

"There's nar fish": A True Story about the Big One that got away...

Ralph Cameron, VE3BBM

The fall of the year 1978 marked my 31 years as a holder of a federal Amateur Radio licence and incidentally 31 years of being able to send and receive the Morse code, which was a mandatory requirement at that time, as was executing the Oath of Secrecy. Ability to copy the code usually improves with practice so, after 31 years of working the Amateur traffic nets, I could copy almost every speed I heard.

Portions of the radio spectrum used for communication have been divided into three regions worldwide, by the International Telecommunication Union (ITU), in order to protect other users from so called propagational overlap, which could cause interference due to vagaries of the sunspot cycle rising and falling every 11 years.

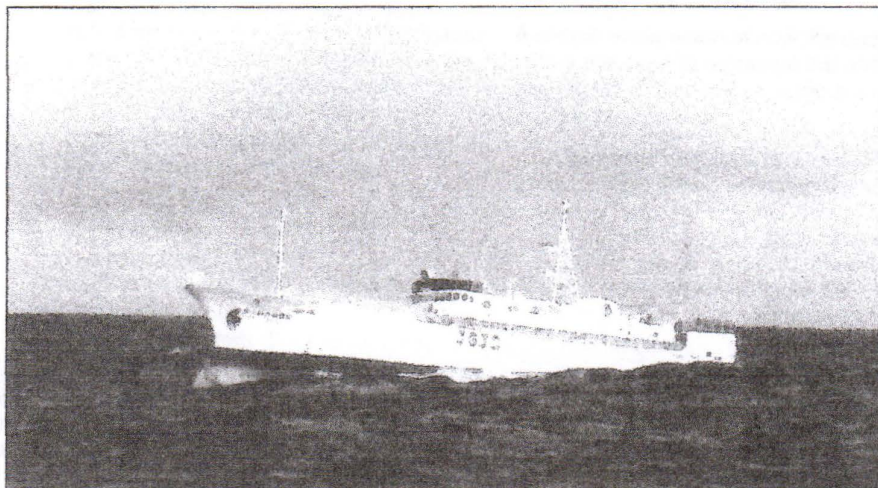
The Oath of Secrecy was meant to preserve confidentiality of anything heard over the airwaves, much like the illegality of opening other people's mail. Provisions of the old Radio Act did not permit profanity or discussion of religion or politics. Canada, being in International Amateur Radio Union (IARU) Region 2, protected at least one chunk of spectrum for exclusive Amateur use. These frequencies were 3.5 to 3.7 MHz, part of our so called 80 metre band.

As Radio Amateurs, we all know that the distances covered by the various short wave bands varies considerably depending on time of day, season and sunspot activity. When the sunspot activity is high, the higher frequency short wave bands become very active and minimum transmitting power is required to contact just about any point around the world. This is what makes it so appealing and fascinating and challenging for those using low power transmitters. Who knows where your "peanut whistle" will be heard?

Friendly Sked

In 1966, our new family moved to Ottawa leaving behind several radio friends from cities such as Toronto, London, West Hill and North Bay. It wasn't long before I started contacting them with the aid of Amateur Radio. No computers, no Internet, but one on one with Morse code, ensuring some degree of privacy for those able to copy it. That aspect hasn't changed much.

One friend I continued to chat with on a continuing basis was Percy Bernard, VE3GN, who claimed to hail from the "ambitious" village of Powassan.



Now if you've driven through Powassan, about 20 miles south of North Bay, you wouldn't want to blink because its a very small northern community. Perc ran the local, single hydro generating station called Bingham Chute, which had one leaky penstock and one generator and there was just enough room in his office to comfortably sit two people. He had also been a long-time Amateur Radio operator in northwestern Ontario and in the early days lived out of a tent at Cameron Falls, and frequently skied 14 miles in to town with his son on his back to do a little shopping. (Hard to believe, but Perc insisted it was true.)

Perc and another old-time Amateur, Mike Caveney, VE3GG, shared similar hydro jobs as generating plant operators and were the first to establish their own radiocommunication system, with Mike at Rat Rapids and Perc near Cameron Falls.

After the move to Ottawa, Perc and I had agreed to schedule at 1900 hours every night, if convenient. We would listen for each others call sign. Perc was licensed as VE3GN and my own call was VE3BBM. Listening to one specific frequency that was usually unoccupied only required one or two "dits" on the Morse key to alert us, before formally using the required exchange of call signs.

Friendly Communications

To add some perspective in the use of Morse code, it is quite easy to express certain emotions using a simple hand key. For instance, when someone tells you a funny, we frequently respond with the letters "HI", which indicate laughing. Or the same operator may tell you a hard to believe "tall story" and add his/her own "HI", to indicate you were being intimidated.

The manner in which the two letters are sent, very fast or very slowly, depends on how the other operator wishes to express hilarity or subtle humour. For a really funny one, the letters "HI" were all sent slowly, with dashes.

The Beginning: Fall of 1978

In early September 1978, Perc and I had just indicated we were ready to chat when another signal appeared on the frequency we were using and caused us interference.

Common Radio Amateur etiquette calls for first checking to see if the channel is occupied before commencing transmitting, even though the channel may appear clear. This certainly wasn't done. Nor were any call signs evident from the signals heard. To make matters worse, the sent code was a strange mixture of normal Morse, interspersed with unrecognizable characters, unlike any I had ever copied. Perc heard them too and agreed. We began to refer to them as "the queer signals".

In situations such as this Amateurs are obligated to report them to the authorities responsible – a local Radio Inspector or officials responsible for spectrum management. At the time it was the Department of Communications.

In speaking with a Departmental representative, a fellow Amateur, he suggested taping the start and ending of the communication, along with anything else. This was done; although, I assured him no call signs were evident, and the frequency used was 3.700 MHz, which the ITU allocated exclusively to Amateur Radio. Three tapes were hand delivered to the Department containing the information requested.

Code Specifics

I will mention at this point that I researched and found many published radio telegraph codes used in countries around the world because these codes were used by marine services, aircraft services and, of course, military services and were in the public domain. In the course of the search I had some fascinating Internet correspondence with the official in charge of radio licensing in Iran, about how the code in Farsi was rendered. Iran at that time was politically tame.

I had read about a code used by the Japanese, which was published and taught to marine radio operators in Japan, but I had not been successful in finding a copy even after searching the Canada Institute for Scientific and Technical Information (CISTI) library. This code was taught to Canadian military during the war for use in intercept sites on the west coast and to a large contingent of Canadian military posted to Australia, for the same reason.

My next step in obtaining a copy of the code was to call the Japanese embassy and explain that I was a Radio Amateur and was interested in their published telegraph code. No sooner said than done, I received a copy in the mail the next day.

Code received

Upon receipt of the code, I noted the odd arrangement of characters, compared to the vowel order in dictionaries. Twenty years later when I bought a very large Japanese Dictionary from the University of Toronto library, I learned the order of the characters corresponded to a Buddhist poem used to memorize all the syllabary or characters used to represent all the phonetic sounds used in the Japanese language. The poem is known as the "iroha" - more on syllabaries later.

While the transmissions continued nightly and I continued taping them, a period of six weeks elapsed without any acknowledgement from the Department of Communications so I decided to make further inquiries through my earlier departmental contact. When I asked what happened to the tapes, the response was "what tapes?"

This response was somewhat disconcerting and it was ascertained the tapes, quote "had disappeared, but the department would replace them". To this I agreed and should state that having dealt with government departments for many years, I foresaw the possibility of this occurring so decided to copy the originals, give them the copy and keep the originals.

That proved to be a wise precaution because without the tapes, there would be no case.

A Letter to the Minister

In due course the replacement tapes appeared in the mail. Further investigation of the continuing signals appeared to be at a standstill so I decided to notify the Minister of my concerns directly, as government policy requires a response within 30 days.

In June 1981, I received a response from the Minister of Communications, Francis Fox (shown on the top right), which stated:

"Please be assured that this material will be carefully reviewed and depending on our findings, appropriate action will be taken."

Should you observe this kind of activity in the future, we would appreciate your advising our Director, Operations Branch, Telecommunication Regulatory Service, at your convenience.

I wish to thank you for the time and effort you have expended on bringing this matter to my attention, and, in particular, for your dedication and thoroughness in the preparation of the data compiled."

I called the number listed on the letter and the person who answered didn't quite understand that what I was copying was in a foreign language. Just "What is Japanese code"? I was asked. Somewhat shocked, I attempted to explain, but was rudely silenced with some bureaucratic statement to the effect that if I heard it again to notify them. Having told them these signals appeared nightly didn't seem to penetrate the narrow filter of the listener. Conversation terminated.

I did learn my inquiry was placed in a red folder at the Department, indicating it was categorized "secret". Where it went from there, nobody was to know.

Construction of the Code

A simple explanation of how the code letters are used to represent the phonetic sounds used in speaking Japanese is provided below.

The Japanese language has four writing systems. The more traditional highly

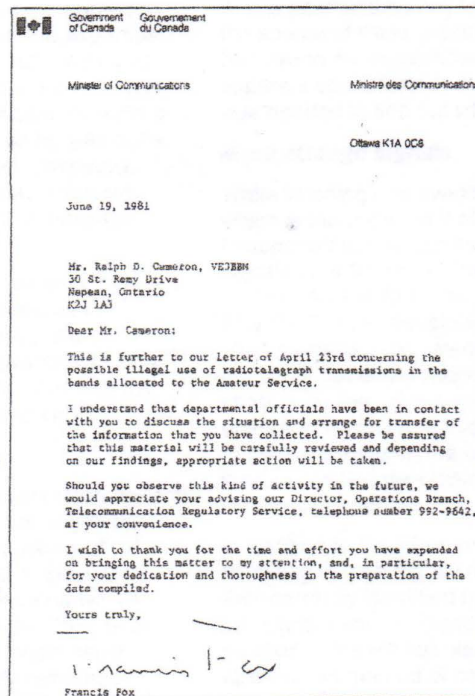
graphic characters are called "kanji" and these are supplemented by a set of cursive characters called "Hiragana". In addition, anglicized and foreign words are usually written in "Katakana" which is similar to our printed characters.

For English readers, the reading may be simplified by writing the English equivalents as vowel/consonant pairs, e.g., "Yubinkiyoku" (post office).

This method of writing is called "Romaji".

Japanese has both short and long vowel sounds so there are rules specific to hiragana and katakana which add an additional character to the sound. These rules are not difficult and it does not increase the difficulty in sending or receiving.

A perfect example would be the word Sa+yo+u+na+ra = Goodbye. The "yo" pair would be followed with the letter "U", in order to elongate the sound, which is the way it should be pronounced.



a	ア	あ	— — — —	ha	ハ	は	— . . .
i	イ	い	. —	hi	ヒ	ひ	— — . . .
u	ウ	う	. . —	fu	フ	ふ	— — . .
e	エ	え	— . — —	he	ヘ	へ	. —
o	オ	お	. — . . .	ho	ホ	ほ	— . .
n	ン	ん	. — . . .				
ka	カ	か	. — . .	ma	マ	ま	— . . .
ki	キ	き	. — . . .	mi	ミ	み	. . — . .
ku	ク	く	. . . —	mu	ム	む	— —
ke	ケ	け	— . — —	me	メ	め —
ko	コ	こ	— — — —	mo	モ	も	—

The written Japanese language has no alphabet but consists of pairs of characters representing all the sounds normally spoken. In addition to the character pairs, there are two operational diacriticals, when used after the syllabary representing the spoken sound that change the pronunciation of the character. These diacriticals also have code equivalents.

There are two grammatical operators that have code equivalents which change the pronunciation: one is a small circle, the other looks like quotation (") marks.

Collectively, the different sounds can be represented by a cursive (written) symbol or a more simplified symbol, are known as syllabary or syllabaries. The set of cursive characters are called "hiragana" while the simple characters are called "katakana". The latter system is used to write anglicized words by use of phonetics. Sound confusing, their usage is really not complicated.

The syllabaries have rules of use and are constructed from the five vowel sounds, in the order a, i, u, e, o, and paired with a consonant. The consonants paired with a vowel are: h, k, m, n, r, t, s, y, etc. It is easy to imagine that a Japanese word like "kore", which means "this" in English, is a combination of the two sounds "ko" + "re" — each pair consisting of a consonant and vowel. Further sounds following the above pairing would be: ka, ki, ku, ke ko; ma, mi, mu, me, mo, etc. There is also a single letter which occurs frequently and is pronounced like our letter "N" and characters to indicate the object and subject in a sentence.

Most North Americans refer to the Japanese telegraph code as katakana. The Japanese have their own word for their version of Morse, calling it "Hore". I have yet to read a published article which refers to this term, but have seen it called "Wabun" which means Japanese writing.

Now you understand a little about the makeup of the language and know that the verb usually follows at the end of a sentence (like Latin) and that there are no indefinite or definite articles, so that inference to plural or singular subjects is by contextual use. In fact you can be safe in placing word order in several ways and still be understood.

Recording Mode

My method of transcribing the transmitted code was to first tape it until I became comfortable in directly writing the katakana equivalent when I had it memorized. This took over a month and because individual transmissions were

fairly short, I soon learned the calling/reporting protocol. Once I had the transmissions transcribed, I began to wonder what to do with them.

Fortunately, I was a test equipment account manager who had customers of many nationalities throughout the federal government and many were gifted scientists. One such Japanese client at the Communications Research Centre in Shirley Bay (Ottawa), Ontario agreed to look at what I had copied. His expertise in laser technology also included being an official translator for the Secretary of State. He told me he got paid 18 cents a word for translation and so he was quite anxious to see what I had. I believed this to be a logical contact; otherwise, I wouldn't have a clue as to message contents.

From day one, it was determined that several characters made sense in Japanese and in a couple of cases the sound order had been reversed so as to confuse any listener unfamiliar with the language (simplified encyption?).

More success

Progress was made at every intercept and it revealed that some of the operators were female as noted by grammatical usage (ie, some words are specifically used by females and the same words differ when used by males). They even had pet names such as "Night Hawk", which is one I specifically remember. It was obvious some fraternization had occurred in the home country.

These signals being received in Ottawa were strong. They could be heard very well in Powassan also. Propagation in fall and winter was exceptional that year on the Amateur 80m band.

In most cases, if Perc and I paused to operate precisely at 1700 hours, one of the unknown stations would come on frequency and I could literally hear the tune up. Sometimes the signal peaked well over S9. The station would use an abbreviated calling procedure e.g., 2/3 followed by contacting station signing 3/2, whereupon they commenced sending their exchanges lasting no more than three to four minutes. I was convinced one station was on land because of its consistently strong signal, night after night.

On some occasions, Perc and I would follow our standard calling procedure and commence to relate the day's activities — lo and behold our intruders stopped sending so it was apparent they could hear us. The mystery began to deepen.

About mid-December 1978, I intercepted what appeared to be a series of names

followed by numbers and submitted them to the translator who was equally puzzled. We weren't sure this was a smuggling operation of some type or what, but after two weeks he called me to tell me the names I had copied with numbers were the results of Sumo wrestling matches in Japan. I guess the marine operators liked to keep track of their favourite sports results!

At this point in time any identification of the source of these signals appeared to be beyond my capabilities and it was apparent some form of direction finding was needed to find out where they were.

More strange signals

While listening one evening above 4 MHz, which is the upper limit of the 80m band, I happened to hear similar "strange" signals on 4.191 MHz. The sound of their keying — known to Morse operators as their "fist" or individual sending characteristics — appeared identical to a couple of operators heard on 3.700 MHz. I had stumbled upon a commercial marine operation which soon told me it was related to fishing off the east coast. This was an exciting development because it linked both activities.

In addition to the 25 or so stations reporting in for a nightly roll call, where they correctly identified by their licensed call signs, I soon twigged to the fact their position in the roll call was used as an abbreviated method of calling procedure in the Amateur band.

Whereas a typical call sign would consist of four letters starting with "J" for Japan or a variation starting with a number followed by three letters. If JXXX was number 7 in the roll call sequence and 7VVV was number 13, then the pseudo calls used on the Amateur frequency would be 7/13 and the response by the other station would be 13/7. After acknowledgment, traffic handling would commence. There were other audible signal characteristics which helped in this identification.

Not one to make hasty conclusions as to the purpose of this illegal activity in the Amateur band, I suspected it had to be traffic not meant for that sent on the marine channels.

Operation and Radio conditions

I soon learned that when radio conditions were poor, a number of alternate frequencies were used, mainly below 3.500 MHz. These frequencies were referred to as W1 or W2 or W3. When a frequency change was requested the signal would be "up W1" or "up W2" or "F1". Whether the move was up or down in frequency, they always sent "up".

There is one code pair which when sent means "the following will be sent in Japanese." This character is sent as one long or barred character and is "hore", which as stated previously is the correct name used by native operators. It indicates what follows is in Japanese telegraph code. It may also be used as a "Q" type code, followed by "?" to ask if this code is understood. I once used this character as a query to a South African station who had a Japanese name and he got awfully excited (me too) when he answered in the affirmative. We exchanged greetings in very basic Japanese and I think both of us were very impressed.

Sometimes this code pair is used amid their reports with mixtures of other characters, e.g., latitude and longitude or weather reports. It was not unusual to receive a mixture of Japanese, English and abbreviations in both languages.

David "Poco" White, W1FZS

After some six months of copying their roll calls, plus those transmissions in the Amateur allocations, a station in W1-land called me and wanted to know what was happening as he too had heard the activity. He was located in Cherryfield, Maine. David "Poco" White, W1FZS, had been an intercept operator in WWII based in Puerto Rico. He had been a "FRUPAC" operator. FRUPAC stood for Fleet Receiving Unit Pacific. He felt he might be able to contribute daytime recordings which I couldn't hear on 3.7 MHz. After being sent a copy of the code, I started receiving one or two tapes weekly. These tapes were transcribed and passed to the translator. I still have the tapes and plan to put them on DVD before disposal.

I didn't learn much from the tapes as I wasn't privy to their translations, except for more unusual content which was infrequent.

Another chance encounter

I usually left my receiver tuned to 3.700 kHz and by accident turned it on one evening to find similar activity. In fact, the activity was occurring at three specific times: 2118 hours, 2131 hours and 2144 hours. Stations identified with their numerical roll call appearance and it was becoming easier to recognize their "fists". The traffic was often identical reports of some type, usually, "fishing area ID", "species/tonnage", "water temp", "wind" and "outside temp". Sometimes there were long personal chats relating to personal messages passed to personnel on board various vessels, e.g., birthday greetings.

One small group of characters preceding each check-in to the net were the letters

"kobachi". Upon inquiry to my Japanese Amateur Radio pen pal, I was told it was a confidential company term. One could speculate it to be some sort of net password legitimizing the report to follow. Such curiosities piqued my interest.

Poor Conditions

Interception relies on stable propagation conditions and on occasion poor reception prevented hearing much. One evening, signals were very poor and I could just hear a station on 3.7 MHz calling for a report exchange. The responder wasn't heard after repeated attempts and I was curious as to whether my signals were heard so a short acknowledgement of his call was made and instantly traffic commenced. The message was brief and the sender was requesting an acknowledgement - none came, as I did not want to confirm reception. The sending station made several requests using "Q" code and his sending became more excited by sending a series of "vvvvv". In Japanese he asked, "doko desuka" = are you there? Finally he disappeared, but I wonder what he dreamt that night?

Transmissions continued through February and toward the end of March the fleet returned through the Panama Canal to their home port in Miura City Japan and could not be heard once in Pacific waters. (on the 80m band).

Annual Activity

The following September, activity once more began on 4.191 MHz, their usual roll call frequency. One or two "fists" and signal characteristics sounded familiar so I recorded portions of their signals using a digital storage scope.

By using tapes from the previous year, I was able to confirm that the same operators were present. This was done by measuring the number of milliseconds each dot and dash occupied. The operators were using standard mechanical semi-automatic keys so that the personal sending style of the operator was present, like a fingerprint, and of course the signature depends to a large degree on contact spacing, spring tension etc. Most spacings agreed within a few milliseconds which pinpointed the specific operator. It's amazing how well this technique coordinates with actually hearing the particular "fist".

Other characteristics which identified these operators were: speed was usually faster than others; and the use of a couple of obsolete kana code characters (wi, wu -discontinued since WWII) which probably meant these were ex-WWII military operators. Since the fishing

industry was composed of family businesses, it was not unusual to expect older family members had been WWII veterans

New Year

New Year celebrations are big in Japan and just prior to the occasion, there was much activity on 3.7 MHz. What was surprising was the consistently strong signal that appeared which did not appear to have a call sign. Due to changes in propagation over the winter, I surmised this signal could be coming from somewhere around Quebec City. After listening to this frequency for over 30 years it appears there is some basis for that conclusion.

Much of the monologue I recorded that night was an eye opener for it appears the operator stated, "I enjoyed the party aboard the ship the night before and came on land in a disguise". This was the translation related to me. This material was reviewed by the Department and copies of their responses were given to me.

My translator stated this was getting serious and suggested he contact the RCMP to which I agreed. Subsequently, a Corporal arrived at the office to discuss the matter and my disappointment with his understanding of the collection of facts resulted in early termination of the interview.

Other Resources

Fortunately, there were two other resources available to approach for pursuit of these "queer signals". One was the Department of Fisheries and Oceans and the other was the Armed Forces Communications Electronics Association (AFCEA), which is an organization which helps interface military requirements with available industrial solutions. I was a charter member of the AFCEA when they formed in Ottawa and their meetings were held monthly at the Royal Canadian Air Force (RCAF) mess.

A phone call to the DFO's surveillance group was met with enthusiasm and resulted in a meeting with Mr. E.K. Swimmings who provided me with a computer printout of Japanese vessels properly licensed to fish in Canadian waters off the east coast. The lists consisted of radio call sign, name of vessel, type of catch permitted, home port and the date of licence. Many of the call signs were identical to ships copied during roll calls.

In one peak year, which I believe was 1981, I copied 125 different call signs and this closely coincides with the year cod catches started their rapid decline.

At a local meeting of the AFCEA chapter, it was fortunate the President was a guest speaker and I asked him if there was anyone in the FCC I could alert to the activity of Japanese ships operating in our Amateur allocation. After his return to Washington he sent me a post card with the telephone number of the Federal Communications Commission (FCC) Boston monitoring station and suggested I give them a call. I promptly called the number and spoke to the duty officer who politely took the information and stated they would listen for the signals at 1800 hours AST.

Two days later I received a phone call from the monitoring station stating that signals were heard and that a directional bearing produced a target ship sitting off the east coast of Newfoundland. I noticed that several messages ended with a signature of "haha" which in Japanese family circles means, "mother". Could this be the mothership with such consistently strong signals?

Before terminating the call the FCC agent asked what government department I worked for and I had to explain I had no connection, whereupon, he said that he probably shouldn't be talking to me! Subsequently, I received an unsolicited bearing from a Canadian source confirming a cross bearing to exactly the same area identified by the FCC bearing.

Dead End

During the many months monitoring this activity, I became ever more vigilant in what appeared to be commercial signals intruding in the Amateur 80m allocations. There were frequent voice transmissions below 3.6 MHz in single sideband mode and attempts by Amateurs south of the border trying to get their attention, with little success.

One evening while listening to the lower part of 80m, I heard what appeared to be a conversation between two foreign stations, with much laughing. I decided to tape it and using an independent translator – I was taking some basic Japanese lessons locally at the time – discovered it was the captains of two Japanese fishing vessels. One was stating, "you go inside the limit because your company is bigger than mine and can afford to pay the fine". Quite a boast for a licensed fisher! This was relayed to Fisheries and a subsequent discussion meeting convened.

The Meeting

The meeting was rather unusual as I was not introduced to anyone but, those attending were interested in the tape

when played in their presence. There were probably 10 attendees and some ears perked up when the "laughing" tape was played. A "copy" of the copy was provided (as before) and I left somewhat bewildered as ever.

On the occasion of one of the many electronic shows which are presented in Ottawa, I happened to encounter the Director of Telecommunications at External Affairs who said to drop in and see him during my next sales call. This occurred about a month later and in discussion with him I was told "the incidents of fishing boats had been discussed and no action was being taken because there had been no interference to government communications". End of discussion.

Needless to say I was disappointed with the apparent inaction and my monitoring became less intense and almost petered out, when I received a call from Mr. Swimmings asking if I was still listening to the ships. I told him of my disappointment that there had been so little interest exhibited and he wanted to know if I could listen for a particular call sign "JGJD". I said I would and that night JGJD appeared and not only passed a report but also the ship's latitude and longitude.

Next day, I relayed JGJD's location to Fisheries and they confirmed that three Japanese ships had been caught inside the limit and ordered into the port of St. John's, Newfoundland.

Coincidence seems to run in threes and while cruising the 9 MHz marine band the next evening, I happened to hear a Boston marine operator take a call from ship to somewhere in Japan. The ship's call sign was JGJD. I can't understand much Japanese other than most calls start out with "moshi moshi" and the very excited voice was obviously a plea for help as his ship had been ordered into port to face the consequences of being inside the limit.

Fate has a curious twist sometimes as I received a picture of the vessel from Fisheries which I consider a trophy. A few weeks later, my supervisor in Montreal who knew of my interest in "fishy" matters, sent me a clipping from "Fishing News" in the Montreal Gazette. It stated that three ships had been caught over fishing, inside the limit and the ship "shoshin maru" call sign JGJD had been fined \$275,000. The other two had similar fines. (See picture).

There were a couple of other sequels to this punishment and one took the form of an announcement on 3.7 MHz.

For several months I had been taking night courses in Japanese at the University of Ottawa and Carleton University as I found the language and writing systems interesting and unique and helped immensely in writing to my Amateur Radio pen pal. So in 1983, at the end of a lengthy interchange between two ships on 3.7 MHz, during the interval between Christmas and the New Year, I transmitted blind, a message in Japanese, "Merry Christmas and Happy New Year from all your Canadian listeners". The queer signals were never heard again. Mission accomplished.

Other News Releases

Two other news releases appeared, one in the Montreal Gazette for December 29, 1983 and the Ottawa Citizen for May 2, 2004, proving that overfishing was still prevalent.

There was also an article in the Montreal Gazette reporting three Japanese vessels being heavily fined for overfishing, including the forementioned one. I have lost the date of this article.

Sad Postscript

Sometime after copying my last transmission and being dismayed that so little action was initiated, when several government departments were alerted to potential, harmful overfishing, I had a call from my initial translator. What he asked me shocked me. He asked if I was still copying the ships and when I told him that I no longer did and the reasons, he stated he was going to attend a party at the Japanese Embassy and they wanted to know "if he had any more stories for them"? I replied, "Definitely not." I think its anyone's guess how long this had been going on. It seems the big one really did get away.

I can now sympathize greatly with the 40,000 Newfoundland fishers who lost their livelihood after the cod moratorium was declared in 1990.

Ralph Cameron, VE3BBM, hails from Leaside, Ontario and resided in North Bay, London, Mimico, West Hill and presently resides in Ottawa. He was sponsored by the Canadian Amateur Radio Federation (CARF) and Radio Amateurs of Canada to the EMC Committee of the Radio Advisory Board in Canada (RABC) for 12 years including two years as Chair of that committee. In addition, he also authored the "Crosswaves" column in The Canadian Amateur magazine.

He enjoys reading/writing, chocolate making, languages, resophonic guitar, two daughters, a son, grand and great grand children and a marriage of 52 years with wife Marilyn. (And oh yes, I collect transmitting tubes).