears that being too lazy to write your legislator is no longer an excuse for not taking part in your government. Apparently, you can now use the comfort



of your computer to get your feelings heard. The Wisconsin Legislative BBS number is 266-8103. It looks like this one allows you to send messages to your state legislator/state senator by modem. You shouldn't expect an answer by BBS; presumably the staff would answer by mail.

If you live in the city of Monona, they have a city BBS at 222-2527. Apparently this one operates on a PC which has "real" duties during the workday, as it's scheduled to be down between 9AM and 5PM weekdays. It seems to cover the city council agenda, proposed new city

ordinances, etc..

Tak Sale....

The financially troubled Tak Communications has put its four Wisconsin television stations up for sale. The stations are WKOW in Madison, WXOW in La Crosse, WQOW in Eau Claire and WAOW in Wausau. Documents filed in federal court in Virginia say the sale



is part of Tak's plans to restructure. A court affidavit says the company, based in Vienna, Virginia, missed a five (M) million dollar payment on a loan in January. Part of the payment was made later, but a March payment was also late. Documents state the lenders filed the affidavit in preparation for a request that Tak be placed in receivership. Earlier this year, Tak fired its news department at WOOW in Eau Claire. The station carries the newscasts of WXOW in La Crosse. Tak also owns television and radio stations outside Wisconsin.

from AP

TOWER...

from AP and Doug Smith

State Department of Transportation officials say they'll confer on a judge's decision to allow construction of a television tower. Transportation officials say the one thousand-706 foot tower is a threat to aircraft. department's Bureau of Aeronautics rejected an application last year from an Illinois company to erect the tower near Beaver Dam. Rut state transportation commissioner Joseph Sweda approved the project January 12th shortly before he resigned from the post. The department appealed but Judge Mark Frankel of Circuit Court in Madison upheld Sweda's authority. Frankel says aviation interests did not prove the tower would be a hazard to air safety. He says if aviation interests had their way, no tall tower permit would ever be granted. Charles Swain, chairman of

Dodge County's Board of Supervisors, says county officials want the decision appealed.

The tower is apparently for the channel 68 CP, for Fond du Lac. According to calculations, this station would put a grade-A contour over the whole city of



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Madison. The tower is planned for Elba Township at the junction of Dodge Co. Trunk TT and "Ghost Mill Road", about one mile north and 4 miles east of Columbus.

The EAA has expressed opposition, claiming this tower (which is 40 miles from Wittman Field!) would make public airspace "unsafe and virtually unusable".

(gee, I wonder how it is one can fly into Fargo, N.D. with *TWO* 2,000 foot towers only 30 miles away!)

WAYWARD CBer....

The following is an actual letter. The original was typewritten, and all spelling and grammar has been carefully left intact, including errors.

To Mr. (name omitted) District Manager for Alabama Radio Shack 3300 N. Pace Blvd Pensacola, FL. 32505

Dear Sire,
This letter is complain about the problems I have having with the ham radio model number 19-1101 I had got from your company Radio Shack. I had this shipped special to me from your store 1096 Eastdale Mall Montgomery Alabama. I was got this because I think that i would get transmitt furthur that I did with the TRC 217 40 channel walkie talkie.

The problem that had first was when I was going to hook this radio HTX-1000 to the antenna the conektor on the radio was wrong it wouldn't attach to my cable. I was able to hook it finally by making a small change in in the

connektor. As soon as I tried to use it there was no sound coming at all. This happened for two days and I never did get to talk to anybody the whole two days. That day the cable company came knocking my door and said there was something causing problems at my house and disconnekted my radio from the cable line. you knew when i brought the Radio that I was going to use that for my antenne. You didn't tell me not to why not?

Next time I decided to put the HTX-1000 in my automobile I thought I would see how it worked their. I hooked it to my CB-antenna and at least I could hear people. But what happens now is no one wants to talk to me because they says you have to have a licencs to talk to them. Why? I dont have to have a licencs to talk on my CB. They'll talk to me there. Anyhow it dont matter much anymore because somebody done took the radio HTX-1000 from my automobile.

What I would like for you Radio Shack to do is refund my money because I don't



WISC-TV 7025 RAYMOND ROAD MADISON, WI 53711 608-271-4321

have the radio anymore and its not my fault i dont and I think you should give me back my money. Also the cable company here says that I hurt something in there line and want to be paid fix it. It will cost \$27482.98 to fix the equipment they say was damaged because you didnt tell me not to hook it to the cable. Please remit to me the check for \$27758.53 for damages due. To save this matter from going to court the check must be in my hand by June first or I will turn this over to my attorneys of law.

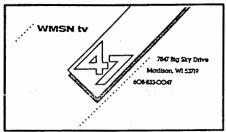
Thank you name withheld

FROM CHAPTER 56....

BEST ADVICE FOR THE MONTH: Avoid the new line of camera lenses marketed under the brand name of Hubble.

HOTTEST RUMOR OF THE MONTH: A small California company is developing laser beam technology to replace microwave equipment in STL-TSL applications. However, our sources indicate that it will be light years before the laser links are ready for release. During the initial testing, the overpowered laser beam zapped a flock of airborne ducks and sliced through a tower leg, collapsing a 1,700 foot structure.

AN ENGINEER: An Engineer is a person who passes as an exacting expert on the basis of being able to turn out, with



prolific fortitude, infinite strings of incomprehensible formulas calculated with micromatic precision from vague assumptions which are based on debatable figures taken from inconclusive experiments carried out with instruments of problematical accuracy by persons of questionable mentality and doubtfur reliability for the avowed purposed of annoying and confusing a hopelessichimerical group of esoteric fanatics referred to altogether too frequently as announcers.

SUSTAINING MEMBERS....

WELCOME ABOARD!!

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Herb Van Driel

and

BROADCAST TELEVISION SYSTEMS (BTS)

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