

THE OVMRC RAMBLER

Volume 35, Number 1 -- January, 1992

TUNING IN HF PACKET -- THE HARD WAY

by Bob Shaw, VE3SUY

When I recently purchased an MFJ-1278 Multi-Mode Controller (or Terminal Node Controller -- TNC), I was anxious to try HF packet with my Kenwood TS-440-SAT transceiver. VHF packet worked pretty well "out of the box" on 2 meters with my Yaesu FT-470 after I made up a cable, but NOT HF! On FM, the received audio tones (explained below) are NOT affected by tuning errors within the capture range of the receiver, but on HF, the audio tones are very sensitive to tuning errors. These tones should be within 10 Hz. of their "correct" frequencies. I found the manual helpful in producing a cable between the TNC and HF transceiver, but I found it sadly lacking in explaining where I would find HF packet in the spectrum, how I would recognize various digital modes by their sound, and exactly how to tune in frequencies where HF packet is "said to be"!

While I am not an expert -- yet, I can recognize three HF digital modes by their sound. RTTY is a continuous warbling. Packet is a series of short RTTY-like warbling of about 1/2 to 1 second long rather randomly timed, and AMTOR is a continuous train of short warbles, with the S-meter jumping from high to low as the carrier is keyed on and off about four times per second. All these digital modes use essentially the same scheme for indicating the digital "ones and zeros" (or MARKS and SPACES). Packet uses a 200 Hz. shift, and RTTY and AMTOR use a 170 Hz. shift.

I have drawn Figure 1 to help explain the tuning process for HF packet, and an understanding of this helps

in understanding the tuning for all the digital modes.

The ORIGINAL plan for HF packet used two audio frequencies for the MARK and SPACE digital signals -- 1600 Hz and 1800 Hz, and thus there is a 200 Hz frequency shift. Using the Lower Sideband (LSB) mode (this seems to be almost universal regardless of band), this meant that the actual RF frequencies for MARK and SPACE were the indicated transceiver frequency minus 1600 Hz and 1800 Hz. The centre frequency of this signal is then the indicated transceiver frequency minus 1700 Hz. The MARK frequency is the higher audio tone and the lower RF frequency. Standard frequencies for HF packet transmission were set using this scheme -- and typically are (but certainly not restricted to)

7.093,000 MHz - 40 M Band and each 2 KHz up

14.103,000 MHz -

14.105,000 MHz-

14.107,000 MHz - 20 M Band and each 2 KHz up

28.101,000 MHz - 10 M Band and each 2 KHz up

etc.

The 2 KHz "channel separation" seems to be fairly standard on all HF bands.

The MFJ-1278 uses slightly different audio frequencies for the MARK and SPACE indications -- 2110 Hz and 2310 Hz, still with a 200 Hz frequency shift. These frequencies are produced when the indicated transceiver frequency is HIGHER

than the standard frequencies mentioned above by an amount equal to the difference between 2210 Hz and 1700 Hz (the difference in the "offsets"). Thus the correct indicated frequency to tune to receive the usual HF packet frequencies is 520 Hz higher ie. 7.093,520 MHz, 14.103,520 MHz, 28.101,520 MHz etc. with an MFJ-1278.

The upper sideband (USB) could be used, and this would have two effects -- reversing the audio tones for MARK and SPACE, and lowering the transceiver indicated frequency by twice offset of the centre frequency. The same digital signal can thus be received on USB at the LSB indicated frequency minus 4420 Hz using an MFJ-1278, or minus 3400 Hz if the TNC uses the original standard audio tones. I have successfully received packet in the USB mode with the indicated frequency reduced by 4420 Hz, setting RBITMASK to \$7F, and shifting the IF-Shift to 3 o'clock (explained below).

The interchange of MARK and SPACE tones can be compensated in the MFJ-1278 by XORing the "data" by the binary values \$7F or \$00 (flip and no flip) using the RBITMASK command (RTTY and AMTOR modes).

When I checked the CALIBRATION of my transceiver with WWV, I found that it was actually zero-beating with WWV at a bit higher indicated frequency than it should. Rather than recalibrate my TS-440, I noted the correction (difference between indicated

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NEXT MEETING OF THE OVMRC

16 JANUARY, 1992
1930 hours

**National Museum of
Science and
Technology**

Auditorium

CLUB CALENDAR

JANUARY PROGRAM

TRAFFIC NETS AND HANDLING

Bob Campbell, VE3KLB

FEBRUARY

ANNUAL DINNER
15 February - 7 p.m.
Robbie's - St. Laurent

APRIL 11

FLEA MARKET
CANTERBURY HIGH SCHOOL

JUNE

FIELD DAY

SOME AMATEUR RADIO NETS

POT HOLE NET - Sundays 1000 hrs. 3.760 MHz (includes Swap Net)

POT LID NET - Sundays 1100 hrs(except Jul & Aug) 3.620 MHz slow-speed CW.

CAPITAL CITY FM NET - Mondays 2000 hrs 146.94 MHz Swap Net

THE WISE OWL NET - Fridays 2000 hrs. 147.30 MHz

OVMRC CODE PHONE - 825-0786 24-hr code practice..

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their generous gift of

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is gratefully acknowledged.

Ramblings

Jerry Wells, VE3CDS



Once again, we are into another new year. At the start of 1992, one wonders -- will we follow the trends that we saw in 91? Amateur Radio went through many changes during the past year. One of the most significant is the dramatic increase in amateur radio operators. This was brought about by the relaxation of the licensing requirements.

As you members of the Club are aware, we have been quite active in the training of new radio amateurs through our Club sponsored courses. It is interesting to see the reaction of some of the students when they realize that part of the course is devoted to teaching Morse code. It is not uncommon to hear the comment "I'm not interested in the code." After a few practice sessions of code at 5-word-per-minute, many of those who expressed little or no interest find themselves hooked. They can't wait to try the test to get the 5 wpm test under their belt. It is interesting to note that getting the code at 5 wpm is a real incentive to learn the theory necessary to pass the Basic Qualification exam. Some of the new hams

with their basic plus 5 wpm really go to work to get their speed up to 12 wpm. There is no doubt that listening on the HF bands above 80 metres gives the new hams the incentive to get that 12 wpm code test. I have had numerous students upgrade their code speed long after their initial success at 5 wpm on the course. The advent of the no code licence has proven to be the real incentive for many people to get into ham radio. The real plus is that most of the new hams learn the code and go on to the 12 wpm level.

Another interesting observation is the number of aspiring students who have been working on their own, in some cases for years but never getting to the point of going for an examination. These individuals are now being referred to delegated examiners by amateurs who are well aware of their desire to get a licence. I have encountered a few in this category... They have studied every book on the subject of ham radio, they know the regs and know the code. These self-taught students are really excited when they realize they

have finally done it. The feeling of accomplishment is tremendous. There is no doubt that we are getting a lot of good new hams as a result of the DOC restructuring of Amateur Radio.

I think that the current merger of CRRRL and CARF will be good for amateurs in Canada. The new year should see one organization representing Canadian Amateurs. The members of the Ottawa Valley Mobile Radio Club are encouraged to support our national organization.

Let us all work to preserve the wonderful hobby of amateur radio in 1992 and in the years ahead. I encourage the older hams to provide guidance and support for the new members to our hobby and our Club. Remember, we were all beginners at one time and we are all participants in the marvellous world of Radio. On that note I realize that this month in 1992 I have been licenced for 40 years. How quickly the time goes by. I still remember my first contact... 7013 Kc rockbound, a W8 in Ohio January 1952... Wish I could find that old log book....

DOOR PRIZE WINNER DECEMBER MEETING

The lucky winner of the door prize at the December meeting -- an ARRL Handbook, was Chuck Baker, VE3PAP. Congratulations, Chas.

Secretary's Minutes



Our Secretary is out of the country and the Minutes of the December 1991 Meeting are not available for printing. They will be published in next month's newsletter.

HF Packet from page 1

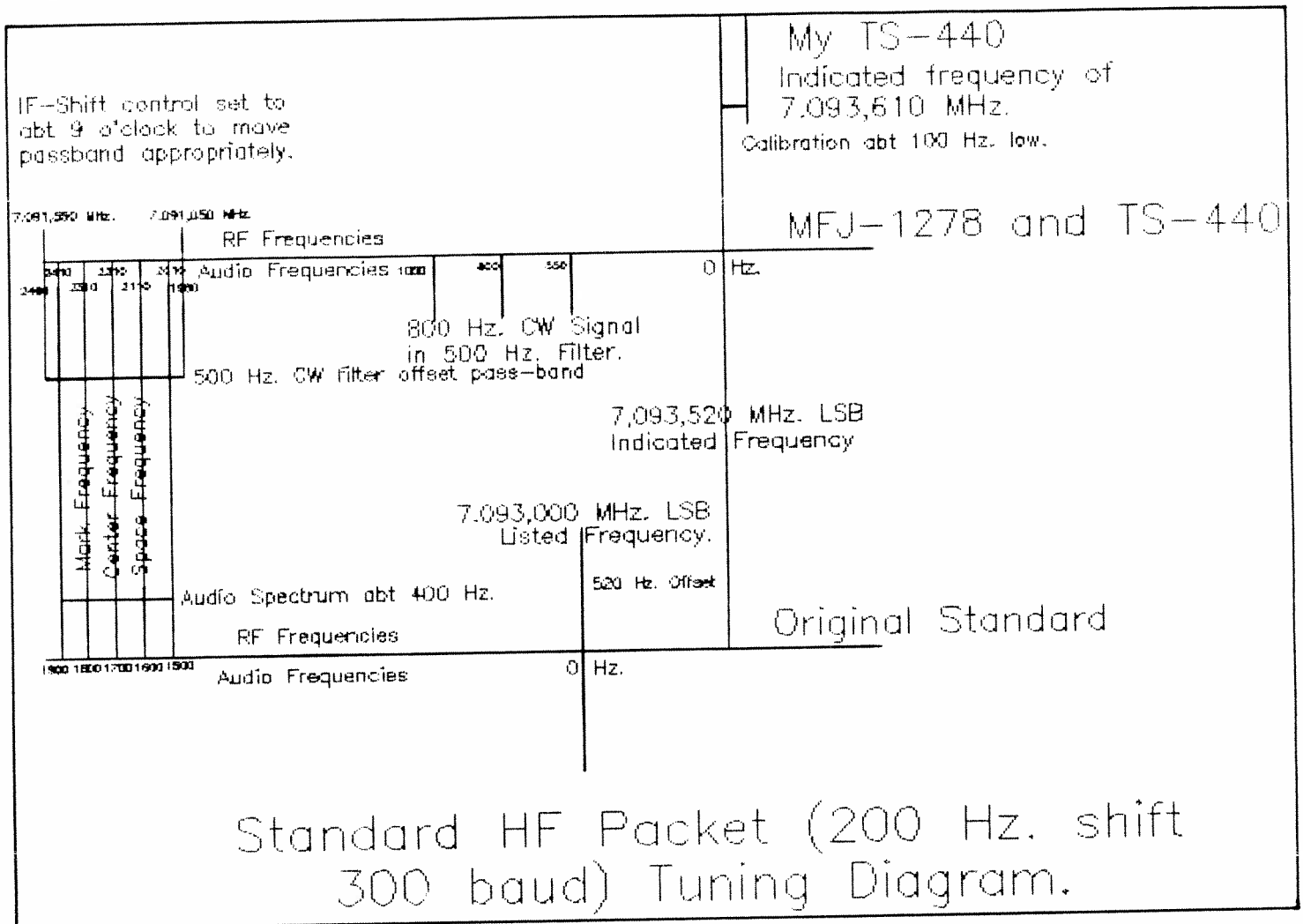


Figure 1. Tuning Process for HF Packet.

frequency and known WWV frequency) as follows:

At 20 MHz receiver indicates 160 Hz high.

At 15 MHz receiver indicates 110 Hz high.

At 10 MHz receiver indicates 60 Hz high.

At 5 MHz receiver indicates 80 Hz high.

Recalibration could correct any ONE of these, but perhaps not all, so I chose to leave the calibration alone. I'm not sure if the TS-440 derives all of its reference frequencies from one master oscillator. However, the "correction" mentioned above for packet frequencies is further altered by the

calibration correction, and FOR MY TRANSCEIVER, is about:

40 M band add 590 Hz to get a corrected indicated frequency

20 M band add 620 Hz

10 M band add 680 Hz

I have modified my TS-440 to indicate frequencies to 10 Hz as shown in *HF Packet Continued on page 6*

NEWS AND VIEWS FROM HERE AND THERE



by Pat Brewer, VE3KJQ

This month our review of club bulletins from across Canada will start in Ottawa with the **Ottawa Amateur Radio Club** *Groundwave*. At their November meeting Paul Cooper VE3JLP showed a videotape of the Bouvet Island DXpedition. The commentary was in Japanese, but Ralph Cameron VE3BBM showed that he is a man of many talents by providing a translation. Bill Balke's item on linking which appeared in the *Rambler* was reproduced in the *Groundwave*. The OARC is setting up a committee to look into restructuring their club in light of declining membership and a recent critical article in the *Groundwave*.

Moving north and west we come to the **Sudbury ARC SARC Communicator**. Memberships for their club will be \$30 this year. Aren't we lucky! A small item relates that wireless mikes are becoming so popular in the entertainment industry that new frequencies have had to be allocated for their use. They will now have five different bands of frequencies, all shared with TV channels.

Next we come to the bulletin of the **Scarborough ARC**. They have gone to publishing every second month. In the current issue there is an article on SWR. This is always a confusing subject since a low SWR does not always indicate that "all is well with the antenna system". "A change in the SWR rather than a high SWR can indicate trouble in your antenna system." The author recommends reading an article in the November 1991 *QST* called "My Feed Line Tunes My Antenna" by W1DX.

Heading down the 400 and across the 401 we come to the bulletin of the **London ARC**. They are still looking for a new bulletin editor and the President laments the "total lack of support from the club membership". On a happier note there is a photo and article on the

"November 11 Nostalgia" station of Dick Moore VE3LRB. He usually operates his Wireless Set #19 on November 11th each year. This year he opted for services other than the army. The transmitter was a CSR-5 receiver from the navy and the transmitter was an airforce Bendix TA12-C from a Lancaster. This might be a worthwhile project for the museum station to consider once it is operating again.

A little further west is Windsor and the **Border City Radio Club**. (As an aside I note with interest that the Scarborough, London, and Border City clubs haven't given their bulletins specific names.) For a brand new club, the Border City club did very well at last year's Field Day. They scored third in Canada and sixth overall in the 7A category. As well they had the most participants at 120. The article makes an important point when looking to score well in Field Day. The top two stations in Canada had only 100 and 250 more contacts respectively than the Border City club, but they scored 1400 and 3000 points higher. How did they do it? With a higher percentage of the two-point CW contacts. Are you listening Vic?

Hopping on a plane we arrive in **Saskatoon** and the *SARC Feedline*. Sixteen club members helped out with marshalling and communications for the Santa Claus Parade on November 16, 1991. The parade started on time and went very smoothly. The club will be participating in "Participation" this month with Saskatoon's "twin" city, Novgorod, USSR (since renamed the *Community of Independent States or CIS - Ed*). Communications will be set up between the two cities via a station in Pickering, Ontario. The *Feedline* is now a much expanded version of the old Saskatoon *Greensheet* and unfortunately is costing the club about 25 percent more to produce.

Another plane ride and we find ourselves at our last destination. This month the **Calgary Amateur Radio Association** bulletin *Key Klix* contains a number of interesting items. The bulletin started off on a sad note. For the first time in the fifteen years that the club has been involved in the Kananskis Sports Car Rally, the race ended in tragedy. One car went off the road and crashed, killing the navigator and injuring the driver. They were a husband and wife team. A number of hams were praised for preventing further tragedy and Alida VE6SDA was especially thanked for her valiant, if vain, effort to save the woman's life. The club president made the point that "the more experience we all have in operating and message handling the easier it is when faced with the real thing." Gordon Coates VE6CTC is the Western Chairman for the Canadian 125th birthday celebration and is planning a special QSO contest. CARA is now proceeding with plans to hold the first annual convention of **Radio Amateurs of Canada**. The club voted in favour of the motion at the October meeting. There is a nice long article on dos and don'ts on VHF/UHF repeaters. Essentially the author feels that the Elders in ham radio don't realize how much they are observed and listened to by the new hams. "Yes, we all have slipped into some poor operating habits unknowingly and maybe it's time we all take a few moments to think of what we say and how we say it." On a final note, it was suggested by the VHF section of the club that a meeting program might include instruction on "how to work and program your radio". I always thought that was one of those great mysteries of life that we were never meant to understand. See you next time!



the Kenwood manual. All frequencies here are rounded to 10 Hz.

I found the Kenwood recommended calibration procedure in the manual to be too inaccurate, as I could not really determine a zero beat with WWV very accurately. I tried my own technique, which I think is likely to be more accurate. I tuned in WWV in the CW mode. With the CW/VOX switch set to OFF, and the key depressed, the transceiver produces an 800 Hz tone without actually transmitting, and the received signal is also heard. I tuned the transceiver under these conditions until I judged a zero beat between the received CW signal at 800 Hz and the generated sidetone at 800 Hz. The indicated frequency less the known WWV frequency yielded a fairly accurate calibration error as shown above. I may remove the covers and try recalibrating the transceiver using this method someday. The 800 Hz sidetone is not likely to be off by more than a very few hertz, and I may even check this somehow.

The audio component of WWV interferes with trying for a zero beat. A low-pass audio filter and a DC oscilloscope or analog meter may prove helpful in really identifying the zero beat of the 800 Hz signals, or the WWV carrier and receiver reference oscillator.

Now there is another problem to be understood. The AUDIO SPECTRUM generated by the 300 baud switching between the MARK and SPACE frequencies is about 400 Hz wide, centred on the average frequency and extends from ap-

proximately 2010 Hz to 2410 Hz. A 500 Hz CW filter should be used to reduce "noise". This filter is also wide enough not to severely distort the signal near the filter skirts. With the IF Shift control in the centre (detent) position on the TS-440, an 800 Hz tone is centred in the pass-band of the 500 Hz CW filter. This is too low for the audio spectrum required for HF packet. The IF Shift control can reposition the pass-band, and on my transceiver, is optimal when set at 9 o'clock. I arrived at this setting as recommended in the MFJ manual by finding an unused frequency and using the Data Carrier Detect (DCD) and tuning indicator of the MFJ-1278 to find the setting of the IF Shift control yielding a centre position of the tuning indicator using this noise with the DCD lamp lit, and using the minimum possible setting of the threshold control.

The standard SSB filter could be used without this off-set, but with greatly increased noise (QRM, QRN and white noise), as the audio tones are within this filter's pass band. MFJ highly recommend a 500 Hz filter.

The simple and inexpensive audio spectrum analyzer described in the article "A Receiver Spectral Display Using DSP" in the January 1992 issue of *QST* by Bill de Carle, VE2IQ would be a very useful tool for observing and measuring much of the above, particularly if you use an IBM PC clone as a terminal emulator. I look forward to building and using this simple interface.

Another two-part article, "What Your Frequency Display Really Tells You -- Parts 1 and 2" by Newkirk in the August and September is-

sues of *QST* is also enlightening and amplifies or clarifies some similar frequency-related topics.

The TS-440 has an FSK mode facility, but it is insufficiently documented in the Kenwood or MFJ manual to use. The audio spectrum analyzer would be useful to see if this mode is suitable for packet.

With the above information, I hope you will be able to make similar measurements on your transceiver and TNC, and tune in HF packet (or other digital mode) using your transceiver's frequency readout, and be pretty well "on the nose" without even receiving the packet signal. Sometimes you want to get on frequency when there isn't any traffic to tune in on, or to be ready when the band opens.

Possibly more important is the fact that when you observe several packet stations supposedly on the same frequency, there is a range of at least 50 Hz error from station to station. Since 10 Hz tuning is desirable, it is necessary to have some way of insuring that your station is at least correctly set. It is better to be "calibrated" than to tune to a station that may be considerably off the correct frequency.

I have enjoyed using HF packet over the past weeks, but it took quite a bit of reading and fiddling to really understand the tuning process! I would appreciate any thoughts or discussion on this topic, and can be reached at:
VE3SUY@
VE3JF.ON
.CAN.NA.



FOR THE WANT OF AN UMBRELLA

by Ed Puccini - VE3EFP

If anyone had told me that buying an umbrella would save me fifteen thousand dollars, I hope I would have had the common sense to do so. "An umbrella?" you say. "What kind of umbrella could possibly save you fifteen thousand dollars?"

Well, it's a long story, but to make it short, let me start at the point where I got my amateur radio licence in 1987 and spent a wonderful year listening and doing a little transmitting on a short inverted "V" antenna. It was not the most sophisticated set-up, but I was in seventh heaven. By spring, 1989, having heard nothing from my neighbours, I approached six of them in my immediate neighbourhood and explained that I wanted to put up a tower. "No problem." was the answer. So, I contracted with Harold MacFarlane to put up the tower of my dreams. He had no sooner got the base legs up when a neighbour from the end of the street set a fire ablaze under the neighbourhood.

For the next eighteen months, I tried to negotiate a compromise with the now aroused neighbourhood. I managed to reduce the number of opposers to six; less than half the original number. But finally, in frustration, I told MacFarlane in November, 1990, to go ahead and complete the installation.

Within a week of the completed work, I was served a subpoena. I appeared in court in February, 1991 and, after much haranguing, the court decided in my favour. However, the judge denied my court costs. The fifteen thousand dollar costs were paid out of my insurance policies, which are now in hock.

Ralph Cameron, VE3BBM, wrote an excellent summary of the case in his column *Crosswaves* which appeared in *The Canadian Amateur* in the July/August, 1991 issue.

Joel Skapinker, VE3TDM, who is a Toronto-based lawyer, wrote to the editor of *TCA* in September of last year, saying, "I believe that the Puccini case, will stand as a strong authority to arm amateurs in their disputes with their neighbours." (*It is small consolation, but I am glad to hear this.*)

Getting back to the subject at hand. You've insured your antenna and your tower. So had I, but not with an umbrella! I took out the usual protection policy for public liability, but had I gone one little step further and taken out what the industry calls a "personal umbrella policy," my legal court costs and more would have been covered. Should you re-examine your policy? Do you need an umbrella?

I wish every ham, new and old alike, could be made aware of the risks they run when they are quietly enjoying their federally licensed hobby. Remember, it doesn't have to be a tower. A dipole or even an invisible antenna may be the cause of litigation simply because your neighbour doesn't like the idea. And heaven help you if your are causing "interference" on his susceptible telephone, VCR or TV that was designed to receive HF signals.

I wish I had known, or at least that my broker had known, how little it costs to protect oneself from malicious and frivolous civil suits. I now have one million dollars of coverage at a nominal cost of ninety dollars - but only good for future claims.

It should be one of the aims of the new amateur radio federation, the Radio Amateurs of Canada to protect not only the frequencies, but the rights of amateurs to enjoy the hobby without harassment from neighbours. Why should the Mangaroos, the Ravenscrosts, the Puccinis et al, have to keep going to court to defend themselves for using

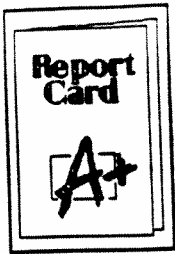
privileges granted them by Federal law. These licensees face economic, physical and emotional ruin just for doing what they have been authorized to do by the Federal Government. Is it not time that this nightmare was put to an end? Should not our national organization seek a federal ruling to protect amateurs against these continuous malicious and frivolous charges?

My case is not over yet. An appeal of my favourable court decision was filed in April, 1991 and is still pending. It hangs over my head every minute of the day and prevents my getting on with my life, such as it is.

I do have many people to thank for their support during my ordeal. Many who gave me moral, technical, and legal support. Prominent among these are Ralph, VE3BBM, and Harold MacFarlane who have been with me all the way. Bill Wilson, VE3NR, and Evan Herriot, VE3IND, who added substantial credibility to my case. Ken Mangeroo, VE3NCM, who has been through this himself and warned me of the possible pitfalls. Debbie Norman at CARF, who immediately answered my calls for help and acted as a resource person, directing me to the experts.

A final word of advice to all amateurs. Do not think that you are immune. Take the necessary steps now to get yourself an umbrella in case this sort of misery should rain on you.

For the want of a nail, the shoe was lost. For the want of a shoe, the horse was lost. For the want of a horse, the message was lost. For the want of a message, the war was lost. All for the want of a horseshoe nail. Much can be said for the want of an umbrella. Ed.



I M I



by Ron Clement VE3 HOPEFUL & Roger Rose VE3 HOPEFUL

Well, some of us have finally done it. On November 26th, twelve students passed the 5 wpm Morse Code test. Congratulations are in order to Bob Kenna, Bob Calver, Lise Quesnel, Gerry Stuurop, Jeff Hiltz, Kevin Jones, Allan Barnes, Jim Robinson, Ron Clement, David Morphy, Daren Bryk and Chris Grace. For those of you who haven't passed yet, hang in there. Remember what Brice keeps on telling us: "practice makes perfect". It's true. I was losing it when it came time to copy Morse at the beginning of the class each week. Why you ask? That's easy, BECAUSE I was not practising enough. I was not doing at least twenty minutes each day. The week before the exam, I did my twenty minutes each day and just never gave up. On the day of the exam, I rested my brains and before you knew it I passed my test. Some of you might feel like giving up. Well don't even think about it. If you need help just ask and I am sure that there are LICENSED AMATEUR RADIO OPERATORS out there who are willing to help you if you are having problems. Just ask one of the instructors and I'm sure they can give you the name of a mentor willing to help you with your morse code or even with some of the homework we get every week.

Our Club meets on the third Thursday of each month in the auditorium of the Museum of Science and Technology, on St. Laurent Blvd. When we paid the tuition for the course, it also included a membership into the Club. Therefore, as a student, you are en-

couraged to attend these meetings. The meetings run from 19:30 until roughly 21:30. Through attendance at these meetings you will enhance your knowledge of amateur radio. At the last meeting, we met and talked to guys who participated in an event called a DXpedition. Listening to them talk about their trip was very exciting. They showed us pictures and explained what they did on this expedition. They had gone to St. Paul Island and made radio contact with a lot of other countries. We sure got a little taste of things to come. Someone else gave a demonstration on the linking system on 2 meters.

I am sure that all those who attended went home with a little more information about amateur radio and some of the activities in which we can participate.

WHAT THE HECK IS THAT ALL ABOUT?

- Imaginary Formulas;
- Dimensionless Quantities;
- Sympathetic Vibrations!

Due to equipment problems, we had to skip code practice on Decem-

ber 10th - Was that a sigh of relief we heard?

On December 17th, Ottawa was hit with blowing snow and only half the class showed up. Doug decided to simply review the previous week's material, which was only a blur for some. Of course, what would a class be without code practice.

All that to say that with the holiday season upon us, we have been transformed. We are now tuned to a narrow bandwidth but... we found a new meaning to the word 'curve'. We have to be selective after all.

We would like to leave you with some now famous quotes from our instructors:

- "This is important stuff" (Doug)
- "How are you doing?" (Jerry)
- "Very important number" (Doug)
- "Don't read, concentrate on copying" (Bryce)
- "Key issue" (Doug)
- "Put that away somewhere in your head" (Doug)

Get your AC in gear, it's relax and enjoy the Season. A final note. We hope that many of you took the opportunity to visit Jerry's "Ham shack." If some of you didn't make it, maybe other amateurs will extend an invitation to visit their set-ups at another time.

That's it for 1991. Have a SAFE and happy holiday season and will see you on January 7th, 1992.
