February, 1987 Volume 6, Number 2

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MONITORING TIMES

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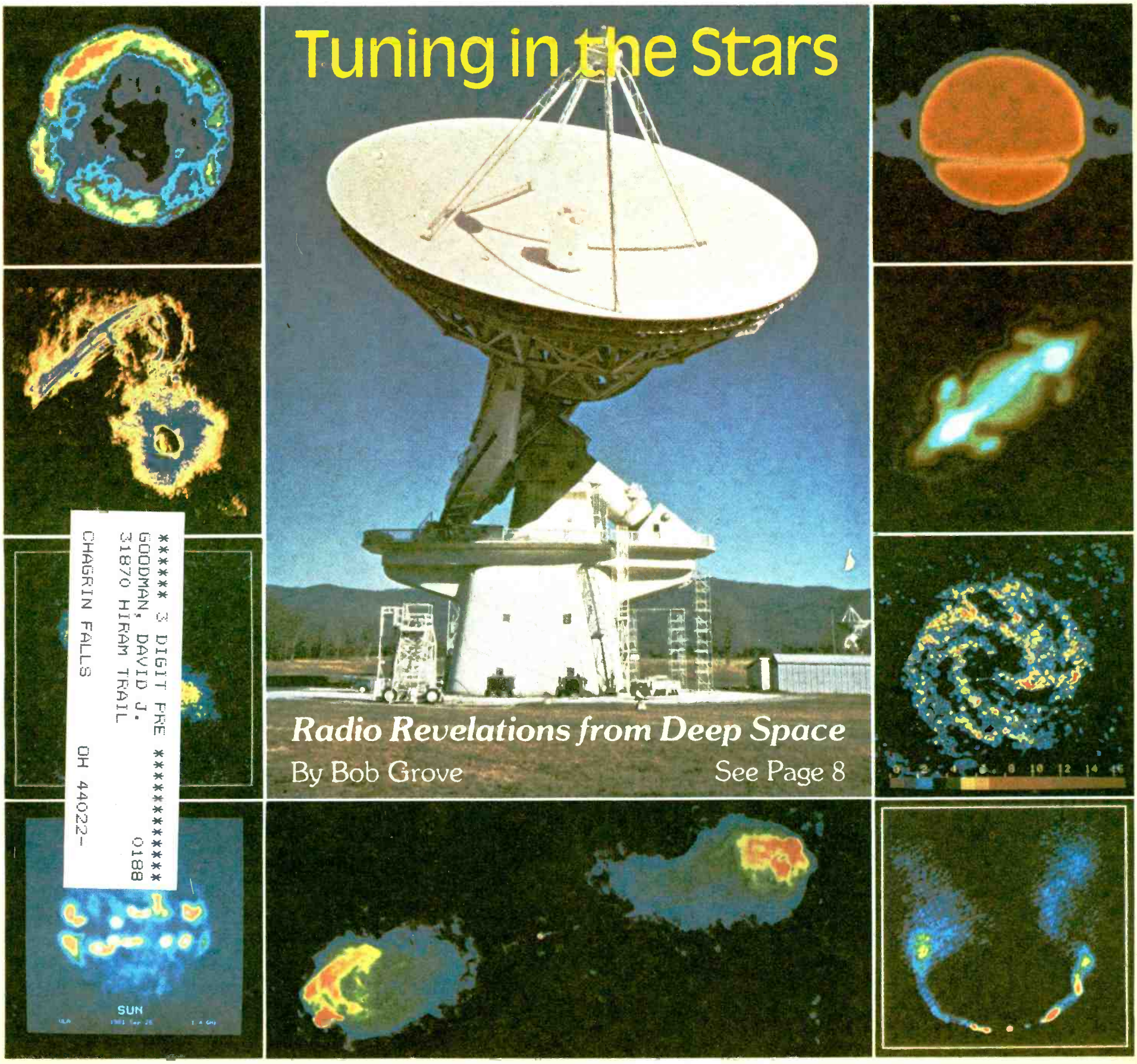

SCAN (the catalogs) *and* SEARCH (the aisles)

But then come to Grove for the best buys in scanners and accessories

ICOM R7000
Now in Stock!

New! Regency HX-1500
HAND-HELD PROGRAMMABLE SCANNER

Regency steps ahead once again with the most powerful hand-held programmable scanner on the market. Just look at these features: • 55 memory channels; • Direct channel access; • Rapid scan and search; • 29-60 MHz FM, 118-136 MHz FM, 406-420 MHz FM, and 440-520 MHz FM frequency range; • Channel one priority; • 0.7 uV average sensitivity; • ±7.5 kHz selectivity; • 2 second scan delay, 4 second search delay; • Individual channel lockout.

Four banks of channels may be scanned jointly or separately with channel overlap. Features a top-mounted scan button for easy control when worn on belt.

This fine unit's non-volatile memory never needs battery backup. Unit requires eight standard AA cells or Nicad rechargeables.

Suggested Retail ~~$360.95~~

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From Bearcat—The BC 100XL!

The **BC-100XL**—now with aircraft! Yes, the all-time popular Bearcat 100 hand-held programmable scanner now has aircraft reception as well. Includes 16 channel memory, illuminated LCD display for night viewing, search, rapid scan (15 channels per second), direct channel access, lockout, delay, low battery indicator, priority, and keyboard lock.

Frequency coverage is 30-50, 118-174, 406-512 MHz. Accessories included: Rubber ducky antenna (with BNC base), AC adaptor/charger, NICAD batteries, earphone, and carrying case.

Handsome new black case with white chrome accents.

Dimensions: 7½"H x 2⅞"W x 1⅜"D; Weight: 2 lbs., 10 oz.

Order SCN 16
Retail ~~$349.95~~
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RETAIL ~~$499.95~~
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SCN-11

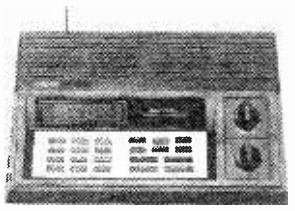
The BC800XLT
Offered at Grove discount prices!

Wide frequency coverage: 29-54, 118-136 (AM), 136-174, 406-512, and 806-912 MHz FM with 40 channels of memory in two banks.

Rapid scan (15 channels per second), powerful 1.5 watt audio amplifier, two telescoping antennas (one for 800 MHz range), 0.7 microvolt average sensitivity, -55 dB selectivity @ ± 25 kHz, instant weather reception, brilliant fluorescent display, AC/DC operation, direct channel access, individual channel delay, priority channel one, fully synthesized keyboard entry.

Dimensions: 12½"W x 4½"H x 9¼"D; *Weight: 7 lbs., 2 oz.*

Bearcat
BC 175 DESKTOP SCANNER



This attractive wood grain finish desk scanner has 16-channel memory, search, priority, multi-function LCD readout, channel lockout, scan delay, direct channel access, instant weather search, and memory backup. Telescoping attachable whip antenna included.

Frequency range is 29-54, 118-136 (aircraft AM), 136-174, and 406-512 MHz FM. Audio output is a powerful 800 milliwatts; selectivity is 45 dB ±25 kHz; scanning speed is 5/15 channels per second.

External jacks are supplied for antenna, speaker and AC or DC power.

Dimensions: 9½"W x 2½"H x 7⅛"D; Weight: 7 lbs., 9 oz.

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Order SCN 12
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Adaptor Lets Your Car Power Your Scanner!

No messy wiring connections to your car's battery system; just plug into your cigarette lighter accessory and power up your scanner (as well as charge NICAD batteries in your portable) while you drive! Choose the appropriate cable for your scanner.

ACC23 for 12 VDC (center pin positive)
Bearcat BC50XL, BC100, BC100XL, BC800XLT
BC 145, BC140, BC175 and BC170 ..... $9.95*

ACC19 for 9VDC (center pin negative)
Regency HX1000, HX1200 ..... $9.95*

*free first class shipping

Extend the Reception Range of Your Handheld!

Universal full-length antenna for handheld scanners and transceivers! Standard BNC base allows custom length extension from 7 to 46 inches! Great for amateur hand-helds shown on this page—plus many others. Replace that rubber ducky with a full-size whip and stand back! Guaranteed to increase range.

Order ANT-8 Universal Full-Length Antenna
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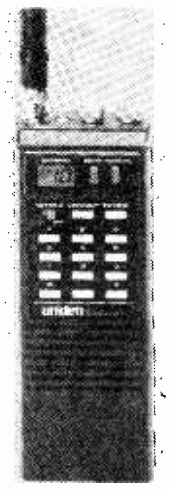
Bearcat BC-50XL

Great value at a low price!

Finally, a low-cost, compact programmable, hand-held scanner with handy belt clip. Runs on five standard AA batteries (not included) or rechargeable NICADS (optional). Features audible low battery warning, splash proof case.

Covers all VHF and UHF land mobile and amateur FM bands: 29-54, 136-174 and 406-512 MHz. 10 memory channels with fast 15 channel per second scanning speed. High sensitivity on all ranges (average 0.5 microvolt). Sharp selectivity from adjacent channel interference (55dB ±25 kHz) and powerful 500 milliwatt audio output. Includes rubber ducky antenna.

Additional features include three second delay, direct channel access, memory backup, keyboard lock, channel lockout, LCD channel display) frequency readout by pressing "REVIEW" button.



SCN-10
Retail ~~$189.95~~

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TRUE CONFESSIONS--Part II:

The FBI Nails Bob Grove!

It has been some 17 years since I placed an ad in a pulp magazine which started, "TOP SECRET FREQUENCY LISTS." It brought considerable attention--including that of the FBI!

I had just remarried and Judy, my wife, still not too sure what to make of someone who gets up at weird hours throughout the night to listen to strange sounds on a strange radio, went to the door to answer the bell. An FBI agent requested my presence.

"Did you place this ad?" he wanted to know, showing me a clipping from the magazine. I nodded.

"Have you ever been arrested before?" he continued. "What do you mean before?" I replied!

Unfazed, and clearly having far more fun at this than I was, he went on. "I'd like to advise you of your rights".

"I know my rights!" I retorted. "What am I being charged with?" The incident was becoming increasingly uncomfortable.

"Where did you get these frequencies?" he wanted to know.

"By listening to the signals on the air," I admitted.

"Are you familiar with the Communications Act?" he continued his inquisition.

"Yes", I replied and recited the high points to him from memory. I pointed out that I could listen to anything I wanted so long as I didn't divulge the the contents of any messages or use the information I overheard for private gain (this was before the ECPA of 1986). I hadn't done any of that, I continued; I only offered for sale lists of active radio frequencies.

We took a tour of my monitoring post; I tuned in SAC communications, local police--the usual representative sampling of a listener's loggings. The agent seemed convinced at that point, but still wouldn't let me see the contents of my file which he said were confidential.

As he exited our doorway I noted a whip antenna on his car.

"Will you be calling in to the field office with your radio?" I asked.

"Yes", he reluctantly replied. I smiled and closed the door.

MT Readers' Survey a Success!

When we say, "Keep those cards and letters coming," you folks really follow through! Our post office has been jammed with your reader survey cards which were enclosed in the January issue.

Although the number of respondents is staggering, we can assure you that every card is tallied and we are finding some fascinating trends. While we warmly appreciate the kind comments which you have been including about our efforts, we also appreciate criticism.

Preliminary findings show that we are close to target, but there are some distinct areas of improvement, and they will be addressed by the *MT* writing staff!

We will have more details soon, but the job is quite overwhelming at the moment. When it's done, you'll be the first to know!

Canadian Weather RTTY

A new brochure has been released from Environment Canada detailing the RTTY wide-area weather forecasts available to the public. We monitored one of the broadcasts last evening from our Brasstown headquarters and signals were loud and clear.

The forecasts focus on central and northern Ontario including Algonquin Park and all areas north of Parry Sound. The southern Ontario forecast includes all areas south of there.

The brochure, *"Making the Most of Environment Canada's Weather Forecasts,"* is available free of charge from weather offices or by writing the regional office at 25 St. Clair East, Toronto, Ontario. It is also available from A-E-S Downsview, 4905 Dufferin St., Toronto, Ontario (phone Nancy Cutler at 416-973-5663).

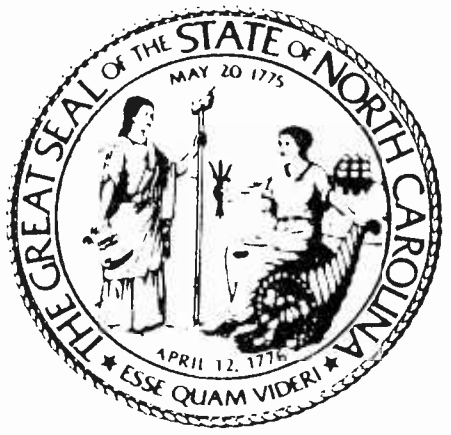
(Thanks to David Alpert for this item)

Larry Miller Executive Director

Larry Miller, broadcast editor of *Monitoring Times*, has been elected Executive Director of The Foundation for International Broadcasting, Inc. (FIBI) in a meeting held on January 4th. FIBI is a registered non-profit organization designed to promote shortwave radio listening "much in the same way that the ARRL [American Radio Relay League] promotes amateur radio."

FIBI publishes *World Radio Report* and supports a number of projects including academic research in the field of international communications and the "Meet America" program whereby the Foundation provides all-expense paid two week study tours of the U.S. for foreign broadcasters.

Also elected to the Board of Directors in January was the Rev. Ken MacHarg of HCJB and Dr. John Santosuosso of *Monitoring Times*.



Grove V.P. Receives Honor

At a special honors ceremony held recently in Asheville, North Carolina, Grove Enterprises vice president Judy Grove was presented an award for outstanding volunteer service by Governor Jim Martin.

The ceremony marked the conclusion of a statewide effort to recognize North Carolina citizens who give freely of their personal time and expertise to help their communities and fellow residents.

Judy was commended for her successful efforts in organizing and implementing the Parents Organization for Students and Teachers (POST), a county-wide effort to improve education in Clay County.

Congratulations, Judy!

The star and planet images featured on this month's cover are products of radioastronomy and are provided courtesy of the National Radio Astronomy Observatory.

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SCANNER FORECAST

If rumors in the industry are true, 1987 should be a banner year for new scanner concepts. We look for faster scan/search speeds (40-70 per second) from Regency. That company is also expected to boast 200 memory channels and reduced spurious signals ("spurs").

One of the country's largest scanner dealers is expected to put out its own scanner to keep up with volume orders. Looking like the Regency MX3000 and usable for both base and mobile applications, the programmable scanner will cover low, high, air, UHF, and can be used in positive or negative ground vehicles.

Most outstanding is the intent to provide a tone-squelch option for volunteer firefighter, EMTs and other listeners who may wish to leave the scanner on for a specific page. At this writing, the scanner is expected to list for under $200.

Both Regency and Bearcat will have new products to release after both January and June Consumer Electronics Shows.

Radio Shack will capture a portion of the market from the walk-in buyer with their new PRO-2004, now compromised from its original promise of continuous 25-550 and 800-1300 MHz coverage by Tandy's marketing decision to censor the 824-851 and 869-896 MHz cellular telephone frequencies.

Tandy's decision ostensibly resolved the dilemma of selling a scanner which would be able to monitor another marketing venture, "private" cellular telephones.

FORUM

ECPA: Toothless tiger still bears watching

Just a word of appreciation for your great public service in helping to tame the runaway Electronic Communications Privacy Act. It was the updates that the monitoring media provided on a regular basis that kept us all current with the state of the danger, and gave us the cues we needed for communicating intelligently with members of Congress.

We all know the bad news: that the bill has been signed into law. But there's good news as well! Based on what I've seen of the legislative report which accompanied the final version of the bill, I would not hesitate to declare that even in the case of cellular monitoring, casual hobby listeners have virtual legal protection. It appears to me that a party whose calls have been intercepted would have to show tortious damage, and offer substantive proof that their person or their business had been harmed by the interception, before any court would be willing to consider the interception seriously.

In other words, I see cellular users being placed for any *practical* legal purpose in precisely the same position as remote broadcast services: under an affirmative burden of proof to demonstrate harm before the courts will take their claim seriously.

Given the fact that both the Justice Department and the FCC declared in the hearing process that they had no intention of enforcing the provisions of the law except in cases of flagrant and egregious abuse--as when the interception is made in furtherance of other criminal activity--I would be quite assertive about informing cellular users that the burden is clearly on them to go to court and present proof of tortious damage, if they feel they have suffered harm through interception. Short of their ability and/or willingness to do so, they have no practical legal basis for threatening scanner owners or hobby listeners. The likelihood of a cellular user being disposed to pay the cost of bringing a vindictive, frivolous suit against a hobbyist is remote indeed, to say the least--especially since the courts do not look kindly on such unsubstantiated lawsuits.

I make this point, however, because I had an interesting conversation with our computer consultant, a cellular car phone owner, who became quite incensed at my explanation for scanner capability, and declared that any law which would intimidate hobbyists from listening to his phone calls was fine with him--even if the "threat factor" was the only real purpose of the law.

I think hobbyists need to be reassured that, in practice, a cellular user would in fact be compelled to sue for tort and prove damages in court. Even if he discovered a party listening to his phone call, he could NOT call the police and have the hobbyist's scanner confiscated as a *prima face* instrument of criminal activity (like drug paraphernalia)--no matter how much he might like to do so. The law simply is not written that way.

Another interesting anomaly that needs to be addressed involves RCC paging services. In our locality, there is a paging service which uses the common itinerant frequency of 151.625 MHz, for reasons best known only to themselves and the FCC. This frequency is shared with a school bus dispatcher, and the local TV cable company repair trucks--both of which have valid listening constituencies. I'd like to have someone explain to me how one is supposed to leave a scanner tuned to the school bus/cable dispatchers, while avoiding listening to the (presumably protected) RCC pager using the same frequency!

I fear that ill-informed judges are going to be the arbiters of such vagaries in the law, and it's going to require a hawkwatch and perhaps numerous *amicus* interventions on the part of organizations such as ANARC and (if they're interested) the ARRL to contain these legal brushfires as they arise. And who's going to foot the bill? Good question. I certainly feel that the lawyers for Regency and Bearcat should be kept closely apprised of developments, as they have a vested interest in maintaining the broadest possible legal rights of the monitoring community.

What about the unresolved issue of the legality of home satellite TV under the ECPA? Are satellite signals "readily accessible"? And if so, what can then be wrong with hooking up your satellite receiver baseband video output to your shortwave receiver and tuning in other nonencrypted services services, as Larry Van Horn explains in his excellent books about satellite reception?

Obviously we're stuck with a law which is so muddled and malefic in the leverage it gives government to suppress free inquiry and freedom of information, that it should never have been passed, even in diluted form. On the other hand, after seeing what Judge Robert Collins did to the Reagan/Meese compulsory federal pee-test law in New Orleans, I'm encouraged that there are still justices on the bench who will issue a ringing affirmation of personal and individual rights against the encroachments of Big Brother government, given sufficient outrage and provocation to arouse them to the task.

The final law may have been mitigated--but we need to remain vigilant. Our objective should be to nullify, and eventually repeal, the application of the ECPA to openly-transmitted and non-encrypted radio signals. I have always felt that we could rally enthusiastically behind a law which offered wire-grade protection to digitally encrypted radio signals--thus placing the burden of demonstrated "non-accessibility" precisely where it belongs. I still feel this is the final and most desirable resolution toward which we should be working, as test cases start to work their way through the courts.

Dave Beauvais/KB1F
Magic Media Services
Amherst, MA

Radio West Changes

For many years, Grant Manning of Radio West in Escondido, California, provided personal sales and service to his faithful customers as he operated his small business in his spare time while working with the local telephone company.

Some months ago the business was sold to Steve and Suzanne Miller and subsequently moved to 850 Anns Way Drive, Vista, California 92083 (phone 619-726-3910). A recent call to the new number, prompted by concerns of MT readers who were unable to reach Radio West, resulted in a recorded answering machine which gave their office hours (during which our call was placed).

At this writing we are awaiting a callback for a statement regarding their business intentions.

Listen in on the Mercenaries

Every war has its soldiers of fortune, and the tribulations in Central and South America are no different. Ed Vest of Dublin, Virginia, thinks he has stumbled onto a very active network of mixed English and Spanish language mercenaries.

Checking into the network at 0000 or 0030 UTC daily on 6593 kHz upper sideband, tactical members are heard discussing helicopters, bridges and other targets, often with vulgar battlefield language.

A secondary frequency of 6622.5 was also heard at 0045 UTC.

We appreciate *MT* readers sharing these choice catches with fellow listeners and encourage others to do so when they stumble across unusually tantalizing quarry.

Cellular Mod for the PRO2004?

Last issue we confirmed that Tandy corporation executives had committed to deleting cellular radiotelephone coverage from their long-awaited PRO2004 programmable scanner. *MT* has had volleys of protests from disappointed prospective Radio Shack customers who will be cancelling their orders.

Now it appears--if an anonymous tipster proves correct--that there might be a way to defeat the deleted frequency provision. *MT* has been told that a diode may be snipped, allowing free access to the full 800-1300 MHz range once again.

We will have to wait until the PRO2004 becomes available to see whether the informant is correct... and yes, we'll let you know!

WORLD RADIO NEWS WORLD R

Albania

Albania's domestic service station, **Radio Gjirokaster** has apparently been reactivated on 5057 kHz. It's been heard from 2200 to 2300 with Albanian folk music and a male announcer.

Australia

Reorganization of **Radio Australia**'s programs seems primarily to have taken the form of changes in news. In the past, Australia broadcast a ten minute bulletin of world news every hour plus a 20 minute news analysis program called "International Report" after the news at 0100, 0400, 0500, 0800, 1300, 1500, 1700, 2000, 2200 and 2300 UTC which alternated with a ten minute bulletin of Australian news. Pacific news was available on some alternate frequencies.

The new schedule calls for the bulletin of world news every two hours starting at 0100 UTC which alternates with "International Report," except at 1600 and 1800 UTC, at which time it is replaced by a three minute news summary. Australian news is now heard every two hours beginning at 0030 UTC.

Benin

ORT-Du Benin at 0350 UTC in English and Setswana. Sign on routine with identifications and religious programming in the Setswana language. (B. Twombey, Carlisle, PA)

Brasil

Radio Bras at 0225 UTC in English on 11745 kHz. Program on the growing movie industry in Brasil. (M. Hennington)

Radio Cultural do Para on 5045 kHz at 0810 UTC in Portuguese. Station identifications; program mostly talk. (W. Burke, Richmond, VA)

Difusora Amazonas, Manaus at 0945 UTC in Portuguese on 4805 kHz. Local news about Manaus followed by international news. (B. Twombey, Carlisle, PA)

Radio Ecuadora at 0920 UTC in Portuguese on 4825 kHz. Lively carnival type music with laughter. Station identification and local announcements.

Radio Guaiba, Porto Alegre on 11785 kHz at 0253 UTC in Portuguese. Program of Easy Listening and Latin music with male host. Station ID at 0254 UTC. (L. Miller-Thorndale, PA)

Radio Nacional da Amazonia on 6060 kHz at 0800. Great music, advertisements -- every night! Strong signal. (W. Burke, Richmond, VA)

Radio Nacional da Amazonia on 11790 kHz at 2140 UTC in Portuguese. Local and extended Brasilian news.

Radio Nacional, Brasilia, at 2030 UTC in Portuguese at 11765 on your radio dial. Brasilian bossa-nova style music, station announcements and news reporting format.

Radio Nacional, Manaus, on 4845 kHz at 0850 UTC in Portuguese. Brasilian "country" music. (W. Burke, Richmond, VA)

Radio Nacional, Manaus, on 4845 kHz at 0955 UTC in Portuguese. Cool samba music and local news. Didn't understand the news but loved the sambas! B. Twombey, Carlisle PA)

Radio Nacional, Porto Velho, at 0945 UTC in Portuguese on 4945 kHz. Local morning announcements and music dedications with Portuguese pop music.

Radio Universo, Curitiba, on 11905 kHz at 0230 UTC in Portuguese. Station ID then man with long religious talk. Good signal but good bye. (L. Miller-Thorndale, PA)

Radio Universo, Curitiba, on 6020 kHz at 0820 UTC in Portuguese. IDs, talk, music; weak but readable. (W. Burke, Richmond, VA) (Sure about this one, William? -ed.)

Bangladesh

Radio Bangladesh, Dhaka on 7105 kHz. Heard around 1340 UTC in Qur'an recitation, then with a woman in presumed Nepali until 1345 UTC sign off. Fair signal but with low audio; submerged by another station's test tone after 1342. The new 21630 kHz outlet has been heard twice (11/24 and 12/5) with the interval signal from 1228 UTC, then sign on announcements for the General Overseas Service in English at 1230. Very weak; considerably better on parallel 15525. It's been a long time since a signal from that part of the world came in on 16 meters! (B. Hill, Sharon, MA)

Burma

The **Voice of Burma** is reported in DX Frontline to be on the air from 1030 to 1545 UTC on 4725 kHz, one hour later than shown in *Radio Database International*. From 1330 to 1345 the station broadcasts an English lesson.

China, People's Republic

The Voice of Jinling in Nanjing, the capital of Jianxi province officially signed on the air with its Taiwan service in November. (Jianxi is not the closest province to Taiwan and the Strait; rather Fujiang is and it already broadcasts to Taiwan over the "Voice of the Strait" outlet from Fuzhou. However, Chinese radio officials said that the Jinling station was the first local radio offering special services for "Taiwan compatriots," according to the BBC Monitoring Service.)

The station operates on 4875 kHz from 1155 to 1600 UTC daily with news about the mainland, Jianxi province and relatives on the mainland.

Radio Beijing on unlisted 7250 kHz noted at 2300 UTC signing on in what sounded like Cantonese. No parallel frequencies were found. (B. Hill, Sharon, MA 12-8)

Haixa 1 on 2490 kHz. Tuned in at 2208 UTC to hear traditional romantic vocals and a male announcer in Chinese. Fair on peaks with another station (probably Brazilian) mixing underneath. The Chinese station on 2340 kHz also in at weaker level. (B. Hill, Sharon, MA 12-8)

Unidentified A Chinese-speaker on 4850 kHz can be heard around 1210 UTC once the Latin on the channel begins to fade. Nothing listed; but it sounds like a People's Republic of China outlet. (B. Hill, Sharon, MA 11-30)

Cuba

Espana Republicana, Matanzas. Heard the 2nd harmonic of this on 2440 kHz at 1130 announcing the start of a news program called "Orbita," running from 6:30 to 9:00 AM local time. Many references to Matanzas. Very good reception. (B. Hill, Sharon MA 12-5)

Cyprus

Cyprus Broadcasting Corporation. The *2215-2245* UTC broadcast in Greek aired Friday, Saturday and Sunday is now on 7180 kHz. Heard well on 12-7 despite the Singapore relay mixing underneath. (B. Hill, Sharon, MA)

Dominican Republic

There's been a change in the schedule of **Radio Discovery** in Santo Domingo. Jeff White informs us that the station will be on the air daily except Sundays to 0400 UTC on 6215 kHz. On Saturdays, programming ▶

WORLD RADIO NEWS WORLD R

begins at 1800 and runs until 0000 UTC on 15045 kHz. Says White: "We aren't going to broadcast on Sundays in January. And we'll see if there's any feedback."

The basic format of Radio Discovery is Caribbean music (merengue, salsa, reggae, calypso, steel band and Latin pop music) interspersed with feature programs. Two telephone lines have been set up to take listeners' requests. The Spanish answer line is 809-562-6617 and English is 813-360-4505. The lines are manned Sundays between 1300 and 1600 UTC.

New to the line-up is "Discovery Digest," The program will have Caribbean travel features, a mailbag segment, and a Dominican diary-type program called "Santo Domingo Journal." The program will, according to host Jeff White, be similar to what he did for Radio Earth. Discovery Digest is slated for broadcast UTC Tuesdays through Saturdays at 0100 and 0300 UTC. Following Discovery Digest at 0130 on UTC Fridays will be "Discovery DX", a radio hobbyists' program. It will also be transmitted Saturdays at 2230 UTC. And finally, Bill Paris' "US Rock," also carried on WRNO Worldwide, will be heard UTC Saturdays at 0130.

Ecuador

Radio Catolica at 1220 UTC on 5055 kHz in Spanish. Religious programming (as you might suspect from the station name) of music and inspirational messages.

Radio Iris, Esmereldas at 1011 UTC on 3381 kHz in Spanish. Ecuadorian folk music; station identification and more flute music.

Radio Jesus Gran Poder at 1050 UTC on 5050 kHz in Spanish. Holy Rosary Mass and religious music.

Radio Quito at 2315 UTC on 4920 in Spanish. Newscast of Central and South America, station promotions and Ecuadorian folk music.

Radio Zaracay at 1015 UTC on 3395 kHz in Spanish. Zaracay promotional announcements, and lots of children singing.

Egypt

Some stations use the same frequency year after year, becoming fixtures at certain points on the shortwave dial. Recently, Israel left the old but odd 9009 kHz and now comes Egypt, another stalwart, who has left 9805 kHz after 15 years. It is replaced by 9900 kHz from 1800 to 2015 UTC (in Italian, German and French to Europe) and the English service has been changed to 2015 UTC on 9655 kHz.

Guatemala

Radio Cultural on 3300 UTC at 0310 UTC in English with "Back to the Bible" program. (L. Van Horn, Orange Park, FL) At 0645 UTC in Spanish. A program of Latin-style instrumental music with station identification as "En Guatemala, Radio Cultural." (L. Miller, Thorndale, PA) At 0710 UTC the station carries the "Musica en Meditacion" program until sign off at 0730 UTC. (W. Burke, Richmond, VA)

Radio Maya de Barillas at 1145 UTC on 3324 kHz in Spanish. Very weak religious programming of music and scripture reading. Poor signal with lots of fading.

Radio Tezulutlan at 2255 UTC on 4835 kHz in Spanish. Marimba music and one brief announcement. Sign quite poor with fading.

India

There are a number of countries in the world who are putting up radio and TV transmitters like there's no tomorrow. One of these is India, which expects to over double the number of TV transmitters in India. And on a recent All India Radio broadcast, the station announced that it would be upgrading facilities (For example, the 20 kW transmitter at Ajmer operating on 603 kHz is being upgraded to 200 kW). In all, 18 new stations will be going up in 11 states. The transmitters will all be imported since India does not manufacture any of its own.

All India Radio. On 4860 kHz, interval signal heard very weakly from 0128 UTC then woman in presumed Nepali at 0130. Fair carrier but extremely low audio. (B. Hill, Sharon MA 11-30) On 7140 kHz, interval signal at 1158 UTC then sign on in listed Sindhi at 1200 UTC. In subcontinental vocal at 1230 UTC recheck; under BBC Cyprus when tune in again just after 1300 UTC. (B. Hill, Sharon MA 12-4) On 7160 kHz, observed sign on at 1330 UTC with listed home service in language; very poor. (B. Hill, Sharon, MA 12-4)

Indonesia

Radio Republik Indonesia Tanjungkarang. On 3395 kHz, "Love Ambon" at 2159 UTC followed by Radio Republik Indonesia identification and presumed Jakarta relay. Bother by het from Zimbabwe/3396 until 2200 UTC then absolutely in the clear. Best reception of this one yet! (B. Hill, Sharon, MA 12-8)

Radio Republik Indonesia Padang. Assumed this one on 4003 kHz from 117 UTC with tedious *lagu melayu* (heavy on the bass beat) played except for one announcement by soft-voiced woman at 1124 UTC. Followed past 1130. Weak at first but building rapidly to decent level by tune-out. Bothered by fax QRM from 4005 kHz. (B. Hill, Sharon MA 12-9)

Israel

Israel Radio says that it now has a new 500 kw transmitter on line. It is not running at full power, however, because the station is awaiting a new antenna. Kol Israel can be heard in English on the following schedule:

0000-0030	5885, 7465, 9435
0100-0130	5885, 7465, 9435
0200-0230	5885, 7465, 9435
0500-0515	7410, 7460, 9012, 9435, 17630
1100-1130	11585, 11655, 12080, 13725, 15640
1800-1815	9585, 9860, 9930, 11655
2000-2030	5885, 7355, 7410, 7465, 9012, 9435
2230-2300	5885, 7410, 7465, 9012, 9435

The schedule for the Reshet Bet home service in Hebrew:

0400-0610	7480, 9385, 9930, 11655
0610-1200	11655, 13750, 15615
1200-1430	11585, 11605, 13750, 15095, 15615
1400-1630	11585, 15095, 11605
1630-1745	11605
1745-2310	7480, 9385, 9860, 9930, 11655

(*Media Monitor* and Westenhaver [respectively] in ODXA.)

Kampuchea

The **Voice of the Kampuchean People** domestic service is now heard on a new frequency, 5035. That frequency is parallel to the old 6090 kHz and Sarath Weerakoon believes that the station's new transmitter may be being used on the 6090, however. This is, he continues, the first time the VOPK has used a tropical band frequency since they abandoned 4908 kHz in the late 1970s. The schedule is:

0000-0030	5035, 6090 kHz
0430-0630	9695 kHz
1100-1415	5035, 6090 kHz
2300-0000	5035, 6090 kHz

Meanwhile, the **Voice of Democratic Kampuchea** has been monitored in Japan from 0000-0030 on 8345 and 9440 kHz, from 0400-0500 UTC on 15110 and 17680, from 0900-1000 on 11695 and 11870, from 1300-1400 on 5250, 11675 and 15360 kHz and from 2330-0000 UTC on 8345 and 9440 kHz. The 5250 kHz frequency is not announced, says *DX Frontline*, while 15360 kHz is, but is not heard.

Korea, North

Korean Central Broadcasting Station, Sinuigu, on 3920 kHz. Tune in at 1118 UTC to hear a seemingly dramatic reading in Korean, then a rousing patriotic chorus. Slightly stronger than dual 2850 kHz. Can also sometimes be discerned around 2200 UTC but never well enough to extract any program details. (B. Hill, Sharon, MA 12-4)

Radio Pyongyang in English at 1100-1150 UTC, Spanish at 1200-1250 and Korean at 1300-1350--all heard on new 7300 kHz (B. Hill, Sharon, MA 12-1+)

Radio Pyongyang at 2335 UTC in English on 11735 kHz, Korean martial music and commentary about their "dear leader, Kim Jong II."

Kuwait

Radio Kuwait observed on new 9760 kHz at 1850 UTC on 12-1 and again around 1730 UTC on 12-4--both times in parallel with 9880 kHz. No sign of 9840 kHz. Earlier (11-14) had been found on 9715 kHz instead of 9840 (B. Hill, Sharon, MA)

Radio Kuwait at 1605 UTC on 15505 kHz in Arabic. Kuwaiti style Arabic music and Middle Eastern news about Iraq, Iran and Kuwait.

Radio Kuwait at 2050 UTC on 11675 KHZ in English. America rock music, closing announcements, Kuwaiti national anthem and sign off at 2100 UTC.

Lebanon

DXer Bob Hill in Massachusetts has tentatively heard the **Voice of the Mountain** on 6053 kHz. Says bob, "Since November 17, what must be this station has been coming through on 6053 (BBCMS says 6052.5) with carrier at 1855 UTC. When horrendous adjacent-channel slop from Prague and others permits, programming consisting of some European but mostly Arabic-style popular songs can be discerned. So far, the announcer is always a woman in what seem perhaps Lebanese rather than standard Arabic. Speech audio is good but noticeably echoey. At 2000 UTC, apparently news is broadcast. Overall readability varies from intermittent to hopeless (the latter particularly when Prague is playing music), although signal strength is fair some days."

Nigeria

Radio Nigeria, Kaduna, on 4770 kHz at 1440 UTC. English news followed by contemporary music by Lionel Ritchie(!) (W. Burke, Richmond, VA)

Oman

Radio Oman at 1740 UTC on 9735 kHz in Arabic. Local music, station identification at 1800 UTC then international and regional newscast.

Pakistan

Radio Pakistan heard on 7100 kHz in English at 1745 UTC, then seemed to switch over to Urdu without any noticeable transition. (B. Hill 12-4) New 7225 kHz carries Bangla at 1230-1445 UTC in parallel with 9791; fair to occasionally good at sign on. (B. Hill 11-30+) The 7365 kHz channel is observed in Urdu from around 1320 to 1400 UTC when an immense utility station wipes out the frequency. This must be a home service transmission. (B. Hill 12-1)

Poland

Radio Polonia's official printed schedule for English broadcasts is as follows:

Time	Freq/Target
0200-0300	6095 6135 7145 7270 9525 11815 15120 (North America)
0300-0355	6095 6135 7145 7270 9525 11815 15120 (North America)
0630-0700	6135 7270 9675 (Europe)
1200-1225	6095 7285 (Europe)
1230-1300	9525 9675 11840 15120 (Africa)
1400-1430	6095 7285 (Europe)
1600-1630	6135 9540 (Europe)
1630-1700	7125 9525 9675 11840 (Africa)
1730-1800	6135 9540 (Europe)
1830-1855	7125 9525 9675 11840 (Africa)
1830-1855	5994 6135 7285 (Europe)
2000-2030	7125 7145 9525 9675 (Africa)
2030-2055	6095 7285 (Europe)
2230-2300	5995 6135 7125 7270 (Europe)

Regrettably, reception of Radio Polonia is erratic.

Programs include: *News Section* - opens each broadcast; *Panorama* - stories on a wide spectrum of topics, Tuesday through Thursday; *Spotlights on Polish Culture* - every Tuesday, reporting on the latest developments in Polish music, theatre, film and literature; *Folk Music* - every Monday, a new edition presenting the rich folklore of Poland's regions; *Jazz, Pop, Rock and Folk from Poland* - every second and fourth Saturday of the month; *Top Twenty* - every first and third Saturday; *Mailbag* - Friday regular, made up from listeners' requests; *What We Said* - a weekly review of Radio Polonia comments, on the air on Mondays; *DX Club Show* - a regular Sunday feature for DXers, music requests and correspondence to the station. Repeats each Thursday; *Polonia Review* - every Sunday a report on Polonian events in Poland and developments in Polonian communities around the world; *Polish Pitaval* - historical series presenting events from lesser known aspects; *Krakow* - every Wednesday another talk on what some consider to be the most beautiful Polish city, which has been placed on UNESCO's World Heritage list; *Polish on the Air* - a special course in Polish for English listeners on Saturdays.

Radio Polonia also offers some interesting transmissions of music, primarily targeted to Europe but often audible in North America. They are:

Concerts of Chopin's Music
0500-0530 5995 6135 7270 kHz
1130-1200 6095 7285 kHz

Night Concerts
2305-2355 5995 6135 7125 7145 7270 kHz

The music programs use a multilingual format that includes English.

Portugal

Recent reports on **Radio Portugal** indicate that the station may be facing a shake-up again. (Within the past two years, Portugal has decreased its English language programming to North America. It's now heard five days a week instead of daily.)

According to the station, at a recent Council of Ministers meeting, the cabinet decided to "provide the Radiodifusao Portuguesa's shortwave service with autonomy in the matters of administration, finance and programming within the state-owned enterprise, Radiodifusao Portuguesa."

The country is planning to make a major investment of 100,000 contos to replace its aging transmitters. Currently Portugal can be heard in English from 0030-0100 UTC Tuesday through Saturday on 9680 kHz and 0330 to 0400 UTC on 9705 kHz.

Qatar

Qatar Broadcasting Service - New 9535 kHz found at 1705 UTC with Arabic identification. (B. Hill, Sharon, MA 12-4)

Rwanda

Radio Rwanda - With CHU temporarily off the air, this station came through on 3330 kHz at 2056 UTC with sign off announcement in French then the stately national anthem by band until 2059. Stayed with a test tone past 2100, then pulled the switch. (B. Hill, Sharon, MA 11-25)

Saudi Arabia

Broadcasting Service of the Kingdom of Saudi Arabia at 1833 UTC in English on 9720 kHz. Feature on building a causeway between Bahrain and Saudi Arabia followed by "The Evening Files" program. Terrific signal!

Sri Lanka

Victor Goonetilike of Sri Lanka reports on Radio Netherland's *Media Network* program that **Trans World Radio Sri Lanka** is to go on the air very shortly on 11835 kHz from 1330- to 1530 UTC with a two hour test broadcast. Listen for gospel music with English language station announcements.

Meanwhile, the All-Asia Service of the **Sri Lanka Broadcasting Corporation** beaming to Asia is going back to their old sign-off time of 1730 UTC. Previously, the station signed off at 1630 UTC. Listen for it on 9720 and 6075 kHz. Indications are that the 15425 kHz frequency will be dropped with TWR Sri Lanka comes on the air.

Swaziland

Trans World Radio on 3200 kHz with religious programming in English at 2010 UTC. Gospel hymn at 2013, then interval signal just before close down at 2016 UTC. Weak and fady. (B. Hill, Sharon, MA 12-2)

Switzerland

The **International Committee of the Red Cross** in Geneva, Switzerland, has been broadcasting since the final days of World War II when it transmitted lists of prisoners awaiting repatriation and people missing because of the war. ICRC uses the facilities of the **Swiss PTT** and **Swiss Radio International**, which are given to them free of charge. Programs are in English, French, German, Spanish,

Please turn to page 32

TUNING IN THE STARS

A Visit to the National Radio Astronomy Observatory

by Bob Grove

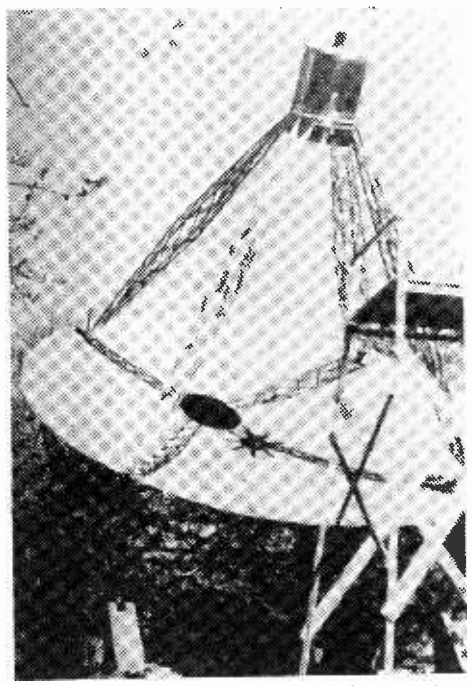
Noise. Who wants to listen to it?! A radio astronomer, for one.

It all began more than half a century ago when Bell Telephone assigned a noise-finding task to one of their engineers, Karl Jansky. The noise was a periodic disruption of communications on their trans-atlantic radio links.

Jansky constructed an elaborate mobile directional antenna array and immediately discovered that all the noise originated from two sources: thunderstorms (local and distant) and an area of the sky near the center of our Milky Way Galaxy.

These sources of terrestrial and cosmic noises were noted and experiments by individuals occasionally took place. In 1937 another engineer, Grote Reber, built a backyard parabolic reflector (dish antenna) in his back yard in Wheaton, Illinois, and began mapping the sky for radio emissions at 160 megahertz. He later determined that our own sun was a major source of radio emissions.

Over the next several decades, radio emanations from the Crab Nebula, Cygnus A, interstellar hydrogen, quasars (quasi-stellar radio sources), other stars in the Milky Way, and even our own solar system--the planet Jupiter--were pinpointed by radio astronomers.



Grote Reber's telescope as it looked in the backyard of his Wheaton, Illinois, home in the mid-1930's. Reber was one of the earliest amateur radio astronomers. National Radio Astronomy Observatory photo.

NRAO

In 1957 ground breaking ceremonies officially culminated the previous three years' worth of studies which selected Green Bank, West Virginia, as an ideal location for the National Radio Astronomy Observatory. A year later, the FCC established the National Radio Quiet Zone, a geographical perimeter within which radio emissions on certain frequency bands are prohibited.

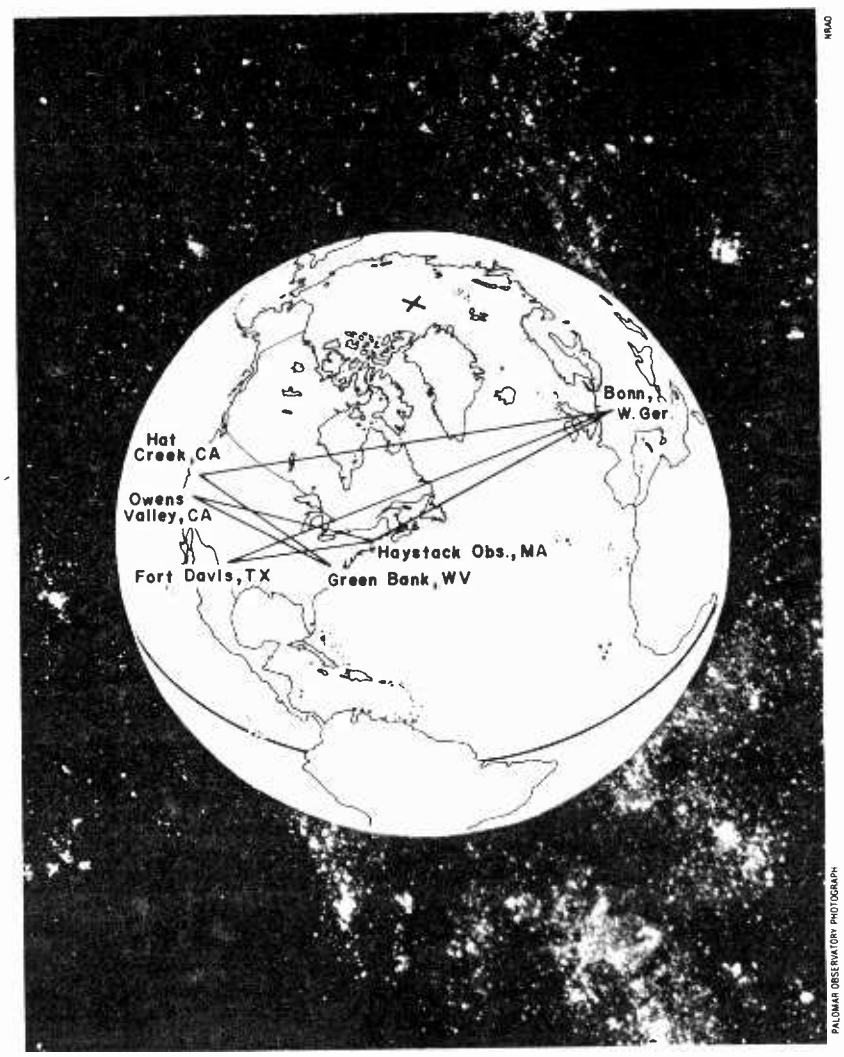
It has been discovered that two prominent frequencies can be used to detect certain molecules in space: 1420.406 MHz (hydrogen, commonly called the "water hole" in the spectrum) and 110 GHz (methyl alcohol). At Green Bank, single-dish observations may be made from 2 to 90 centimeters (330 to 15,000 MHz or 0.33-15 GHz).

Established by the National Science Foundation and now administrated by Associated Universities, Incorporated, a cooperative, non-profit organization composed of nine major institutions of higher learning, NRAO consists now of four primary sites: Green Bank with its dish antennas and interferometer; Kitt Peak, Arizona, and its millimeter-wave telescope; Socorro, New Mexico; and the Very Large Array (VLA) - 27 interconnected reflector antennas; and the main offices at Charlottesville, Virginia.

For Your Further Reading

Radio Astronomy, 2nd edition, by John D. Kraus; 710 pages. $38.50 plus $1.50 shipping from Cygnus-Quasar Books, P.O. Box 85, Powell, Ohio 43065.

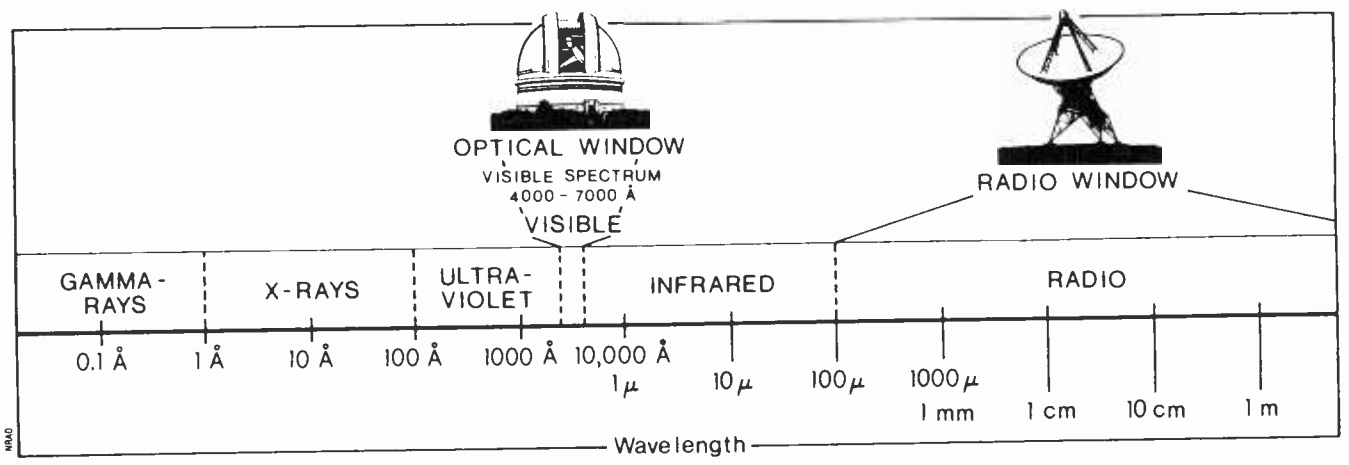
Radio Astronomy Handbook by Robert M. Sickels; 247 pages. $32.00 plus $1.50 shipping from the author, 7605 Deland Avenue, Ft. Pierce, Florida 33451.

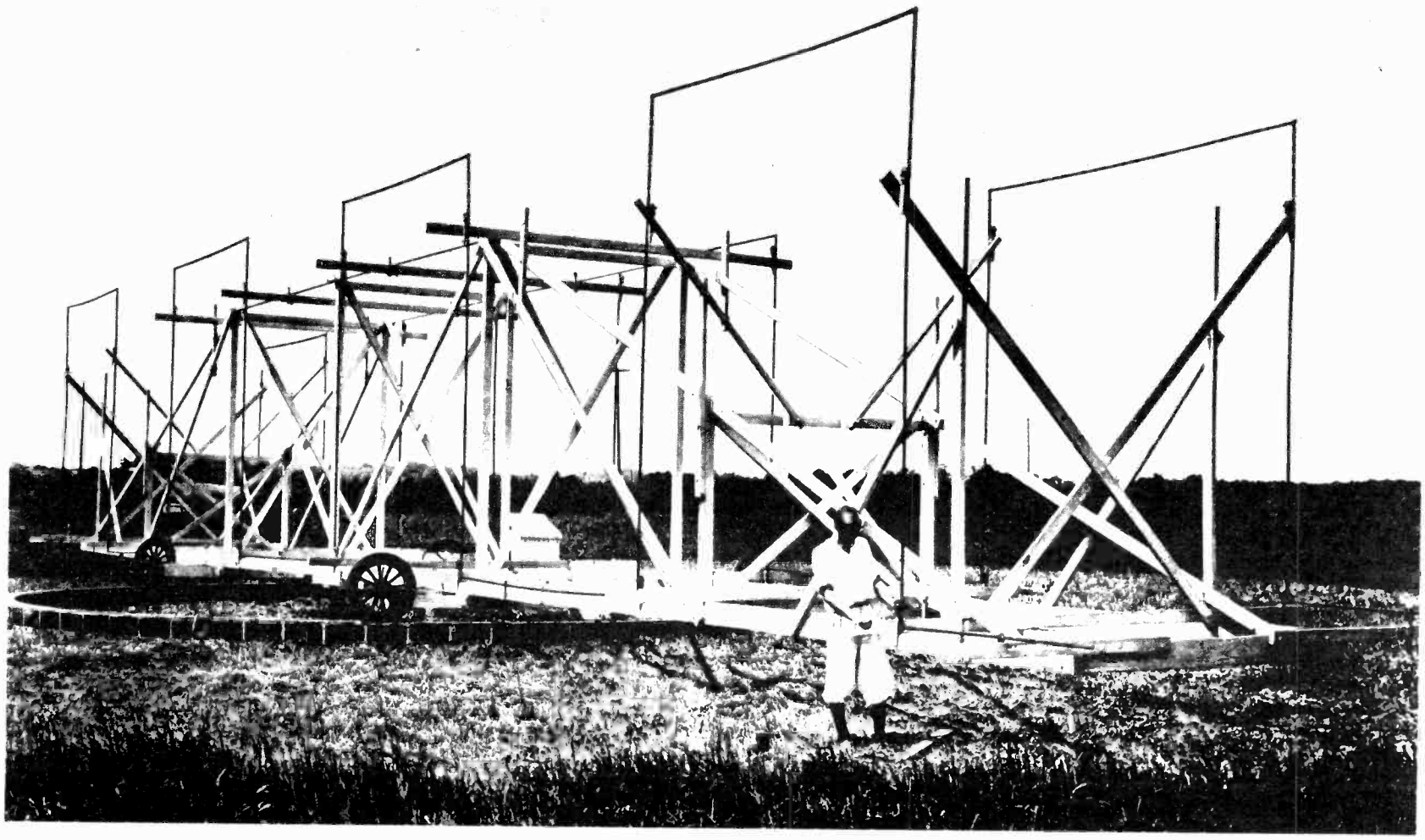


Radio Astronomy: The Journal of the Society of Amateur Radio Astronomers; monthly publication averaging 24 pages. $20 subscription from SARA Treasurer John Weiss, P.O. Box 2632, Montgomery, AL 36105.

Why listen to noise? *The illustration below should make it clear why it is worth the enormous time, effort and money involved. Greater accuracy and detail can be pinpointed by constructing larger telescopes (Green Bank possesses one telescope 300-feet in diameter), or using interconnecting telescopes, as in the Very Large Array, or by observations such as the one pictured above.*

VLBI (very long baseline interferometry) observations such as this use telescopes that are widely separated to obtain the resolution of a single telescope almost as large as the earth. The map above shows the distribution of telescopes in a typical VLBI experiment using the U.S. VLBI Network plus a telescope in Europe.





BELL LABORATORIES

A photograph of Karl Jansky with the rotating antenna (designed to operate near 21 MHz), which he used to discover radio emissions from space. Bell Labs photo.

Mysterious Signals Tantalize Radio Astronomers

A letter from well-known radio astronomer Robert Sickles invites *MT* listeners to tune in on two new radio signals reaching earth from space.

The first, presumably natural, signal is described as a "thermal rushing noise" by its discoverer, Dr. Michael Valdez of the Florida Institute of Technology. The signal was first heard on 432 MHz but has been received by other amateur radio astronomers as well on 144, 680, 1420, and 4000 MHz.

The broadband nature of the signal suggests that it is a natural synchrotron object, possibly enhanced by some as yet unknown stellar process. Alternatively, it could be some type of flare from an unidentified source.

The exact coordinates of the object place it at right ascension 19:30 hours, declination -25 degrees, or about 30 degrees east of the constellation Saggitarius and 3-1/2 degrees north of its center.

Coincidentally, the radiating source is very close to a mysterious narrowband emitter reported by Doctors Kraus and Dixon of Ohio State University's famed "Big Ear" radio telescope in Delaware, Ohio.

The signal, which measured 17 sigmas above the radiometer threshold, has been nicknamed the "wow" signal after the exclamation by the student who annotated the computer printout.

For the last 13 years the "Big Ear" has been involved in SETI (search for extra-terrestrial intelligence) work after having cataloged the largest list of naturally-emitting objects in the world.

The strange "wow" signal was detected by the radio telescope in the drift scan mode and has not been heard since. Apparently non-random and possibly intelligently encoded, it was recorded in the 1420-1450 MHz range.

Any suitably-equipped observers who are interested in participating in the monitoring project are encouraged to contact Robert Sickels, editor of *Radio Astronomy* magazine (the SARA monthly journal), at 7605 Deland Avenue, Ft. Pierce, FL 33451. He may be reached by phone at 305-464-2118.

...And...

Tuning in on Mother Earth

Low frequencies have strange signals, too!

Traditionally, monitoring natural signals from space has been done at high frequencies--in excess of 20 megahertz. There are, however, some interesting noises to be heard lower--much lower.

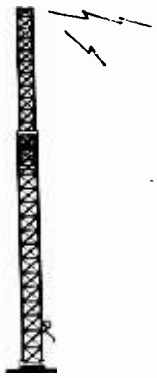
Most of these sounds originate in the earth's atmosphere (called "'spherics"). These sounds are often characterized as "swishers," "whistlers," "swishlers," "pingers," or even collectively as the "dawn chorus."

Some experimenters connect a long wire antenna to a high pass filter (to reduce AC hum noise) which is, in turn, connected to an audio amplifier to hear the noises which vary throughout the day and night.

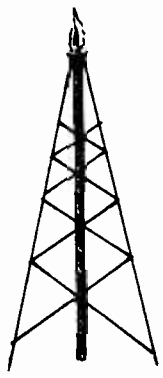
Small probe antennas have been pointed seaward (infact, immersed) to collect electrical signals from fish and other denizens of the deep. Earthquakes are said to be preceded by unusual low frequency activity.

When a missile is launched the rocket plume radiates low frequency energy which may be heard near 8 kHz. Underground communications can be conducted over reasonable distances between two audio amplifiers connected to buried ground rods.

There are other phenomena associated with these low frequencies as well and this could be the subject of a future article if readers are interested in ELF (extremely low frequencies).



DXing the OPEC Nations



by Gayle Van Horn

Twice a year, I have an anxiety attack.

Perhaps it's my imagination. But every time the oil ministers gather, I begin to panic. I panic at the thought of long gas lines.

For anyone over the age of, say twenty-nine, the oil embargo of the early 1970s is more than history. It's a painful reminder of what it's like to have your lifestyle drastically and suddenly changed by a group of people living halfway around the planet. Do you remember gas rationing? Waiting until your "day" came up to fill you tank? Having to abandon plans for a trip because there might not be enough of that liquid gold to get you from here to grandma's house? Of having to wait in line for gas as if it was the return counter at Macy's on the day after Christmas -- every day of the year? They're not images that sit well with an independent-minded and mobile society like America.

OPEC did change the world. It made Americans aware of their dependence on foreign countries for their needs and the growing global interdependence of its economy. It made us aware of the limitations of our resources. And it meant a goldstrike for many other countries, some of whom until that moment lived in utter poverty.

At once, nations like Nigeria catapulted from the lowest ranks of countries to aspiring financial and political greatness. New capitals were immediately put on the drawing board. Skyscrapers begun. Grandiose plans unveiled. And then it happened. Americans got wise. They conserved. Detroit unveiled its own plans; small, gas-conserving cars -- doing away with the block-long boats that Americans were used to driving. Everyone realized that they were hooked -- and quickly kicked the gas habit. And not a few people in the U.S. applauded when these "upstart" nations got their due. Even today, stories of Nigeria's half-finished "new" capital, festering in raw sewage, sets a few faces aglow with an evil smile.

While we were at the height of the gas crisis informed of what was going on by our own domestic media, there was -- and still is -- a source of more in-depth information.

Will base gas prices ever again rise to over a dollar? The man who owns the service station down the street from me vows the prices will rise again by the end of the year to perhaps higher than ever before. Will arms sales to Iran tip the balance of the war with Iraq in one way or another and ultimately affect our oil supply? Nonsense? Who knows. The Sheiks do.

First, the nations of OPEC often meet in Geneva, so Swiss Radio International is a good choice. Their schedule is in the frequency section of *Monitoring Times* so you might want to look it up and tune in their daily news program, *Dateline*.

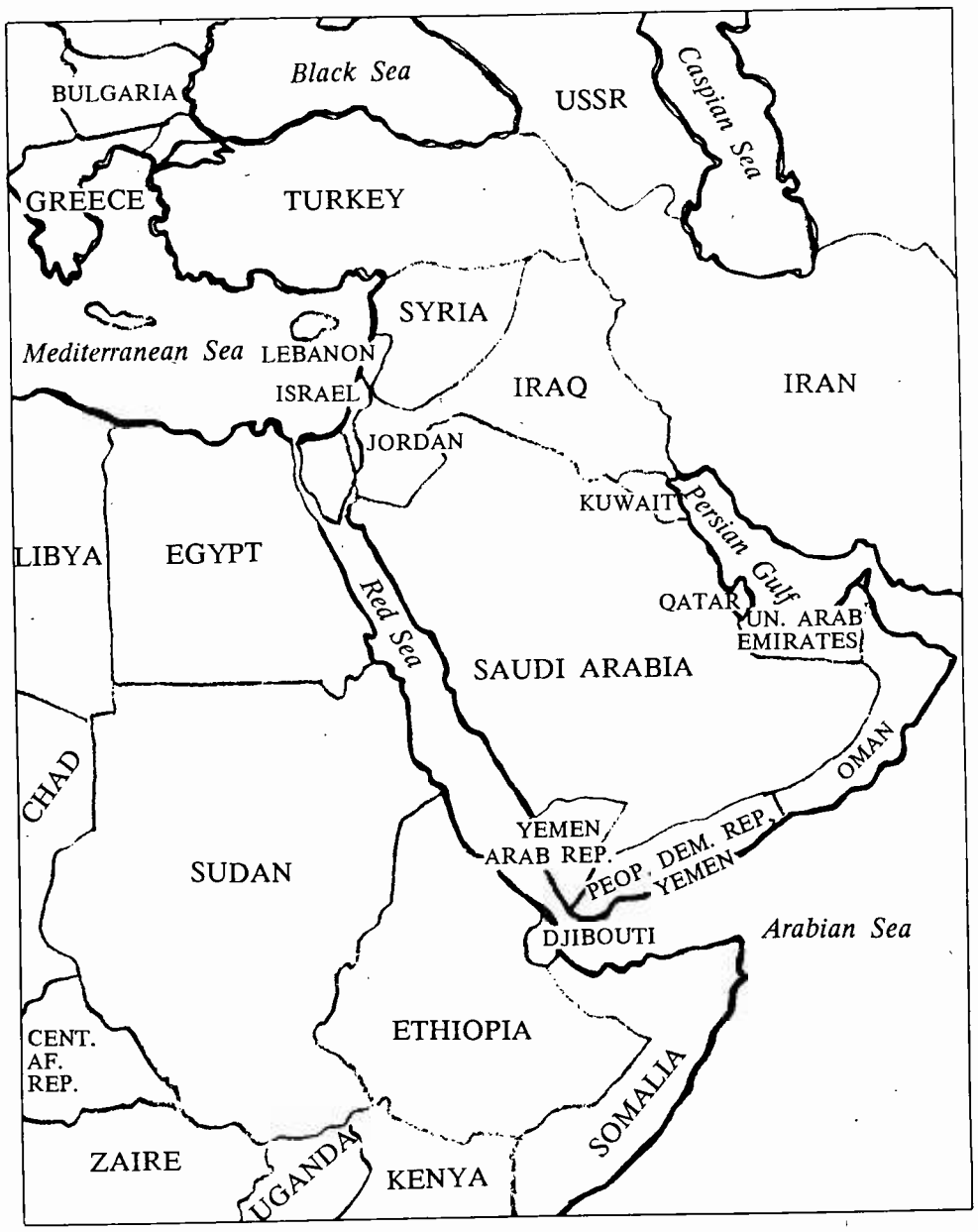
But how about the OPEC countries themselves? Where do you turn to find out the "inside" scoop? Shortwave, of course. Here's who to listen to and where to find them.

As for the oil producing nations themselves, we'll run down a handful of them -- some of which may surprise you.

Saudi Arabia occupies much of the Arabian peninsula. Plateaus, which cover 90 percent of the country, slope gently towards the Persian Gulf coastal plain and include the Nafud Desert and Rub'al-Khali, which translates into the forbidding "Empty Quarter." The country contains two of the holiest places in Islam: Mecca, the birthplace of the prophet Mohammad and Medina. Interestingly, despite its abundance of oil -- discovered back in 1938 and today third to only the USSR and the U.S. in production -- 62 percent of the workforce is employed in agriculture. But that agriculture accounted for less than one percent of the Saudi's GDP.

The Saudis are no slackers when it comes to radio. They have a number of one and two million watt transmitters on the AM band including a 2 million watt unit at Duba that can often be heard in the U.S. on 1521 kHz.

The external shortwave service is no slacker, either. There are 50, 100 and 350 kW units in use but despite that fact, the station -- sometimes called **Radio Riyadh**, but more often known as the **Broadcasting Service of the Kingdom of Saudi Arabia** (BSKSA) -- is not always easy to hear, it does offer a few hour of English broadcasts that can be chased down. Try 9720 and 11855 kHz between 1000 and 1400 UTC and again from 1600 to 2000 UTC on 9720 only.



The station also broadcasts relays of the local radio in Arabic and recitations of the Holy Quran. Other languages used by the external service include such exotic tongues as Bambara, Urdu and Somali.

Citizens of **Kuwait** have to suffer through 130 degree days from time to time. And the violence of the Middle East has spilled onto their territory from time to time. But it's all made a bit easier by the fact that Kuwait has the world's highest per capita Gross National Product -- $17,270.00. It is one of the world's top ten oil producers.

Its history is a bit unusual. While it became independent in 1941, Britain remained responsible for its foreign policy until as late as 1961 when it gained full freedom. In the meantime, it has used it oil revenues to establish one of the world's most elaborate welfare states.

For shortwave listeners, **Radio Kuwait** has always been a joy. It's fairly easy to hear (as long as you're able to listen to the radio in the local afternoons) and has a variety of programs that are quite out of phase with what one would expect from a nation in the Middle East. Tune them in and there's a good chance you'll hear an entire Bill Cosby record played without interruption. There might be some classic American jazz from the 1930s. Or you could catch a local weather report warning people of an approaching sandstorm but comforting them with the fact that the drugstores will remain open all night. It's one of the few truly entertaining -- and often surprising -- stations on the dial and it deserves a chunk of your time. Try them at the following schedule:

0500 - 0800 UTC on 15345 kHz
0700 - 0800 UTC on 9560 kHz
1800 - 2100 UTC on 11675 kHz

And who can forget the tiny nation of **Qatar**? Actually, how many people even know that it exists? Unfortunately, you'll learn precious little about it from your shortwave.

Qatar is small; only 4,247 square miles. Its population is in the low six figures. It is primarily a desert with a name and a capital called Doha.

There is little interest among North American shortwave listeners in Qatar's broadcasts, primarily because none are in English. The transmitters are set up in a place called Al Khaisah and are powerful enough, but seldom reported. You might try for this elusive station from 1000 to 1230 kHz on 15285 kHz and again from 1530 to 1700 UTC on 11730 kHz.

Back as recently as 1971, there existed a loose federation of seven states in the Middle East once known as The Trucial States. They included the Emirates of Abu Dhabi, Ajman, Dubai, Fujairah, Ras el Khaimah, Sharjah and Umm al Qaiwain -- not places the easily roll off the tongues of westerners. They are now known as the **United Arab Emirates**. And shortwave listeners should be able to spot two fairly familiar names: Abu Dhabi and Dubai. Both broadcast independently from a country that, after the British pulled out of the region in the early 70s, is now an "independent federation."

UAE Radio Dubai broadcasts in English on:

0330-0415 on 9640, 11940, 11730, 17830 kHz
0530-0600 on 17775, 21700 kHz
1030-1130 on 17775, 17865, 21605, 21700 kHz
1330-1400 on 17775, 17865, 21605, 21700 kHz
1400-1415 on 11940, 11775, 17865, 21605 kHz
1600-1700 on 9640, 11955, 15300, 15320, 15435 kHz

You might also try for the **Voice of the UAE** from Abu Dhabi between 0800 and 1000 UTC on one or more of the following frequencies: 5960, 6155, 9595, 11715, 11890, 15115, 15230, 15275, 15330, 17820 kHz.

The story of **Iran** is well known. There was the well publicized departure of Shah Mohammad Reza Pahlavi, the ascendancy of the Ayatollah Khomeini and the founding of the Islamic Republic.

Iran seems to have a fetish about broadcasting. It has an enormous network of radio transmitters and is a strong believer in shortwave, its information minister often boasting that within a few years, the nation will reach every inch of the planet with the **Voice of the Islamic Republic of Iran.**

Its broadcasts, fairly well heard in North America, are a delight to listen to for people with a slightly twisted sense of humor. Since its war with Iraq, there are numerous, graphic accounts of incredible victories over their enemies. The Iranians, it seems on VOIRI, never lose a battle. And there are still plenty of references to the "Great Satan" -- America. A totally tactless broadcaster, it will spend fifteen minutes deriding the U.S. and then tell listeners there to send in for a QSL card -- and then send the QSL card with a stamp that depicts blindfolded U.S. hostages being led by a mob. It's all very charming.

Your best shot at the winner of the "Miss Congeniality" in the broadcasting PR pageant is in the afternoons between 1930 and 2030 UTC on 9022 kHz. Other English transmissions include:

1115-1215 UTC on 11790, 15085 kHz
1215-1230 UTC on 11895, 15085 kHz
1300-1315 UTC on 11895, 15085 kHz

Radio Baghdad, Iraq, provides the other side to this strange coin with broadcasts that, too, can be so strange as to be humorous -- unless one stops to think of the incredible carnage occurring at the border with Iran. Not only is it the practice of both sides in the war to send human waves of sometimes 30,000 poorly trained men and boys into the marshes in the south to be gassed and killed, but the practice has been going on for a ludicrous six years.

Conflict is no newcomer to Iraq. Importantly, more than half of its people are Shia Muslims -- the dominant group in warring Iran. It has had a monarchy, established by the British, which lasted for only twenty-six years when the army took over. There has been fighting with the Sunni Muslim Kurds in the north who want an independent state, joining territory with Iran, Turkey and the U.S.S.R.. And it was the site of a startling Israeli air raid against a nuclear reactor in the capital of Baghdad.

Iraq is well represented on the shortwave bands but does not show the expansionist radio tendencies of Iran. It, too, has a home service on shortwave, broadcasting "The Voice of the Masses" and religion.

Radio Baghdad is easy to hear and less vitriolic but none the less self-aggrandizing in its claims of righteousness and victory.

Try for Baghdad between 0000 and 0200 UTC on 11750 kHz (not the best frequency choice) and again from 2000 to 2200 on 15120 kHz.

Algeria, too, is a country whose economy is based largely on petroleum production. The Sahara desert covers more than 85% of Algeria but yields oil and gas that accounts for 90 percent of its exports. In total reserves, it ranks fourth in the world.

A nation of several languages, Arabic (the official one), Berber (which survived the introduction of Arabic in the 7th century) and French (a byproduct of the over one million French citizens who inhabited this once-French nation), you'll hear all of these languages on **Radio Algeria** along with Spanish and English, the latter being heard most afternoons between 2000 and 2030 UTC on 17745 kHz. The transmitters are located at two separate sites near Algiers.

The final nation in our OPEC tour is not so easy to hear and in fact deserves an article all its own: **Indonesia**. Indonesia is an island republic in South-East Asia, a region of rain forests and active volcanoes. Much of the republic is tied together with a myriad of shortwave stations, many of which are difficult, if not outright impossible to hear. To make matters worse, the country embraces some 70 different languages, dotting the shortwave bands from 2260 to 15150 kHz with an amazing babble of tongues.

The Voice of Indonesia in Jakarta is the easiest to hear of all the stations and it includes a few hours of English broadcasts, notably from 0100 to 0200 UTC on 9680 and 11790 kHz, from 0800 to 0900 UTC on 11790 and 15150 kHz and again from 1500 to 1600 UTC on 11790 and 15190 kHz.

Now that you've completed your armchair tour of the OPEC nations, keep an eye on the newspapers and local news. Listen for the next time that the OPEC nations meet. And stay one jump ahead with your shortwave radio. ■

TV DESCRAMBLERS

Although Monitoring Times is primarily concerned with communications and international broadcasting, many of our readers have satellite or cable entertainment television. Questions frequently come to our offices regarding decoders for scrambled broadcasts.

An article by Bob Cooper (of "Coop's Satellite Digest") which appeared in the December 1986 issue of Radio Electronics presented excellent insight into the state of scrambling--and descrambling as well.

The proliferation of home satellite dish systems (or "TVRO"--television receive only) in the first half of this decade brought a flurry of activity from satellite networks who feared losses of revenue from prospective subscribers; they decided to encrypt their transmissions so that the interlopers would be left in the dark.

Early efforts to scramble signals were rather primitive and easy to defeat by basement experimenters with a knowledge of electronics. That changed when companies like Oak and M/A-Com came to the networks' rescue with sophisticated digital encryption.

Oak introduced their ORION (Oak Restricted Information and Operations Network) system and M/A-Com has unleashed their Videocipher system in the forms of the VC-2 for cable and VC-2000 for the home. Videocipher II is commonly seen on such scrambled channels as HBO, Cinemax, CNN, The Disney Channel, and at least 12 others.

The video portion of the scrambled signal was quickly recovered by such specialists as The Black Box Solution (4014 Central Ave., Hot Springs, AR 71913) and Arunta Engineering (3111 W. Thomas Rd., Phoenix, AZ 85016); the audio, however, was a different matter.

ORION's video and audio are now available from a Canadian firm called Westar Technologies (2 Bloor St. W., Suite 100, Toronto, Ont, Canada M4W 3E2); their unauthorized package costs around $500.

Videocipher's aural information is encrypted by the Digital Encryption Standard (DES), once considered unbreakable, but now falling vulnerably to intense hackers and crackers who seem to have discovered the key.

It appears to be merely a matter of time before Videocipher and ORION clones permeate the TVRO and cable market. Will the FCC be forced into submission as they were with the unmanageable CB craze of the late 1970s?

Illicit as they may be, inexpensive black box decoders appear to be a wave of the future and it will be interesting to see if they can be regulated in the face of an adamant public.

HCJB UPDATE

HCJB program hosts John Beck and Dee Balenko have resumed their programming responsibilities in Quito. Beck and his family have been in the United States for nine months on "Home Ministry Assignment" representing HCJB throughout the country. Beck returns to HCJB's *DX Party Line*, hosted in his absence by Louis Mateer and Brent Allred. Balenko returns as host of *Happiness Is*."

This month HCJB marks the beginning of an experimental English transmission to Japan. The programs are much the same as regular HCJB broadcasts and include *DX Party Line, Happiness Is* and *Musical Mailbag*, as well as the tailor-made *Quito Calling Japan* on Saturdays. Try for the broadcasts--in English--at 1200 UTC on 6075 kHz.

The results of HCJB's annual "Letter Month" are in and the top three programs on the station are: #1 - *DX Party Line*, #2 - *Happiness Is*, and #3 - *Passport*.

When the ranking is adjusted for a program's total time on the air, the ranking shifts to: #1 - *Saludos Amigos*, #2 - *Open Line Call-In* and #3 - *DX Party Line*. Congratulations to John Beck, Ken MacHarg and Dee Balenko and all the others for the excellent showing.

The -- CENSORED -- Ship

by Menlo DuPem (?!)

WARNING

This Article is Highly Classified
Read at Your Own Risk

(We know it's true because a U.S. Government spokesperson told us so!)

It seems that from time to time a small ship stops in Seattle for a little R&R and supplies, and most recently she stopped in again for the same reasons plus some fresh paint on her white hull. She's the USNS Mizar, T-AGOR-11, an Oceanographic Research Ship crewed by civilians.

It is a rather unique ship in some ways. The U.S. Maritime Commission had three of them built in 1958. They were relatively small (just 262 feet long) cargo ships with ice breaker bows for use in the waters of Western and Northern Alaska. They operated out of Pier 91 in Seattle and had unique names: Eltanin, Mirfac and Mizar.

In 1964, the Mizar was converted to an "oceanographic research ship" by opening a large hole in the bottom of the hull which runs right up to the main deck where two hydraulically-operated doors cover it.

Through this hole, a 1400 pound metal cage (called the "fish") containing still and television cameras, flash and lighting units, and sonar, is lowered along with power lines on heavy steel cables which are stored in one of the old cargo holds.

The "fish" can operate at extreme depths (in excess of 15,000 feet). In 1964 it was used to locate the sunken submarine, USS Thresher. In 1968 it found another sunken sub, the USS Scorpion. In 1966 it located a lost hydrogen bomb off the coast of Spain.

Other operations it probably participated in were the Russian submarine which the U.S. raised in the Pacific and the four H-bombs which went to the bottom of Westenholm Fjord near Thule air Base, Greenland, in the late 1960's when a B-52 crashed.

While it has operated for various departments of the government, it is currently assigned to the Naval Space and Warfare Systems Command (usually called "SPAWARS"). This agency exists to "architect and engineer the battle forces of the future." SPAWARS, which employs about 3,950 people, is an outgrowth of the Naval Electronic Systems Command and is commanded by a Vice Admiral.

What recently brought the Mizar into the public eye, at least in Seattle, was a first class, top drawer, public relations screw-up by the Navy. A young reporter for the *Seattle Post-Intelligencer* called tc ask about Mizar after seeing it on the waterfront at the Coast Guard's Pier 36.

Mizar often spends short periods in Seattle but this was the first time someone from the news media had asked about it. The reporter's interest was simply a possible sidebar feature comment and he was not expecting anything more than the possibility of a few lines about a research ship in on a short visit, perhaps with a picture.

The reporter was completely surprised when the Navy's spokesperson stated, "That ship is highly sensitive. It is highly classified. Its very mission is classified. The equipment on board the ship in view is classified. It is classified as it sits in port. You're touching a very sensitive area."

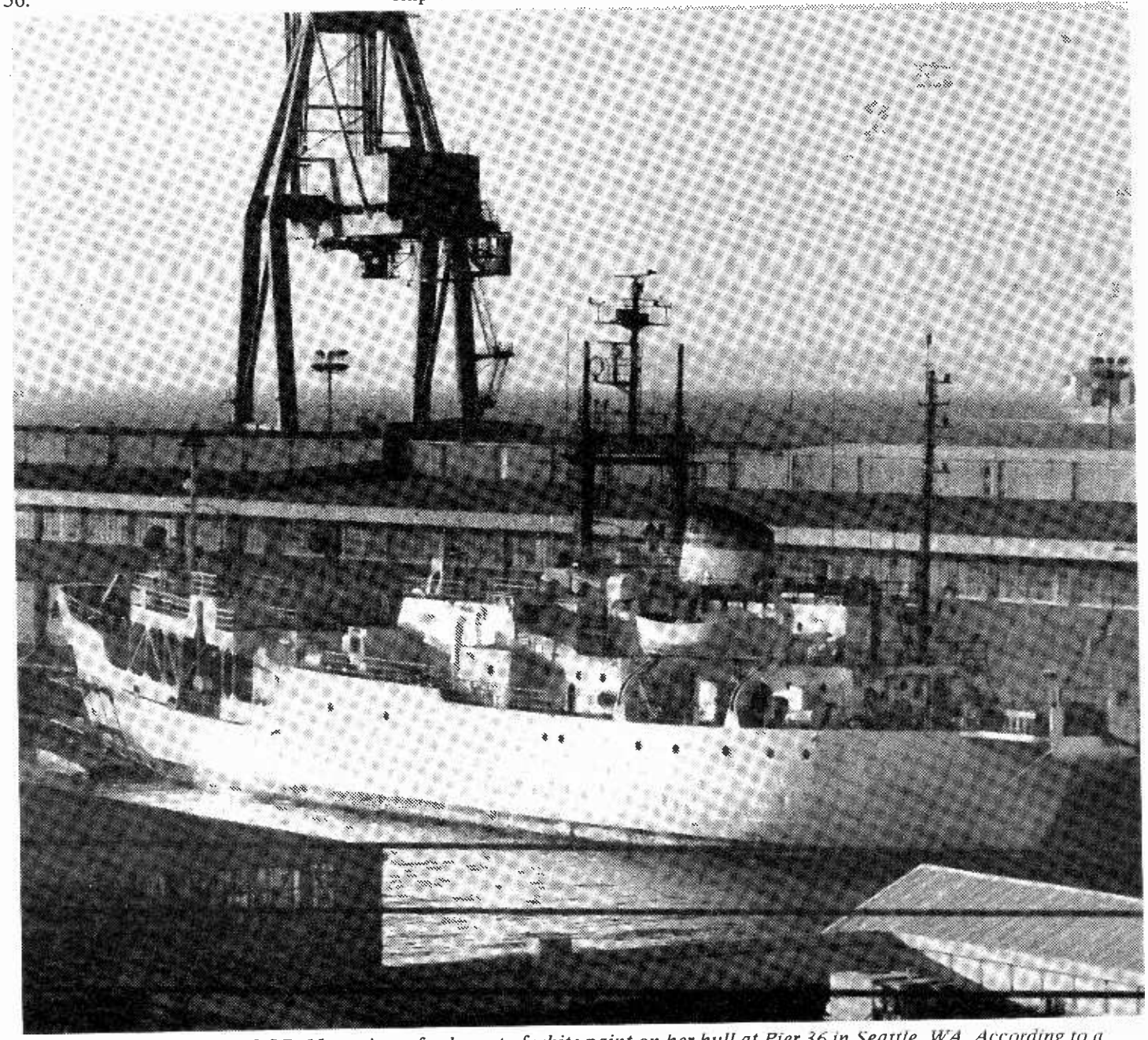
Needless to say, the reporter now had a story of interest! Others heard about it and, in addition to stories and pictures in the paper, TV 'copters buzzed around for their "Live at Five" pictures of this "Top Secret Ship in our Port!"

If the Navy spokesman had simply said, "Oh, that's just the USNS Mizar, an oceanographic research ship that comes to Seattle from time to time for supplies, R&R and painting" (all of which is perfectly true), it probably would have been ignored as usual.

A smart PR man might have also mentioned about Mizar's conversion from a cargo ship and about its earlier days in Seattle and Alaska waters as a throw-away since that information is readily available in the archives; but they didn't and it got lots of unwanted publicity.

As oceanographic research ships go (there are several other similar NOAA and USNS ships stationed in Seattle), the Mizar has a considerable number of antennas, some with interesting designs (see photo). Its size is rather advantageous, being small enough to be taken near shore yet big enough to carry a good sized technical crew and lots of equipment.

The cargo holds, when they were converted, provided room for a photo lab, electronics shop, Navaids room, control center, and living space for the echnical (scientific) crew. Above the cargo holds are handling devices for hoisting items over the side. It has a lot of equipment which



The USNS Mizar, T-AGOR-11, getting a fresh coat of white paint on her hull at Pier 36 in Seattle, WA. According to a Navy spokesperson, this picture should be classified!

can be used for oceanographic research in its traditional sense, but what does it really do?

Some Solid Speculations

Given the fact that the newest military addition to the Seattle/Puget Sound area is a Trident submarine base, and given the Russian interest in the Trident subs, that is the most likely reason for the Mizar's presence during the last several years.

The Russians have been seeding the approaches to the Strait of Juan de Fuca with large sub-surface ELINT (electronic intelligence) buoys which record and retransmit on demand sonar signatures and other information. The Russians have also placed other underwater devices/detectors in the North Pacific area.

The Mizar has limited ice-breaking capabilities and, unlike most USNS ships, is painted white. Not only can it locate Russian buoys, but it can also place its own sub-surface countermeasure buoys nearby to counter and/or confuse the real data or even provide totally false data.

Additionally, the Mizar is capable of checking out specific "areas of interest" in the ocean which may contain certain "abandoned" Russian military technical hardware, the obtaining of which would be of exceptional help in our analysis of Russian capabilities.

COMINT and ELINT work would be an obvious extra capability of the Mizar. While most of the best work in that area is now accomplished by satellite, confirming information is still of value and would be a good secondary capability.

All in all, a most interesting ship. And one which would still be relatively unnoticed, but for a PR SNAFU!

Seattle Post-Intelligencer
December 17, 1986

TACOMA BOAT

$1 million contract to overhaul top-secret ship

Tacoma Boatbuilding Co. has been awarded a contract worth about $1 million for annual overhaul and modification to the top-secret Navy ship Mizar.

Company officials said the contract is the first substantial U.S. government repair project the company has undertaken since filing for protection from creditors under Chapter 11 of the bankruptcy code on Sept. 23, 1985.

The Mizar, classified as an oceanographic research ship, has been on a classified mission in the Northwest. Government officials have refused to discuss the vessel's work.

Radio Works Farther in Sea

What began as an attempt to improve communications underwater with a diving buddy has developed into a sophisticated new underwater radio system.

The system, developed by a small company in suburban Delta, transmits at much greater distances and depths than anything else available, said Brent Larsen, president of Orcatron Manufacturing Ltd.

Another advantage of Scubaphone, he said, is that the transmission quality is as clear as a telephone call.

The device can transmit up to 1,200 metres, compared with about 100 mtres for conventional system, Mr. Larsen said. His system can also be used to depths of 250 metres.

Scubaphone uses single side-band radio which, unlike conventional systems, only transmits when a diver speaks. Interference is reduced and so is battery use in the self-contained unit.

Filtering devices eliminate other interferences such as bubble noise when the diver exhales.

Thanks to Harold Sellers of Newmarket, Ontario, for submitting this article from The Globe and Mail.

DXing with the Eck-spurts

A Common-sense Guide to Shortwave DXing

PART II

by Larry Miller

I remember back when I first started listening to shortwave. And it's a wonder I'm still listening today. I had an old Wells and Garner tube receiver that came from the radio room of the USS Thomas Paine when the destroyer was scrapped some years back. The radio was a grotesque, black affair -- about three foot by three foot by three foot and weighing in, literally, at about 80 pounds. Attached to the back was a three foot length of bell wire which acted as my antenna. I'd toss it about the room whenever I decided to switch the set on.

Night after night I'd sit at that old monster, spinning its enormous dials, listening for even the slightest whisper from its equally enormous speaker. And night after night I would hear only one thing: "Oh, Canada..." -- the interval signal from Radio Canada International. Reception was absolutely awful. If I could make out every tenth word of the program that followed, I'd consider it a good night. Occasionally, when a Voice of America program would make its way through the maze of red hot tubes, I'd call the whole family into the room to listen: "From Washington, this is (static) America. I'm (squeal). This afternoon, (crashing noise) President (crash!) met with (static)..." Exciting as this was to me, I was puzzled to find that no one else shared my enthusiasm. "My God!" they'd invariably say. "How can you listen to that (static)?"

After a while, I began to have my doubts about shortwave. Sure, I had an impressive collection of about 1,500 Radio Canada International QSL cards on the wall. And I sure knew the first four notes of their national anthem by heart, adding immeasurably to my knowledge of Canadian music. But after a while, I became plagued with the notion that maybe -- just maybe -- I was actually supposed to hear all the words in a broadcast. But for the life of me, I couldn't find another soul on this planet that listened to shortwave. Finally, I ran into some hams who convinced me that everything would be all right if only I got my novice "ham" license.

The point of this old -- and very true -- war story is that often, newcomers to shortwave don't know exactly what to expect. Instead of some friendly, helpful advice, they're instead confronted with the exploits of some shortwave wild-eye: strange, flea powered-stations with unusual-sounding names that broadcast on Saturday afternoons only from a ham rig in the back of a Desoto parked somewhere in the Andes in South America. The implication is always the same: if you don't hear it, you're an idiot.

Thankfully, though technology has long since advanced beyond my Wells Garner, the question still arises: "Is what I'm hearing the same as what everyone else is hearing?" After all, shortwave (unfortunately) is by no means the national pastime in the U.S. so it's not always so easy to compare notes with other listeners.

Last month we said that we would conduct a bandscan and in that way you'd have the chance to compare notes with someone else on what's being heard on the bands. You should know, however, that we used some pretty hot equipment: a Drake R7 and a 250 foot inverted L antenna. You should adjust your expectations along the lines of those variables.

Our bandscan started at 0100 UTC and lasted until 0200 UTC. The frequency range we chose was 9000 kHz on up -- until we got to 0200 UTC.

The ground rules were simple. We would move up the band, logging everything that we heard in one hour, using the spectrum occupancy chart printed in last month's *MT*.

In addition, we included in this bandscan only information we were able to obtain on this occasion. We did consult *Radio Database International* for hints, but we did not refer to information we already have on file. Since you do not have access to it, it would put us at an unfair advantage. Further, keep in mind that in the frequency range we chose -- 9000 to 9600 kHz, there are over 120 possible channels. So given that we're only working with an hour, that gives us less than two minutes per channel -- not ideal for making positive identifications. Of course, in an on-going bandscan, you would conduct this over a period of days or weeks -- not just one occasion -- and would have the opportunity to recheck your records and add to your store of information. In any case, here's how our bandscan went, starting at exactly 0100 UTC.

0100 UTC

9020 kHz: We did not encounter a broadcast station until we hit 9020 kHz and the station on that frequency was very weak. The language was Chinese and we did hear an ID for the Central People's Broadcasting Station but not the city. A man continued with a long talk but the signal was really barely audible.

9022 kHz: Another very noisy channel with a weak signal. The language was Farsi and there were mentions of Iran. *Radio Database* says that indeed the Voice of the Islamic Republic of Iran is on this frequency at this time; the language it reports is "other," which includes the possibility of Farsi. In any case, it sounded like other more audible VOIRI broadcasts at other times.

9030 kHz: There's a station here but it's too weak to identify at this time. *RDI* does show another Central People's Broadcasting station on this frequency but we simply can't make out anything about the broadcast -- language, etc. We'll try and go back if we have time.

9074 kHz: We stumbled onto one of the so-called "numbers" or spy stations -- stations with a man or woman (in this case a woman in Spanish) reading groups of numbers in any one of a dozen languages. By their very nature, we don't know what their purpose is and hence, have no idea where they are broadcasting from and so forth. I might also mention that these stations change time and frequencies with pretty much reckless abandon so don't be disappointed if it's not here when you tune in.

9085 kHz: Surprise! It's another spy station, this one with a man saying, "whiskey, sierra, lima..." etc.

9239.5 kHz: This isn't a bad catch. It's an Armed Forces Radio and Television (AFRTS) feeder at Barford in England. The programming is the standard stuff -- this time a football game. But it's on upper side band. This frequency is not always active. A feeder, in case you're not aware, is a shortwave transmission used to get programming from one place to the transmitter site. Recently, the VOA announced that they'd be doing away with the shortwave feeders and switching over to satellites so catch 'em while you can.

9360 kHz: Here's Radio Exterior de Espana -- known in English as Spanish Foreign Radio. This time it's in its native language, Spanish, and is broadcasting to South America. It's a good, strong signal tonight.

9395 kHz: Some Middle Eastern style music catches our ear here. A fair signal with an announcer in Greek, we hear an ID as "Edho Athena." It's the Greek service, Foni Tis Helladas.

9420 kHz: 9420 parallels 9395 with the same programming from Greece. Parallel is a term used when two frequencies carry the same programming at the same time. This frequency, incidentally, is much stronger than 9395 kHz.

9435 kHz: No real surprise here. It's Kol Israel broadcasting from Jerusalem in English. A very strong signal.

9450 kHz: A very weak channel. This one could be Moscow but we're just not getting enough to make an ID.

9455 kHz: A Voice of America frequency in English with a woman reading some sort of political-type feature. Very strong signal but no ID.

0115 UTC

9465 kHz: This is a pretty strong signal. It's in Spanish and a woman is apparently talking about elections in Argentina. There's no ID but the delivery is somehow familiar. Doubtful it's an Argentine station but we'll have to check back later.

9470 kHz: Things are starting to get tough. This is a pretty weak station and it's broadcasting Andean-style music. No talk or identification is forthcoming so we'll have to move on.

9475 kHz: This one is also in Spanish but is a lot easier to identify because of an ID as Radio Cairo from Egypt. It's broadcasting to North and Central America, according to *RDI*.

9480 kHz: The language sounds like Russian. The music sounds Russian. This might be a Soviet domestic station. But it is very weak. Again, we'll try to get back to it for confirmation.

9490 kHz: This one is in Portuguese with a fair signal. Could be Radio Peace and Progress from the Soviet Union on its way down to South America. We'll have to recheck for an ID later.

9500 kHz: Another very weak signal, also possibly in Portuguese. And we pick up another ID as Radio Tirana Albania. The time is 0128 UTC and that's important. It means that we have a better chance to catch some bottom of the hour station identifications so let's go back and try to identify some of the stations we've missed.

9030 kHz: Spin back to 9030 to see if we can find an ID on that possible second Chinese regional but alas, the signal is gone.

9465 kHz: There's still no ID here but I'm beginning to suspect that we've got the Voice of America in Spanish. It's just a gut feeling.

9480 kHz: There's a long pause at 0130 UTC on this frequency -- a full sixty seconds of dead air -- and then a station identification as "Govorit

Moscova" and indeed, we can confirm that this is a Soviet domestic outlet.

9465 kHz: Our suspicions about 9465 are confirmed. We get an ID as the Voice of America at 0131 UTC.

Let's get back to the bandscan where we left off.

9505 kHz: This is an interesting frequency. The signal is very weak and the language unknown. But there is definitely a jammer on the frequency -- someone doesn't want someone to hear this station. So let's take a look at *Radio Database International* and do a little detective work. According to *RDI*, there are two stations supposed to be on this frequency at this time: Radio Berlin International in Spanish and Radio Free Europe/Radio Liberty. And Radio Liberty is, according to RDI, jammed. The language is not Spanish so that kind of rules out Berlin. And in any case, I don't think Berlin could broadcast itself out of a paper sack so I'm going to guess that this is RFE/RL.

9510 kHz: Very weak. Possibly Bucharest but I can't even identify the language here it's so bad.

9509.5 kHz: This is the first time I've heard any station on this frequency. There's a male announcer and it's very weak. This one might be worth checking out in detail in the future.

9515 kHz: The BBC in English with a comedy program from transmitters in Ohio.

9520 kHz: Another Radio Free Europe/Radio Liberty channel; also jammed. Unfortunately, it's also so weak that I can't establish whether it's parallel with 9595 kHz.

9525 kHz: This is what I call a hash. There are two stations in here. One is in Spanish with a man with a high pitched voice; the other sounds a bit VOA-ish and is talking about the Cuban press.

9530 kHz: nothing but music coming through here. No talk so hard to determine. Just on a hunch, I'm going to see if it parallels 9630 which is Spain -- but no go. It's very weak.

0145 UTC

Quarter hours (:15 and :45) also present, like the top (:00) and bottom (:30) of the hour, a chance to pick up some IDs. So we'll spin the dial back to 9490 and see if we can pick up something on what we suspect is Radio Station Peace and Progress. And the fates are with us. We have an ID confirming RP&P at 0145 UTC.

9535 kHz: There's a real strong signal here in Spanish and it sounds as comfortable as an old shoe. After a while, you start to get a feel for a station's audio, its delivery and so forth and this one sounds like Radio Canada International. It immediately IDs as such.

9540 kHz: Another hash. There's two stations in here, both weak and both unidentifiable at the moment.

9545 kHz: We catch the Deutsche Welle sign off announcement here.

9550 kHz: Another hash. Two stations, one playing music, the other with a man talking.

9555 kHz: Possibly Russian and/or Portuguese language.

9560 kHz: Later on, at about 0400 UTC, Turkey broadcasts in English to North America here. For now it's in some other language but it's still Turkey. Oddly enough, there's a jammer in the background. Sometimes there are other stations on the same frequency and one might be jammed. So you hear the jammer going on on the frequency but not the original station that is being ▶

ON YOUR WAVELENGTH

Andrew Piper of the BBC World Service offers a simple guide to the wavebands.

Any point on the tuning scale of your radio can be described in two different ways: in terms of frequency or wavelength. Frequency is measured in megaHertz (MHz) or kiloHertz (kHz), and wavelength in meters (m). Your set may be marked in one or the other or both! Older receivers may refer to Mc/s or kc/s (megacycles or kilocycles per second), an earlier form of MHz and kHz. Nowadays, frequency rather than wavelength tends to have the upper hand (or is it band?).

International broadcasting happens in certain rather restricted areas of the frequency range. Many receivers may indeed concentrate on just these narrow areas, the broadcasting bands. On short waves these are usually called by their wavelength -- the 13, 25 or 49 meter band. Your set may be marked in this way: 13, 16, 19, 25, 31, 41, 49. These are the meter bands. Their equivalents in frequency are respectively: 21, 17, 15, 11, 9, 7, 6 MHz.

Each broadcasting band has its own uses and characteristics.

Long wave (LW) is only available in Europe. The signal can travel long distances. The BBC World Service uses 200 kHz (1500 m) during the small hours.

Medium wave (MW) frequencies travel short distances during the day, and long distances at night, when the band may be affected by interference from other stations. The frequency range is from 526 to 1606 kiloHertz (570 to 187 meters).

Short wave (SW, or in German, KW) is used for broadcasting over long distances -- in general the higher the frequency the longer the distance.

The frequency bands currently used by the BBC World Service are:

- **4 MHz** (75 meters), used particularly in the tropics, and also in Europe where it is especially useful during the dark winter mornings and evenings. The band is often relatively free of interference.

- **6 MHz** (49 meters) and **7 MHz** (41 meters) are popular bands which are most effective in winter and under cover of darkness. They are, however, extremely congested, especially in Europe.

- **9 MHz** (31 meters) and **11 MHz** (25 meters) are useful over medium distances during daylight hours and longer distances at night.

- **15 MHz** (19 meters), **17 MHz** (16 meters) and **21 MHz** (13 meters) are for long distance broadcasting. They are daytime frequencies, and can be rather unreliable. However, when they work they are usually very good.

- **Very High Frequency** (VHF), often marked on radios as FM (Frequency Modulation), provides a very local service. The BBC World Service can be heard on VHF in certain large cities, for example Singapore and Berlin.

So the choice of frequencies for an international broadcaster is based on skill, knowledge -- and not a little bit of luck.

(COMMON SENSE DXing, cont'd)

jammed. But RDI doesn't show any likely candidates for jamming on this frequency at this time and I can't imagine anyone jamming Turkey to North America sooo... Maybe there's one of those Middle Eastern clandestines buried deep in there somewhere and all we're getting is the jammer.

9565 kHz: This sounds interesting. It's a man talking in Spanish and sounding very much like an auctioneer. There's no ID but I've heard Radio Universo here from time to time. It's probably them.

9570 kHz: This late in the hour, things start to shift on the shortwave bands. On this frequency, for example, there's a female -- probably Romania -- but it's getting wiped out by Deutsche Welle's interval signal which has just come on the air announcing their forthcoming transmission on the frequency in a few minutes.

9575 kHz: An easy one. Italy in Italian.

9577.4 kHz: Totally unidentified.

0159 UTC

9580 kHz: There's a very weak, eerie sounding program on 9580 kHz of really old jazz music. Sounds like it's being played on an old Victrola. And it identifies as Radio Moscow.

9590 kHz: The BBC is playing a country and western music program. It parallels to 9515 kHz which we heard earlier.

9595 kHz: There's some music here but before we can get a handle on it, it signs off abruptly with no identification. It's now 0200 UTC.

As you can see, we've made some pretty decent discoveries -- a Chinese regional, two spy stations, Radio Free Europe, Radio Peace and Progress. At the same time, you'll also notice that there are a lot of holes in our spectrum occupancy chart. And therein lies shortwave's greatest lesson: it takes time to learn the bands.

Let's see how you do. Work up a bandscan from 0100 to 0200 from 9000 to 9600 kHz. And send it in. It'd be interesting to compare what you heard against what we heard. Remember -- you don't have to be an expert. You just have to give it time. For us, however, it's time to put down the headsets and crack open a beer. It's been an hour well spent. ■

The entries on these sheets have been compressed and reduced to save space. In actual practice, you would leave three or four open lines between each frequency.

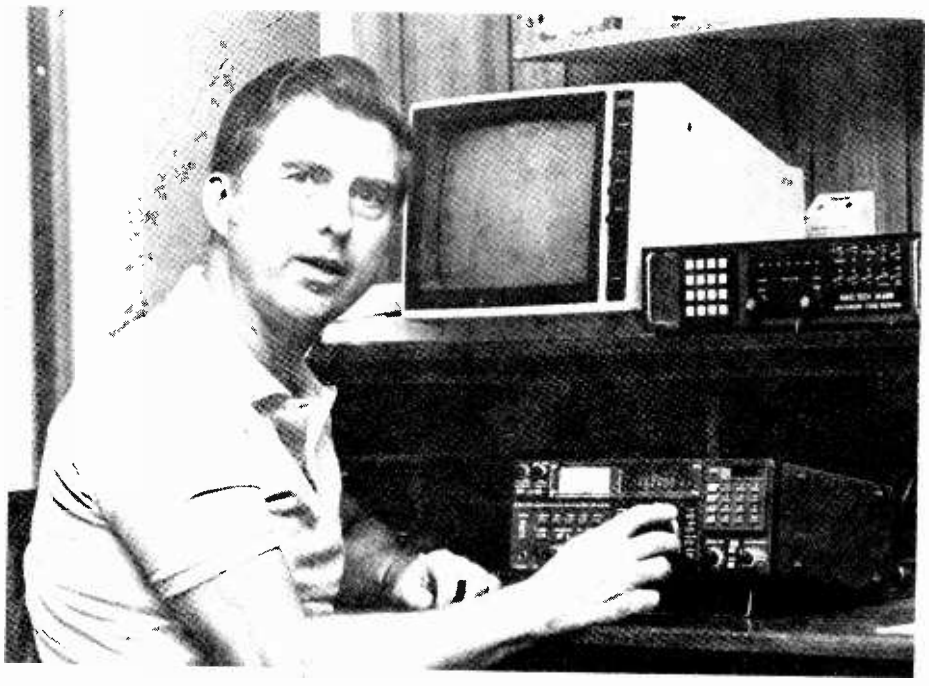
FREQ. START 9000 — FREQUENCY END 9595
TIME 0100 to 0200 UTC

MONITORING TIMES

SPECTRUM OCCUPANCY CHART

Freq	Station Name	City/Country	Time Start	Time End	Lang	Target	Power	Comments
9020	CENTRAL PEOPLE'S BROADCASTING STATION	? P.R. CHINA			CHINESE	HS		LONG TALK BY MAN BARELY AUDIBLE
9022	VOICE OF ISLAMIC REPUBLIC OF IRAN	TEHRAN IRAN			? FARSI	EU/AF		VERY NOISEY - MAN TALKING
9030								
9074	NUMBERS STATION	?			SPANISH	?		WOMAN GIVING NUMBERS IN SPANISH. DECENT SIGNAL
9085	NUMBERS STATION	?			/	?		MAN GIVING CODE - "WHISKEY SIERRA LIMA ..."
9239.5	AFRTS (USB FEEDER)				ENGLISH			FOOTBALL GAME IN ENGLISH, PROBABLY VIA BARFORD, UK
9360	R. EXTERIOR DE ESPANA	NOBLEJAS SPAIN			SPANISH	SA	350 KW	GOOD SIGNAL, MAN + WOMAN IN SPANISH
9395	VOICE of GREECE	ATHENS GREECE			GREEK	?	100 KW	MIDDLE EASTERN MUSIC AND ID "EDHO ATHENA..." FAIR
9420	VOICE OF GREECE							PARALLELS 9395 GOOD
9435	KOL ISRAEL	TEL AVIV ISRAEL			ENGLISH	N/A	300 KW	STRONG SIGNAL
9450								
9455	VOICE OF AMERICA	GREENVILLE NORTH CAROLINA			ENGLISH	SA	500	STRONG SIGNAL, WOMAN WITH STANDARD POLITICAL STUFF
9465	VOICE OF AMERICA		:15		SPANISH			STRONG SIGNAL. TALK ABOUT ELECTIONS IN ARGENTINA.
9470					SPANISH?			ANDEAN TYPE MUSIC
9475	RADIO CAIRO	KAFR SILIM-ABIS EGYPT			SPANISH	SA	250	WOMAN WITH SPANISH TALK
9480	MOSCOW DOMESTIC	MOSCOW USSR			RUSSIAN	HS		ID "GOSKOMIT MOSKVA"
9490	R. STATION PEACE AND PROGRESS	SOVIET UNION			PORTUGUESE			TENT. CONFIRMED ID
9500	R. TIRANA				PORTUGUESE			TENT. MAN + WOMAN ANNOUNCER. FAIR SIGNAL
9505	RADIO LIBERTY	HOLZKIRCHEN W. GERMANY			RUSSIAN	RUSSIAN		LIGHT JAMMING
9509.5								MALE ANNOUNCER
9510	BUCHAREST ?				?			TENT. VERY WEAK
9515	BBC	CINCINNATI OHIO			ENGLISH	ENGLISH		COMEDY PROGRAM
9520	RADIO LIBERTY/FREE EUROPE							POSSIBLY PARALLEL WITH 9505 KHZ
9525								2 STATIONS ON FREQUENCY, 1 IN SPANISH ONE ENGLISH
9530					SPANISH ?			MUSIC; NOT PARALLEL TO 9630 (SPAIN)
9535	RADIO CANADA INT'L				SPANISH		SA	ID HEARD
9540								2 STATIONS. BOTH WEAK
9545	DEUTSCHE WELLE	WEST GERMANY			ENGLISH			HEARD SIGN-OFF ANNOUNCEMENT
9550								MUSIC - MAN TALKING
9555	RADIO FREE EUROPE							TENT. POSSIBLY IN RUSSIAN OR ROMANIAN
9560	TURKISH RADIO TV (V. OF TURKEY)	ANKARA TURKEY			?			ID, JAMMING IN BACKGROUND
9565	R. UNIVERSO	CURITIBA BRAZIL			SPANISH			ID; MAN WITH WHAT SOUNDS LIKE AN AUCTION
9570	R. BUCHAREST		:59		?			FEMALE ANNOUNCER, DEUTSCHE WELLE INTERVAL SIG
9575	RTV ITALIANA (RAI)	ROME ITALY			ITALIAN	N/A	100	FEMALE ANNOUNCER
9577.4								STATION THERE BUT CAN'T MAKE IT OUT
9580	RADIO MOSCOW	BLAGOVESHCHENSK SOVIET UNION						OLD JAZZ MUSIC; VERY WEAK; ID'S RADIO MOSCOW
9590	BBC				ENGLISH			COUNTRY + WESTERN MUSIC
9595								MUSIC; OFF ABRUPTLY AT :59

ICOM's State-of-the-Art 'Compatibles': New R7000 Joins World Famous R-71A



"Now with these two superior pieces of equipment, you can enjoy laboratory quality reception from DC to daylight—100 kHz to 2000 MHz! Use them in combination with our fine antennas for signal reception which simply can't be beat."

—Bob Grove

ICOM R-71A Sets Industry Standards For Power, Quality

We've said it before and we'll say it again: the R-71A is the most powerful general coverage receiver ever made available to the general public. It is also straightforward to operate and feels the way a receiver should.

Continuous tuning from 100 kHz-30 MHz with signal resolution of 10 Hz eliminates the need for RIT, even on SSB or RTTY.

The brilliant fluorescent display provides frequency information down to tenths of a kilohertz and alerts the listener to other dial settings (mode, memory channel, VFO). A 32-channel memory (plus 2 independent VFO's) stores both frequency and mode and may be scanned or searched. Additionally, the squelch works on the scan mode (as well as normal reception), stopping automatically on a busy channel for monitoring! A real bonus with add-on frequency converters.

An effective noise blanker has adjustable controls for optimum reduction of a wide variety of impulse noises, from power line hash to the Russian woodpecker. An internal speaker produces good audio and a tone control adjusts sound to comfort.

Outstanding sensitivity of 0.15-0.5 uV (from 1.6-30 MHz with internal preamp on). Many accessories are available for this first-class unit. **Order RCV6**

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Only $799 plus $10 UPS

R7000: In a Word, Superb.

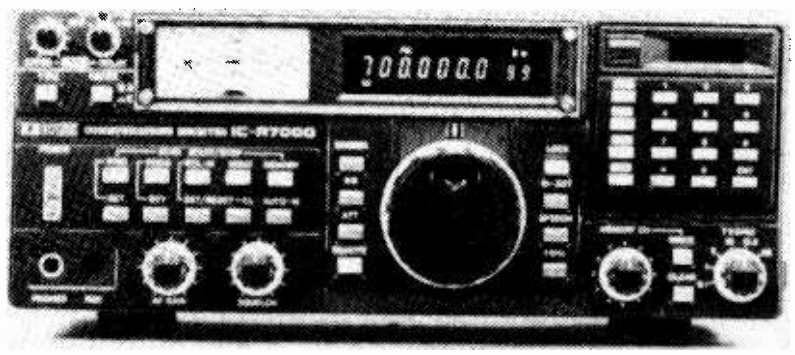
Yes, the new ICOM R7000 follows the reputation of its companion, the world-famous R-71A short wave receiver, but is fully compatible with that unit due to its total spectrum 25-1300 MHz frequency coverage (up to 2000 MHz with slightly degraded performance)!

Add to this enormous tuning range 99 memory channels with priority function, keyboard entry or dial tuning, FM/AM/SSB modes, five tuning speeds, S-meter/center tuning meter, narrow/wide filter selection, noise blanker, and adjustable scanning speed (1-5 channels/sec.) with selectable delay, and you have the most advanced scanning receiver ever designed for the serious VHF/UHF listener.

The R7000 covers aircraft, marine, business, ham (amateur radio), emergency services, government and television bands—all for a remarkably low price. For simplified operation, this receiver offers direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency. The frequency will be automatically entered without changing the main tuning knob.

Memory channels may be called up by pressing the Memory switch, then keying in the memory channel number from 1 to 99. All memories are backed up by a lithium battery.

But the features don't stop here. Optional accessories include the RC-12 remote controller, a voice synthesizer to announce frequency settings, and even a serial interface for external computer control!



The tradition of ICOM's equipment superiority is only enhanced by this state-of-the-art scanner. You simply can't do better than the "best there is."

Now in Stock

$950 plus $10 UPS

Specifications

- Scanning: memory, mode, select memory scan, priority, or programmable frequency limits.
- Narrow/wide filter selection.
- Six tuning speeds: 0.1, 1.0, 5, 10, 12.5 or 25 kHz.
- Compact size: 4⅜" x 11¼" x 10⅞".
- Weight: 16.5 lbs.
- Typical sensitivity: 0.25 uV.
- Selectivity: 2.8, 9, 15 and 150 kHz @ -6 dB.

Order SCN 4

- Image rejection: better than 60 dB.
- Coverage: 25-2000 MHz continuous coverage (1000-1025 not covered)
- Dial lock.
- Noise blanker.
- Combined S-meter, center meter.
- Fluorescent display with dimmer switch.
- Optional RC-12 infrared remote controller.
- Optional voice synthesizer.
- AC or DC operated.
- 10.7 MHz IF output for panadaptor (not available from ICOM.
- Audio output: 2.5 watts.
- Computer control option: serial port, TTL compatible.

We carry a complete line of accessories for both receivers. See our catalog!

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RADIO ACTIVITY

The Michigan Area Radio Enthusiasts (MARE) is one of the new breed of local clubs. Founded a little over two years ago, it serves listeners with local meetings (the January one was in Dearborn), DXpeditions (members will go out for the rare DX on February 13th-15 at the Island Lake Recreation Area near Brighton) and a bulletin that comes out once every other month. Former editor and publisher Don Hosmer, one of the founders of the organization, recently left to accept the Executive Secretary position at ANARC and as a result, there are, as the December/January bulletin says, "some new columns, new editors, new publisher, new board member and [a] new address." It is a dynamic local organization that tells members everything from what members are hearing to who sent in Christmas cards to club headquarters. Membership is a very reasonable $5.00 a year from P.O. Box 311, Wixom, Michigan, 48096-0311.

MEDIUM-WAVE NEWS
Editor: Harold "The Yellow Rose of Texas" Frodge

Bolivia: 740 La Cruz del Sur CP27 La Paz was at 730 kHz/ 760 R. Santa Clara CP157 Sorata was at 800 kHz & now runs 0900-1200, 1600-1730 & 2100-0100 / 1140 R. Horizontes de Campi at Cobija is CP221, runs 1000-0330 & was at 1150 kHz/ 1145 R. Centenario CP25 Santa Cruz now 5/1 kW & runs 0930-0400 M-F & 1000-0100 Sat-Sun/ 1250 R. Los Andes CP16 Tarija now 2/2 kW/ 1380 R. 16 de Noviembre CP 221 Cacaba was at 1380 kHz & runs 1000-0200 with 0.55 kW/ 1480 R. Estevan Arze in Tarata was on 1140 kHz & runs 0900-0300.

Honduras: 810 R. Valle HRLP Choluteca now 3 kW & runs 1000-0400/ 920 R. Catacamas HRSK Catacamas now 5 kW & runs 1100-0300, was at 950 kHz/ 970 R. Tic Tac HRTL Tegucigalpa now 3 kW & runs 24 hrs/ 1070 R. Guaymuras HRGH El Paraiso now 3 kW & runs 1100-0400/ 1300 R. Sant Rosa HRLR Santa Rosa de Copan now 3 kW.

Montserrat: 930 R. Antilles will begin carrying BBC World Service pxs at 1600, 1800 & 0400. The station already carries VOA, RCI & DW pxs.

Nicaragua: 700 HTA700 Managua now IDs as R. El Fabuloso/ 720 R. Catolica HTA720 Managua is off the air/ 840 R. Noticias HTA840 Managua is now 10 kW & runs 1100-0500.

Venezuela: 540 R. Perija YVOV Ville del Rosario is now 25 kW/ 550 R. Okey YVKE Caracas was R. Mundial/ 630 R. Nacional YVKA Caracas is off the air/ 820 Vision Guayana YVSH Upata was R. Guayana/ 930 R. Maracay YVLJ Maracay is now 25 kW/ 970 R. Okey YVLR Maracay was R. Central Maracay/ 970 R. Tourismo YVSD Valera is now 20/10 kW and runs 0900-0400/ 1060 R. Guarico YVLN San Juan de los Morros is now 10 kW.

Americas MW items come from the September 1986 WRTVH Newsletter.

UTILITIES: LW, MW, SW, VHF, UHF, ETC, ETC.....
Editors: Dale Konyha and Mark Drolias

6761.0 USB	10/19/86 Routine Traffic, Flash message Plane in distress. Gear door hanging. Calling Reep control via Advantage. Reep 01, 04, 06, calling Wurtsmith. Wurtsmith transferred to K.I. Sawyer. 3 planes down.
6812.0 USB	10/19/86 Andrews AFB, working King 27000 sending data over 127. (test)
6756.0 USB	10/19/86 Andrews AFB.
6761.0 USB	10/19/86 Thief control to Reep 10 confirming orders on weather request. In flight emergency. Reef 4 Flash. 04 & 06 23:08 GMT; 07 to Wurtsmith and K.I. Sawyer; Arrive time 0125 GMT.
3130.0 USB	11/2/86 E-2C wkg. 4-QK + 7-GP Sub hunt games.
284.80 UHF	10/27/86 Sting Flight wkg. Dragnet W/ Dogfights using F-4's.
308.00 UHF	1/27/86 Dragnet wkg. Macho Flight. Dog Fights. (Dragnet=AWACS)
4373.0 USB	11/2/86 6-PB calling 2-VA no contact. (Navy)
6802.0 ---	11/2/86 3 Digit groups. SS numbers.
6715.0 LSB	11/2/86 SAM 31681 wkg. Andrews.
6840.0 ____	11/2/86 EE numbers W/ E.Z.I. overcover.
6723.0 USB	11/2/86
3109.0 USB	11/2/86 Bakerboy wkg. Air Opts. requesting aircraft return station.
5700.0 USB	11/2/86 Downtown wkg. Ladybird to Data at 02:41 (SAC Bravo/Quebec)
6730.0 LSB	11/2/86 Andrews wkg. Navy 676 aircraft P-3
6890.0 AM	11/3/86 Downtown Radio checking Sea Wasp on Kilo (SAC)
4746.0 USB	11/3/86 Hicum AFB Hi. Coded message.
6705.0 USB	11/3/86 Goatpen Phonepatch to Best Deal via Trenton.
7885.0 AM	11/6/86 SS 5 digit groups
7845.0 USB	11/6/86 Secure voice. Unknown.
7845.0 USB	11/6/86 SS 5 digit groups.
5692.0 USB	11/6/86 Secure voice. Coast Guard Freq.
7887.0 AM	11/12/86 SS 5 digit groups.
5700.0 USB	11/12/86 Drycell working ??

QSL CORNER
Editor: Bill Carney

Alaska: KNLS, 11905 kHz, full data station photo card in 10 days. No return postage; v/s Y.A.Houser. (Frodge-from Yanshan PRC) Transmitter site card in 12 days for English report and mint stamp. Also sent information about station and program/frequency schedule. (Carney)

Bangladesh: Radio Bangladesh, 11935 kHz, "Bengal Tiger" card and partial data letter in 1 1/2 years for follow up and 3 IRCs. Verification signer: Kazi Rafique, Assistant Director (Lare)

Canada: CFCX, 6005 kHz. Full data card in 30 days for mint stamp. No v/s listed on card (Walker)

Germany East: Radio Berlin International. Willard received his membership package and enclosed was a membership certificate, reception report forms, RBI note pad, post cards, pennant, RBI pin, 2 special first day issue stamped envelopes, a package of loose East German stamps, RBI plastic bag, a book, 4 pocket calenders, and of course a QSL card. Received in one month, frequency on card was 6125. (Dermyer) I see that you must be a fellow philatelist! (Carney)

Netherlands: Radio Nederland, 6165 kHz, full data Flevo Transmitter site and requested "Writing Useful Reception Reports guide in 39 days for 1 IRC. (Galvin)

Sweden: Radio Sweden International, 15345 kHz full data Archipelago card with sked in 8 days for 1 IRC. V/s Claude Stephenson. (Galvin)

Mediumwave Verifications via Bob Walker:

628	WTMJ	Milwaukee, WI	Full detail card in 59 days. V/s Jimm Wuijiman, Mgr of Engineering
630	CFCO	Chatham, ON	Card in 22 days. No V/s.
640	WWLS	Norman OK	Letter and business card in 17 days for mint stamp. V/s Jay Sanders, Program Director.
1060	KYW	Philadelphia PA	Card with full detail in 5 days for mint stamp. V/s Jan Kowalsyk, CE
1500	WTOP	Washington, DC	Full data QSL card in 8 days.

WORLDWIDE RADIO LISTENING
Editor: Bill Carney

Australia: A new Radio Australia transmitter site is under construction in Brandon in northern Queensland. Three of the 10 kW transmitters from Lyndhurst are now on their way by truck to Brandon. The new site will serve Papua New Guinea and the Soloman Islands. It's hoped to be in operation during the last half of next year. (Radio Australia) VLwUV in Sydney left the air in September. This station, listed with 500 watts on 1692 kHz, provided radio courses for the University of South Wales. (Rob Williams via SCDX #1905) If any of you have Harold Frodge's "Noisy Band" list you can delete this station.

Belize: According to Bill Whitacre of the VOA, tests on 1530 and 1580 arte 1100-1400 and 2300-0300. (Arthur Cushen via SCDX #1905)

Gabon: Swiss Radio International has registered the use of 9625 kHz for broadcasts in Portuguese and Spanish to South America at 2200-0100. From November 2, these signals will be relayed via Paris to the transmitters of Africa No. One in Gabon. (BBCMS/RNMN/SCDX #1906)

Honduras: Sani Radio has been noted in English at 0315-0500 on 4755 kHz. "Sani" is a Miskito word meaning "Through the grapevine" (Charles Delarve in SCDX #1908) Also noted operating 1200-1600, 2000-0200. 10 kW from Puerto Lempira, Gracias a dios dept. Owned by International Rescue Committee, sponsored by International Development Agency, AID. Most programs in Spanish and Moskito; callsign HRRI (Glenn Hauser, FRENDX LN)

Iceland: Current broadcast schedule for the ISBS: 1215-1245 on 13775, and 1855-1945 on 9985 to Europe; 1300-1330 on 1855-1945 on 15395, and 2300-2345 on 11730 to North America. These are relays of the home service so all programming is in Icelandic (WRTVH on RNMN 23 Oct)

Italy: AWR Forli is now off the air. The Italian PTT (their version of the FCC) has objected to their broadcasting out of the official SW broadcasting bands They will try to be on the air soo on 9605 at around 0600 UTC. They will be testing (as of October 27) at 1330-1800 on 6015, 6145, or 7165 kHz (RNMN 23 Oct).

Netherlands: Radio Netherlands may be changing their interval signal slightly. They are choosing from several new high-quality digital recordings of their current interval signal, the folk song "Merck toch hoe sterck." So the interval signal will be the same song, just a different version of it. (RNMN 16 October).

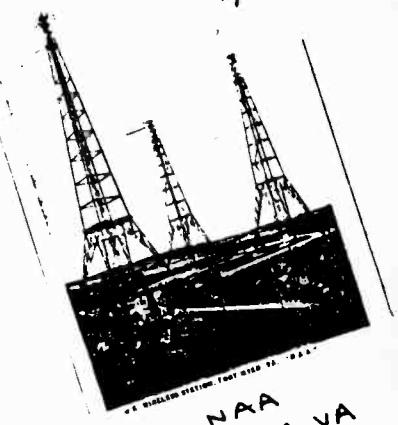
Tonga: The Tonga Broadcasting Commission should now be using shortwave, 1800-1000 on 5030 with 6012 as a standby. (RNMN)

OLD RADIO POST CARDS

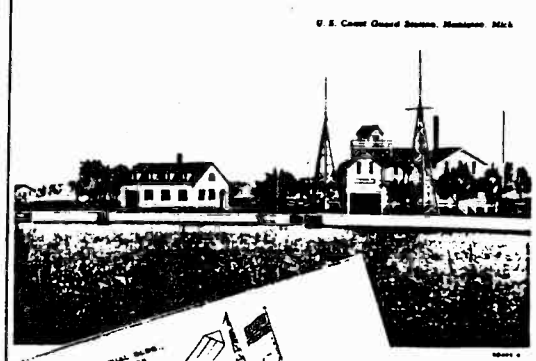
by Harold Frodge

I've admired the old pictures and postcards of radio stations used in *Popular Communications* and other radio magazines. This summer, I started looking for old postcards at antique shows. They are not easy to find but three shows turned up a dozen or so. I've found cards for commercial stations, military stations, unidentified transmitters, ham and CB QSL cards, an ARRL campaign card and a DXer's comedy card. I have yet to find a broadcast or utility station QSL card, but I'm sure that there are some out there.

Most cards run in the $.10 to $1.00 range. Look for cards of old hotels. Many times, the local hotel is the tallest building in town and a good place to locate an antenna. If you are lucky there will also be a sign identifying the station, although this appears to be the exception. I also have cards for WXYZ and KNX showing call letter signs.



To try to identify unidentified stations, I have written to local museums and historical societies, but have had no replies yet. One of these stations had a transmitter on top of the Hotel Tuller in Detroit. The card was postmarked 26-August-38. Recently I found another Hotel Tuller card postmarked 16-October-47 showing no antenna. Does anyone know what this station was? Another unidentified station is one with an antenna on the top of the Union Industrial Building in Flint (no postmark, but presumed to be vintage 30's.). Another unpostmarked card shows the U.S. Coast Guard station in Manistee -- anyone know the call?



frequency SECTION

LEGEND:

- The first four digits of an entry are the broadcast start time in UTC.
- The second four digits represent the end time.
- In the space between the end time and the station name is the broadcast schedule.
  S=Sunday M=Monday T=Tuesday W=Wednesday
  H=Thursday F=Friday A=Saturday

If there is no entry, the broadcasts are heard daily. If, for example, there is an entry of "M," the broadcast would be heard only on Mondays. An entry of "M,W,F" would mean Mondays, Wednesdays and Fridays only. "M-F" would mean Mondays through Fridays. "TEN" indicates a tentative schedule and "TES" a test transmission.

- The last entry on a line is the frequency. Codes here include "SSB" which indicates a Single Sideband transmission, and "v" for a frequency that varies.
- Frequencies in bold are most likely to be heard regularly in North America.

We suggest that you begin with the lower frequencies that a station is broadcasting on and work your way up the dial. Remember that there is no guarantee that a station will be audible on any given day. Reception conditions can change rapidly, though, and if it is not audible one night, it may well be on another.

Frequency updates from readers are also welcome and should be sent to:

Larry Miller, Frequency Coordinator
Monitoring Times
P.O. Box 691
Thorndale, PA 19372

Anyone whose material is used will receive a certificate of appreciation from Monitoring Times.

The MT Monitoring Team

Greg Jordan, NC

Gail Van Horn, FL

Steve Forst, PA

All frequencies in this list have been heard by one or more MT monitors during the previous month.

0000 UTC [7:00 PM EST/4:00 PM PST]

0000-0015	Voice of People of Kampuchea	9693, 11938
0000-0030	BBC, England	**5975**, 6005 **6120**, **6175** 7325, 9410 9515, 9590 9915, **12095**
0000-0030	KGEI, California	15280
0000-0030	Radio Berlin International	6080
0000-0030	Radio Canada International	**5960**, **9755**
0000-0030 M	Radio Norway International	**9590**, **9610**
0000-0045	Kol Israel	5885, 7465 9435, **9815**
0000-0050	Radio Pyongyang,North Korea	15140, 15160
0000-0100	Armed Forces Radio and TV	**6030**, **11790** **15345**, **17765**
0000-0100	All India Radio	9910, **11715**
0000-0100	CBC Northern Quebec Svce	**6195**, **9625**
0000-0100	CFCX, Montreal, Canada	6005
0000-0100	CFRX, Toronto, Canada	6070
0000-0100	CFVP, Calgary, Canada	6030
0000-0100	CHNX, Halifax, Canada	6130
0000-0100 TEN	Christian Science Monitor	7365
0000-0100	CKFX, Vancouver, Canada	6080
0000-0100	KCBI, Texas	**11910**
0000-0100	KSDA, Guam (AWR)	15115
0000-0100 TEN	KVOH, California	**9505**
0000-0100	KYOI, Saipan	15405
0000-0100	Radio Australia	**15160**, 15240 **15320**, 15395 **17750**, **17795**
0000-0100	Radio Baghdad	11750
0000-0100	Radio Beijing,China	**9550**, 15445
0000-0100v	Radio Dublin International	6910
0000-0100	Radio Havana Cuba	**6090**, **9740**
0000-0100	Radio Korea (South)	15575
0000-0100	Radio Moscow, U.S.S.R.	**5915**, **5940** **6000**, **6070** **6170**, **7115** **7150**, **7185** **7215**, **7310** **13665**, **15425** 15590
0000-0100	Radio Sofia Bulgaria	**6070**, **11720**
0000-0100	Radio Thailand	9650, **9665** 11905
0000-0100	Radio Veritas, Philippines	**9740**
0000-0100	Radio New Zealand Int'l	11780, 15150
0000-0100	RTL Luxembourg	**6090**
0000-0100	Spanish Foreign Radio, Spain	**6125**, **9630**
0000-0100	Voice of America	**5995**, **6125** **6130**, **9455** **9650**, **9775** **9815**, **11580** **11680**, **11740** 15205
0000-0100	WHRI, Indiana	**11770**
0000-0100	WRNO Worldwide	7355
0000-0100	WYFR, Florida	**9660**, **15440**
0015-0100	AWR, Costa Rica	**15460**
0030-0100	BBC, England	**5975**, **6005** 6075, **6120** **6175**, **7325** 9515, **9590** **9915**, 11750
0030-0055	BRT, Belgium	**5910**, **9925**
0030-0100	HCJB, Ecuador	**9870**, **11910** **15155**
0030-0100 A	KTWR, Guam	15340
0030-0100	Radio Belize	3285
0030-0100	Radio Kiev, Ukrainian SSR	**6200**, **6715** **9765**, **11790** **13645**, **15180**
0030-0100 T-A	Radio Portugal	**9680**
0030-0100	SLBC, Sri Lanka	6005, 9720 15425
0030-0100	WINB, Pennsylvania	15145
0045-0100 M	Radio Cultural, Guatemala	3300, **5955**
0045-0100	Radio Korea World News Svc	7275
0045-0130	Radio Berlin Intl	**6080**, **9730**
0050-0100	Vatican Radio	**6030**, 9605 11845

0100 UTC [8:00 PM EST/5:00 PM PST]

0100-0115	All India Radio	6035, 7215 9595
0100-0115	Vatican Radio	**6030**, **9605** 11845
0100-0120	RAI, Italy	**6010**, 9575
0100-0125	Kol Israel	5885, **7465** 9435
0100-0130	HCJB, Ecuador	**9870**, **11910** **15155**
0100-0130	Radio Berlin International	**6080**, **9730**
0100-0130	Radio Japan General Service	7140, 9675 15235, 17810
0100-0130	Radio Vientiane, Laos	7112v
0100-0145	Radio New Zealand Int'l	**15150**
0100-0145	WYFR, Florida	**9555**, **15440**
0100-0150	Deutsche Welle, West Germany	**6040**, **6085** **6145**, **9545** **9565**, **11785**
0100-0200	ABC, Perth, Australia	15425
0100-0200	Armed Forces Radio and TV	**6030**, **11790** **15355**
0100-0200	BBC, England	**5975**, **6005** **6120**, **6175** **7325**, **9515** **9590**, **9915**
0100-0200	CBC Northern Quebec Srvc	**6195**, **9625** **11920**
0100-0200	CFCX, Montreal, Canada	6005
0100-0200	CFRX, Toronto, Canada	6070
0100-0200	CFVP, Calgary, Canada	6030
0100-0200	CHNX, Halifax, Canada	6130
0100-0200	Christian Science Monitor	7365
0100-0200	CKFX, Vancouver, Canada	6080
0100-0200	FEBC, Manila, Philippines	15315, 21475
0100-0200	KCBI, Texas	11910
0100-0200	KSDA, Guam (AWR)	15115
0100-0200 TEN	KVOH, California	**9505**
0100-0200	KYOI, Saipan	15405
0100-0200	Radio Australia	**15320**, **15395** 17715, 17750 **17795**
0100-0200	Radio Baghdad, Iraq	11750
0100-0200	Radio Belize	3285
0100-0200	Radio Canada International	5960, 9755 **11845**, **11940**
0100-0200 M	Radio Cultural, Guatemala	5955
0100-0200 TES	R. Discovery, Dominican Rep.	6245v
0100-0200v	Radio Dublin International	6910
0100-0200	Radio Havana Cuba	**6090**, **9740**
0100-0200	Radio Moscow	**5915**, **5920** **5940**, **6000** **6070**, **6130** **6170**, **7115** **7185**, **7195** **7215**, **7310** 7440
0100-0200	Radio Moscow World Service	7130, 7315 11720, **11845**
0100-0200	Radio Prague, Czechoslovakia	**5930**, **7345** 9540, **9740** **11990**
0100-0200	Radio Thailand	**9665**, 11905
0100-0200v	RAE, Argentina	**9690**, **11710**
0100-0200	SBC Radio 1, Singapore	11940
0100-0200	Spanish Foreign Radio, Spain	**6125**, 9630
0100-0200	Sri Lanka Broadcasting Corp.	6005, 9720 15425
0100-0200	Voice of America	**5995**, **6130** **9455**, **9650** **9775**, **9815** **11580**, **11680** **11740**, **15205**
0100-0200	Voice of Indonesia	9680, 11790
0100-0200v T-A	Voice of Nicaragua	**6015v**
0100-0200	WINB, Pennsylvania	**15145**
0100-0200	WHRI, Indiana	**9690**
0100-0200	WRNO Worldwide	**7355**
0130-0140	Voice of Greece	**7430**, 9395 **9420**
0130-0200	HCJB, Ecuador	**9870**, **15155**
0130-0200	Radio Austria International	**6155**
0130-0200 W,A	Radio Budapest Hungary	**6025**, **6110** **9520**, **9835**
0145-0200	Radio Korea	6480, 7275

0200 UTC [9:00 PM EST/6:00 PM PST]

0200-0215	Vatican Radio	6145, 7125 **9650**
0200-0225	Kol Israel	**5885**, **7465** 9435
0200-0230	BBC, England	**5975**, **6005** **6120**, **6175** **7325**, **9410** **9515**, **9590** **9915**
0200-0230	Burma Broadcasting Corp	7185
0200-0230 T-A	Radio Budapest, Hungary	**6025**, **6110** **9520**, **9835**
0200-0230 M-F	Radio Canada International	**5960**, **9755**
0200-0230	Radio Korea World	7275, 11810
0200-0230	Swiss Radio International	**6135**, **9625** **9725**, **9885** **12035**
0200-0230 T-A	Voice of Nicaragua	**6015**
0200-0230	WINB, Pennsylvania	15145
0200-0250	Deutsche Welle, W. Germany	6035, 7285 9650, 9690 11945
0200-0256	Radio RSA, South Africa	**6010**, **6185** **9615**
0200-0300	ABC Perth, Australia	15425
0200-0300	Armed Forces Radio and TV	**6030**, **11730** **11790**, **15355**
0200-0300	CBC Northern Quebec Service	6195, **9625**
0200-0300 TEN	Christian Science Monitor	9745
0200-0300	GBC, Guyana	5950
0200-0300	HCJB, Ecuador	**6230**, **9870**
0200-0300	KCBI, Texas	11910
0200-0300	KSDA, Guam (AWR)	15115
0200-0300 TEN	KVOH, California	**9505**
0200-0300	KYOI, Saipan	15405
0200-0300	Radio Australia	15240, 15395 **17795**
0200-0300	Radio Belize	3285
0200-0300	Radio Bras, Brazil	**11745**
0200-0300	Radio Bucharest, Romania	5990, **6090** 9510, 9570 **9835**, 11810 11940
0200-0300	Radio Cairo, Egypt	**9475**, 9675 **9900**
0200-0300 T-A	Radio Canada International	**5960**, 9755
0200-0300 TES	R. Discovery, Dominican Rep.	6245v
0200-0300 T-S	Radio Dublin International	6910
0200-0300	Radio Havana Cuba	**5965**, **6035** **6090**, **6035** **6140**, **6190** **9740**
0200-0300	Radio Japan	15420, **15195** **17825**
0200-0300	Radio Korea, South	11810
0200-0300	Radio Moscow	**5915**, **5940** **6000**, **6070** **6130**, **7115** **7215**

frequency SECTION

0200-0300	Radio New Zealand Int'l....	15150
0200-0300	Radio Polonia, Poland.....	6095, 6135 **7145**, 7270 9525, 11815 15120
0200-0300	Radio Thailand.....	**9665**, 11905
0200-0300 TES	Radio Veritas, Philippines.	**9740**, 15195
0200-0300	SBC Radio 1, Singapore.....	11940
0200-0300	Sri Lanka Broadcasting Corp.	6005, 9720 15425
0200-0300	Voice of America.....	**5995, 6130 7205, 9455** 9575, **9650 9775, 11580 15205**
0200-0300	Voice of Asia, Taiwan.....	7285
0200-0300	Voice of Free China, Taiwan.	5985, **9555 11740**
0200-0300	WHRI, Indiana.....	**9690**
0200-0300	WINB, Pennsylvania.....	15145
0200-0300 M	World Music Radio.....	6910
0200-0300	WRNO Worldwide.....	**7355**
0200-0300	WYFR, Florida.....	**11805**
0215-0220	Radio Nepal.....	5005
0215-0300	Radio Berlin International..	**6080, 9730**
0230-0300	BBC, England.....	**5975, 6005 6120, 6175 7325, 9515** 9915
0230-0300	KNLS, Alaska.....	**11905**
0230-0300	Radio Netherland.....	**6020, 6165 9590, 9895**
0230-0245	Radio Pakistan.....	7315, 11740 15115
0230-0300	Radio Sweden International..	9695, 17840 SSB
0230-0300	Radio Tirana Albania.....	**7060**, 7120 **9760**
0230-0300	SLBC, Sri Lanka.....	9720
0230-0300 S,M	WINB, Pennsylvania.....	15145
0240-0250	All India Radio.....	6110, 9545 9610
0245-0300	Radio Berlin International..	**6125, 6165**

0300 UTC	[10:00 PM EST/7:00 PM PST]	
0300-0310	CBC Northern Quebec Service.	**6195, 9625**
0300-0315	Radio Budapest, Hungary.....	6025, 6110 9520, 9835
0300-0325	Radio Netherland.....	**6020, 6165 9590, 9895**
0300-0330	BBC, England.....	**5975, 6005 6120, 6155 6175**, 7160 **7185, 7325 9515, 9600** 9915
0300-0330	Radio Berlin International..	**6125, 6165**
0300-0330	Radio Cairo, Egypt.....	**9475**, 9675
0300-0330	Radio Canada International..	**5960, 9755**
0300-0330	Radio Japan General Service	**17810**, 17835 17845
0300-0330	Radio Kiev, Ukrainian SSR...	**6200, 9765 11790, 13645**
0300-0330 T-A	Radio Portugal.....	**6075, 9705**
0300-0330 S,M	WINB, Pennsylvania.....	**15145**
0300-0345	Radio Berlin International..	**9560, 9620**
0300-0350	Deutsche Welle, West Germany	**6045, 6185 9545, 9565** 9640
0300-0350	Voice of Turkey.....	9560
0300-0400	Armed Forces Radio and TV...	**6030**, 11730 **11790**, 12060 **17765, 21570**
0300-0400	CFCX, Montreal, Canada.....	6005
0300-0400	CFRX, Toronto, Canada.....	**6070**
0300-0400	CFVP, Calgary, Canada.....	6030
0300-0400	CHNX, Halifax, Canada.....	6130
0300-0400 TEN	Christian Science Monitor...	9745
0300-0400	CKFX, Vancouver, Canada.....	6080
0300-0400	HCJB, Ecuador.....	**6230, 9870**
0300-0400	KCBI, Texas.....	11910
0300-0400	KSDA, Guam (AWR).....	17840
0300-0400	KVOH, California.....	9852.5
0300-0400	KYOI, Saipan.....	15190
0300-0400 M	La Voz Evangelica, Honduras.	4820
0300-0400	Radio Australia.....	**15160**, 15240 **15320, 15395 17715, 17750 17795**, 11750
0300-0400	Radio Beijing, China.....	**15180, 15280 15445**
0300-0400	Radio Belize.....	**3285**
0300-0400	Radio Cultural, Guatemala...	5955
0300-0400 T-S	Radio Dublin International..	6910
0300-0400 T-S	Radio Earth.....	**7400**

0300-0400	Radio Havana Cuba.....	**5965, 6035 6090, 6100 6140, 7400, 9740**
0300-0400	Radio Moscow, U.S.S.R.....	**5915, 5940 6000, 6070 6130, 7115 7165, 7185 7310, 11770 12050, 13665**
0300-0400	Radio New Zealand Int'l....	11780, 15150
0300-0400	Radio Polonia, Poland.....	6095, 6135 7270, **9525** 11815
0300-0400	Radio Prague, Czechoslovakia	**5930, 7345**
0300-0400	Radio RSA, South Africa.....	**3230, 4990 7270**, 9585
0300-0400	Radio Thailand.....	9560, 11905
0300-0400	SLBC, Sri Lanka.....	6005, 9720 15425
0300-0400	TIFC, Costa Rica.....	5055
0300-0400	Trans World Radio, Bonaire..	**9535**
0300-0400	Voice of America.....	**5995, 6035 6130, 7280 9455, 9550 9575, 9650 9740, 9775 11580, 15205**
0300-0400	Voice of Free China, Taiwan.	**5985, 9555 9680**, 11745
0300-0400	Voz Evengelica, Honduras....	4820
0300-0400 M	WHRI, Indiana.....	**7400**
0300-0400 M	World Music Radio.....	6910
0300-0400	WRNO Worldwide.....	**7355**
0305-0400 A	Radio Austria International.	5945, **6055 6155**
0310-0330	Vatican Radio.....	**6150**
0315-0330	Radio France International..	**6005, 6055 6175**, 7135 9535, **9600** 9790, **9800**
0330-0400 M	CBC Northern Quebec Service.	6195, **9625**
0330-0400	BBC, England.....	**3955, 5975 6120, 6175 9410, 9600**
0330-0400	Radio Austria International.	**6155**
0330-0400	Radio Havana Cuba.....	6090, **6100 6140**, **9740**
0330-0400	Radio Sweden International.	11705
0330-0400	Radio Tanzania.....	5985
0330-0400	Radio Tirana Albania.....	6200, **7065**
0330-0400	UAE Radio, Dubai.....	**9640, 11940 15435**
0335-0340	All India Radio.....	3905, 4860 **7105**, 9545 9610, 11830 11895, **11940**
0340-0400	Voice of Greece.....	7430, 9420
0345-0400	Radio France International..	6175, 7135 **7175**, 9535 9800, 9901
0345-0400	Radio New Zealand Int'l....	9620, 9645 11705
0350-0359	Radio Yerevan,Armenian SSR	**11790, 13645 15180**

0400 UTC	[11:00 PM EST/8:00 PM PST]	
0400-0410	Voice of Kenya.....	6090
0400-0415	Radio Budapest.....	**6025, 6110 9520, 9835**
0400-0415	Radio Cultural, Guatemala...	3300
0400-0425	Radio Netherlands.....	**7175, 9895**
0400-0425	Radio RSA, South Africa.....	**3230, 4990 7270, 9585**
0400-0430	Radio Bucharest, Romania....	5990, 9510 9570, 11810 11940
0400-0430 T-A	Radio Canada Intl.....	**5960, 9755 11920**
0400-0430 M	Radio Norway International..	**9590**
0400-0430	Swiss Radio International...	6135, 9725 9885, 12035
0400-0430	Trans World Radio, Bonaire..	9535
0400-0430 S,M	Trans World Radio, Bonaire..	4835, 7295
0400-0500	ABC, Perth, Australia.....	**15425**
0400-0500	Armed Forces Radio and TV...	**6030**, 12060 **11730**, 11790 17765
0400-0500	BBC, London, England.....	**3955, 5975 6005, 6120 6175, 7105 7160, 9510 9600**
0400-0500	Capital Radio, South Africa.	**3927, 3930** 7149
0400-0500	CBC Northern Quebec Service.	6195
0400-0500	CFCX, Montreal, Canada.....	6005
0400-0500	CFRX, Toronto, Canada.....	6070
0400-0500	CFVP, Calgary, Canada.....	6030
0400-0500	CHNX, Halifax, Canada.....	6130
0400-0500	Christian Science Monitor...	9745
0400-0500	CKFX, Vancouver, Canada.....	6080
0400-0500	HCJB, Ecuador.....	**6230, 9870**
0400-0500	KNLS, Alaska.....	**9670**
0400-0500 TEN	KVOH, California.....	9852.5
0400-0500	Radio Australia.....	9755, **11945 15160**, 15240 **15320**, 15395 17715, 17795

frequency SECTION

0400-0500	Radio Beijing.....	**9645, 11980** 15180
0400-0500	Radio Belize.....	**3285**
0400-0500 T-S	Radio Dublin International..	**6910**
0400-0500	Radio Havana Cuba.....	**6035, 6090** **6140, 9740**
0400-0500	Radio Japan.....	**9595, 9675**
0400-0500	Radio Moscow.....	**6130,** 7155 9500, 11770 12030
0400-0500	Radio Moscow World Service.	**5920, 5940** **6000, 6170** **7165, 7775** **7185, 7270** **7310, 9635** **9765, 11790** **12050, 13645**
0400-0500	Radio New Zealand.....	9620, 11780
0400-0500	Radio Pyongyang, N.Korea...	**15140, 15160** 15180
0400-0500	Radio Sofia Bulgaria.....	**7115**
0400-0500	Radio Uganda.....	**4976, 5026**
0400-0500	RAE, Argentina.....	**9690,** 11710
0400-0500	VLW 15, Lyndhurst,Australia	15230
0400-0500	VLW 15, Waneroom, Australia	15425
0400-0500	Voice of America.....	**3990, 5995** **6035, 6040** **7170, 7280** **9575, 9670** **11835,** 15205
0400-0500	Voice of Turkey.....	**9560**
0400-0500	WHRI, Indiana.....	7400
0400-0500 S-F	WMLK, Pennsylvania.....	**9455**
0400-0500v M	World Music Radio.....	6910
0400-0500	WRNO Worldwide.....	**6185**
0415-0430	Radio France International..	6175, **7135** **7175, 9550** 9790, **9800**
0425-0450	RAI, Italy.....	5980
0430-0455	Radio Tirana Albania.....	**9480, 11835**
0430-0500	Deutsche Welle, W. Germany..	7150, 7225 9565, 9765
0430-0500	Radio Austria International.	**5945,** 6155 **9755**
0430-0500	Radio Berlin International..	**9560, 9620**
0430-0500	TWR, Swaziland.....	**7210**
0445-0500	Radio France International..	6055, 6175 7135, 9535 9550, 9790 9800

0500 UTC	[12:00 AM EST/9:00 PM PST]	
0500-0505	Radio Belize.....	3285
0500-0510	Radio Lesotho.....	4800
0500-0515	Kol Israel.....	7410, 9009 9435, 9860 **11610,** 11960 21710
0500-0515	Vatican Radio.....	11725, 15190
0500-0530	BBC, London.....	**5950, 5975** 6005, 7105 **7160, 9410** **9510, 9600** 9825, 12095
0500-0530	Capital Radio, S. Africa....	**3927.5**
0500-0530	KNLS, Alaska.....	**9670**
0500-0530	Radio Canada Int'l.....	11840
0500-0530 M	Radio Norway International.	15180, 15165
0500-0530 S,M	Trans World Radio, Bonaire..	9535
0500-0550	Deutsche Welle.....	5960, **6120** **6130, 7225**
0500-0600	ABC, Melbourne, Australia..	15330
0500-0600	ABC, Perth, Australia.....	15425
0500-0600	Armed Forces Radio and TV...	**6030, 11790** **15330, 17765**
0500-0600	CBC Northern Quebec Service.	9625
0500-0600	CFCX, Montreal, Canada.....	6005
0500-0600	CFRX, Toronto, Canada.....	6070
0500-0600	CFVP, Calgary, Canada.....	6030
0500-0600	CHNX, Halifax, Canada.....	6130
0500-0600	Christian Science Monitor...	9745
0500-0600	CKFX, Vancouver, Canada.....	6080
0500-0600	HCJB, Quito, Ecuador.....	**6230, 9870** 11910
0500-0600	KVOH, California.....	9852.5
0500-0600	KYOI, Saipan.....	15190
0500-0600	Radio Australia.....	**15160,** 15240 15320, 15395 17715, 17750 **17795, 17795**
0500-0600	Radio Beijing, China.....	9565
0500-0600	Radio Canada International..	6140
0500-0600v	Radio Dublin International..	6910
0500-0600	Radio Havana Cuba.....	**5965, 6035** **6090, 6190** **9740**

0500-0600	Radio Japan General Service.	**9675,** 15235 17810
0500-0600	Radio Korea World News Svc..	7275
0500-0600	Radio Moscow.....	**5905, 5915** **5940, 5980**
0500-0600	Radio Uganda.....	**4976, 5026**
0500-0600 S	Radio Zambia.....	11880
0500-0600	SBC Radio 1, Singapore.....	11940
0500-0600	Soloman Islands Bcasting Co	5020
0500-0600	Spanish Foreign Radio.....	9630
0500-0600	TWR, Swaziland.....	**7210**
0500-0600	VLW 15, Lyndhurst,Australia	15230
0500-0600	VLW 15, Waneroo, Australia.	**15425**
0500-0600	Voice of America.....	**5995, 6035** 7200, **7280** **9575**
0500-0600	Voice of Nicaragua.....	**6015**
0500-0600	WHRI, Indiana.....	**7400**
0500-0600v M	World Music Radio.....	6910
0500-0600	WRNO Worldwide.....	6185
0530-0600	BBC, London.....	**5975, 9510**
0530-0600	Radio Cameroon.....	4850
0530-0600	Radio Netherland.....	**6165, 9715**

0600 UTC	[1:00 AM EST/10:00 PM PST]	
0600-0610	Ghana Radio.....	**4915**
0600-0610	Voice of Kenya.....	**4806,** 6090
0600-0620	Vatican Radio.....	**6185, 9645**
0600-0625	Radio Netherland.....	**6165, 9715**
0600-0630	Deutsche Welle.....	7290, 9625 9700
0600-0700	Armed Forces Radio and TV...	**6030,** 15330 17765
0600-0700	BBC, London.....	**3955, 3975** **5900, 5975** 6175, **7105** 7150, **7120** **9510, 9600** **9640,** 9915
0600-0700	CFCX, Montreal, Canada.....	6005
0600-0700	CFRX, Toronto, Canada.....	6070
0600-0700	CFVP, Calgary, Canada.....	6030
0600-0700	CKFX, Vancouver, Canada.....	6080
0600-0700	CHNX, Halifax, Canada.....	6130
0600-0700 TEN	Christian Science Monitor...	7365
0600-0700	GBC-2, Accra, Ghana.....	3366
0600-0700	HCJB, Quito, Ecuador.....	**6230, 9870**
0600-0700	King of Hope, Lebanon.....	6280
0600-0700 TEN	KVOH, California.....	6005
0600-0700	KYOI, Saipan.....	15190
0600-0700	Radio Australia.....	15160, 15240 17715, 17750 **17795**
0600-0700	Radio Cook Islands.....	**11760**
0600-0700	Radio Havana Cuba.....	9525
0600-0700	Radio Korea, South.....	**9570, 7275**
0600-0700	Radio Moscow.....	**5905, 5915** **5940, 5980** **7175, 7310** **7270, 7300** **9490,** 9635 9580, 9755 11770, 11950 **12030,** 13605
0600-0700	Radio New Zealand Int'l....	11780
0600-0700	Radio Pyongyang, N. Korea..	13650, 13680
0600-0700 S	Radio Zambia.....	**11880**
0600-0700	SBC Radio 1, Singapore.....	11940
0600-0700	Soloman Islands Bcasting Co.	5020
0600-0700	VLQ 9, Brisbane, Australia..	9660
0600-0700	VLW 15, Lyndhurst,Australia	15230
0600-0700	VLW 15, Waneroo, Australia.	15425
0600-0700	Voice of America.....	3990, 5995 **6035,** 6080 6125, **7280** 9530, 9550 9670
0600-0700	Voice of Asia, Taiwan.....	**7285**
0600-0700	Voice of Free China,Taiwan..	**5985**
0600-0700	Voice of Malaysia.....	6175, 9750 15295
0600-0700	WHRI, Indiana.....	6100
0600-0700 S	World Music Radio.....	6910
0600-0700 S	WRNO Worldwide.....	6185
0600-0700	WYFR, Okeechobee, Florida...	6065, 7355 7365, **7400** 9455, **9680** **9852.5**
0615-0655 A,S	BRT, Belgium.....	**9880, 21810**
0615-0630 M-F	Radio Canada International..	6140, 7155 9740, 9760 11775
0615-0630 M-A	Vatican Radio.....	15190, 17730
0625-0700	TWR, Monaco.....	7105
0630-0655	Radio Netherland.....	9895, 11930
0630-0700	Radio Polonia.....	6135, 7270 9675
0630-0700	Radio RSA, South Africa.....	5980, 7270 9585, 11900
0630-0700	Radio Sofia, Bulgaria.....	9700, 11720 15140
0630-0700	Radio Tirana.....	**7065**
0630-0700	Swiss Radio International...	3985, 6165 9535, 9870 12030, 15430
0645-0700 M-F	HCJB, Quito, Ecuador.....	6205

0700 UTC	[2:00 AM EST/11:00 PM PST]	
0700-0712	Radio Bucharest, Romania...	11940, 15250 15335, 17790 17805, 21665
0700-0730	Burma Broadcasting Corp.....	9730
0700-0730	BBC, London.....	**5950, 5975** **6050, 7150** **7210, 9510** 15360
0700-0730 A,S	TWR, Bonaire.....	9535
0700-0730v	Radio Zambia.....	11880v
0700-0735	TWR Swaziland.....	6070
0700-0745	Radio New Zealand Int'l....	11780, 15150
0700-0745	WYFR, Florida.....	**6065, 7355** **7400,** 9455
0700-0750	Radio Pyongyang.....	11930, 13750 15340
0700-0800	ABC Brisbane.....	**9660**
0700-0800	ABC Lyndwurst.....	9680
0700-0800	Armed Forces Radio and TV..	15400
0700-0800	CFCX, Montreal, Canada.....	6005
0700-0800	CFRX, Toronto, Canada.....	6070
0700-0800	CFVP, Calgary, Canada.....	6030
0700-0800	CHNX, Halifax, Canada.....	6130
0700-0800	CKFX, Vancouver, Canada.....	6080
0700-0800 A,S	ELWA, Liberia.....	11830
0700-0800	FEBC, Manila.....	11850, 15350
0700-0800	GBC-2, Accra, Ghana.....	3366
0700-0800	HCJB.....	**6130, 6205** **9745, 9845** **9860, 11720**
0700-0800	King of Hope, Lebanon.....	6280
0700-0800 TEN	KVOH, California.....	6005
0700-0800	KNLS, Anchor Point, Alaska..	9555
0700-0800	KYOI, Saipan.....	15190
0700-0800	NBC, Papua New Guinea.....	4890
0700-0800	Radio Australia.....	**5995, 9655**
0700-0800 S	Radio Earth (via Milano)....	7295
0700-0800	Radio Havana Cuba.....	**9525**
0700-0800	Radio Japan General Service.	**9675,** 9735 **11955, 15235** 17810, 17855
0700-0800	Radio Kuwait.....	9560
0700-0800	Radio Moscow.....	**7165,** 7290 17590, 17880
0700-0800	Radio Thailand.....	9655, 11905
0700-0800	SBC Radio 1, Singapore.....	5010, 11940
0700-0800	Soloman Islands Bcasting Svc	5020
0700-0800	VLM4 Brisbane, Australia....	4920
0700-0800	Voice of America.....	**3990, 5995** **6035, 6080** **6125, 7280** **9530, 9540** **9550, 9670** **11840**
0700-0800	Voice of Free China.....	**5985**
0700-0800	Voice of Malaysia.....	6175, 9750 15295
0700-0800	Voice of Nigeria.....	15120, 15185 17800
0700-0800	WHRI, Indiana.....	**9620**
0700-0800 S	World Music Radio.....	6910
0700-0800 S	WRNO Worldwide.....	**6185**
0715-0730 M-A	Vatican Radio.....	11725, 15190
0715-0800 S	FEBA Radio, Seychelles.....	15120, **17795**
0725-0800	TWR Monte Carlo.....	7105
0730-0735	All India Radio.....	5990, 6010 6020, 6050 7110, 7250 9610, 11730 11850, 11935
0730-0800	BBC, London.....	**9510, 9600** **9600, 9640** **11860**
0735-0800 M-H	KTWR, Guam.....	15115
0730-0800	Radio Finland.....	6120, 11755 15265
0730-0800	Radio Netherlands.....	**9630,** 9715
0730-0800	Radio Prague.....	11855, 17840 21705

0800 UTC	[3:00 AM EST/12:00 AM PST]	
0800-0805	GBC, Accra, Ghana.....	3366
0800-0825 M-F	BRT, Belgium.....	9880, **17595**
0800-0825	Radio Netherlands.....	**9630, 9715**
0800-0825	Voice of Malaysia.....	6175, 9750 15295
0800-0830	Voice of Islam,Bangladesh..	11645, **12030**
0800-0830	HCJB, Quito, Ecuador.....	**6130, 6205** **9745, 9860**
0800-0830	Voice of Nigeria.....	7255, 15185

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0800-0845 S	FEBA, Seychelles.....	15120, 17795
0800-0900	AFAN, Antarctica.....	6012
0800-0900	AFRTS Far East Network.....	11750
0800-0900	BBC, London.....	**9410, 9510**
0800-0900 S	BBS, Bhutan.....	**6035**
0800-0900	CFCX, Montreal, Canada.....	6005
0800-0900	CFRX, Toronto, Canada.....	**6070**
0800-0900	CFVP, Calgary, Canada.....	6030
0800-0900	CHNX, Halifax, Canada.....	6130
0800-0900	CKFX, Vancouver, Canada.....	6080
0800-0900	FEBC, Manila.....	**6030,** 11890, 21475
0800-0900	FEN, Tokyo.....	**3910, 6155**
0800-0900 S,A	GBC-2, Accra, Ghana.....	3366
0800-0900	HCJB, Quito, Ecuador.....	**6130, 9745**
0800-0900	King of Hope, Lebanon.....	6280
0800-0900	KNLS, Anchor Point, Alaska.	11860
0800-0900 M-H	KTWR, Guam.....	**15515**
0800-0900	KYOI, Saipan.....	15190
0800-0900	Radio Australia.....	**5995, 6080, 9580, 9655, 9710,** 15395, **11720,** 17715, 17750
0800-0900	Radio Earth (via Milan).....	7295
0800-0900	Radio Korea World News Svc..	7275
0800-0900	Radio Kuwait.....	9750
0800-0900 S	Radio Prague.....	6055, 9505, 11990
0800-0900	Radio Pyongyang, N. Korea..	13680, **11830, 15160, 15180**
0800-0900	RTE Portugal.....	9670
0800-0900	SBC Radio 1, Singapore.....	5010, 11940
0800-0900	TWR Monte Carlo.....	7105
0800-0900	Voice of Indonesia.....	11790, 15150
0800-0900	WHRI, Indiana.....	**7355**
0800-0900 S	WRNO Worldwide.....	**6185**
0830-0900	Radio Austria Int'l.....	**7210, 11840**
0830-0900	Radio Beijing.....	9700, 11755, 15440
0830-0900	Radio Prague,Czechoslovakia	11855, 17840, 21705
0830-0840	All India Radio.....	5960, 5970, 5990, 6010, 6020, 6050, 6100, 7110, 7125
0830-0855 M-A	Radio Netherlands.....	**9630**
0830-0900	HCJB, Quito, Ecuador.....	**6130, 9745, 11925**
0830-0900	Radio Netherlands.....	17575, 21485
0830-0900	Swiss Radio International...	9560, **9885**, 11905, 15570
0840-0900	Radio Australia.....	6045, 6060, **9580, 15395**
0847-0852 A	R. Pacific Ocean, Vladivost.	9500, 9620, 9635, 9795, 9810, 11710, 11815, 11910, 12010, 15260, 15295, 17765, 17815, 17850

0900 UTC	[4:00 AM EST/1:00 AM PST]	
0900-0905	Africa Number One, Gabon....	7200, 15200
0900-0915	BBC, London.....	**9410, 9510, 9750, 11750, 11860**
0900-0925	Radio Netherlands.....	17575, 21485
0900-0930	Radio Australia.....	**5995, 6080, 9580, 9655, 9710, 11720**
0900-0930	Radio Korea.....	7275
0900-0950	Radio Pyongyang N. Korea....	9765, 11830, 13650
0900-1000	ABC, Brisbane, Australia....	**4920, 9660**
0900-1000 S	Adventist World Radio.....	9670
0900-1000	AFRTS.....	**6030, 6125, 9530, 9590, 9700**
0900-1000	Deutsche Welle.....	**9690,** 11945, 15160, 15185, 15205, 15320, 17780, 17800, 21560
0900-1000	FEBC, Manila.....	11890, 21475
0900-1000	FEN, Tokyo.....	6155
0900-1000	HCJB, Quito, Ecuador.....	**6130, 9745**
0900-1000	King of Hope, Lebanon.....	6280
0900-0100	KNLS, Anchor Point, Alaska.	11850
0900-1000	KSDA, Guam.....	**15440**
0900-1000	Radio Afghanistan.....	6085, 9590, 15255, 17655
0900-1000	Radio Japan.....	**9675, 11875, 11955, 15235, 17810**
0900-1000	Radio Moscow.....	**9795**
0900-1000	Radio New Zealand Int'l.....	9600, 11780
0900-1000	Radio Tanzania.....	9685v
0900-1000 S	Radio Prague.....	6055, 9505, 11990
0900-1000	SBC Radio 1, Singapore.....	5010, 11940
0900-1000	Voice of Nigeria.....	7255, 15120, 15185, 17800
0900-1000	WHRI, Indiana.....	**7355**
0900-1000 S	WRNO Worldwide.....	**6185**
0915-1000	BBC, London.....	**9760, 9750, 11750**
0930-1000	Radio Australia.....	9580, **9655, 9710**

1000 UTC	[5:00 AM EST/2:00 AM PST]	
1000-1010	Voice of Kenya.....	9665
1000-1030	Afghanistan.....	6085, 9590, 15255, 17655
1000-1030	Deutsche Welle, W. Germany..	7225, 9735, 17765, 21600
1000-1030	Kol Israel.....	11700, 13725, 15640, 15650, 17565, 17685, 17815
1000-1030	Radio Australia.....	**9580, 9655, 9770**
1000-1030 S	Radio Norway International..	9590, 15175, 15185, 15230
1000-1030	Swiss Radio Int'l.....	9560, **9885**, 11905, 15570
1000-1030	Voice of Vietnam.....	9840, 12035
1000-1100	AFRTS.....	**6030,** 6125, **9530, 9590, 9700, 11805**
1000-1100	All India Radio.....	11705, 11810, 15320, 15335, 17387, 17875
1000-1100	BBC, London.....	6195, 9410, 9740, 9760, 11750, 12095, 15070, 15280, 21660
1000-1100	B.S. Kingdom Saudi Arabia..	11855v
1000-1100	CFCX, Montreal, Canada.....	6005
1000-1100	CFRX, Toronto, Canada.....	**6070**
1000-1100	CFVP, Calgary, Canada.....	6030
1000-1100	CHNX, Halifax, Canada.....	6130
1000-1100	CKFX, Vancouver, Canada.....	6080
1000-1100	FEN, Japan.....	3910, 6155
1000-1100	HCJB, Quito, Ecuador.....	**6130,** 11925
1000-1100	KNLS, Alaska.....	**11930**
1000-1100	Radio Dubai, UAE.....	17775
1000-1100	Radio Honaire, Soloman Ils..	5020
1000-1100	Radio Moscow.....	9600, 9795, 13645, 13665, 13680, 13705, 15110, 15140, 15155, 15225, 15265, 15490, 17625, 17645, 17665, 17775
1000-1100	Radio New Zealand Int'l.....	9600, 11780
1000-1100 S	Radio Prague.....	6055, 9505, 11990
1000-1100	SBC Radio 1, Singapore.....	5052, **11940**
1000-1100	Voice of Nigeria.....	7255, 15120
1000-1100	WHRI, Indiana.....	**7355**
1000-1100 S	WRNO Worldwide.....	**6185**
1005-1010	Radio Pakistan.....	15605, 17660
1030-1040	Voice of Asia, Taiwan.....	5980
1030-1100	Radio Austria International.	9625, 12025, **15270**
1030-1100	Radio Australia.....	**9580**
1030-1100	Radio Budapest Hungary.....	9835, 11910, 15160, 15220
1030-1100	Radio Netherland.....	17710, 21665
1030-1000	Radio New Zealand.....	**6020, 9650**
1030-1100	Sri Lanka Broadcasting Corp	6100, 9620, 11835, 15120, 17850
1030-1100	UAE Radio, Dubai.....	17775, 17865, 21605, 21700
1040-1050	Vatican Radio.....	6250, 9645, 11740
1040-1050	Voice of Greece.....	15630, 17565
1045-1000	Radio Nepal.....	5005, 9590
1050-1100 M-F	Radio Budapest Hungary.....	9585, 9835, 11910, 15160, 17710

1100 UTC	[6:00 AM EST/3:00 AM PST]	
1100-1115	Radio Pakistan.....	15605, 17660
1100-1125	Radio Netherland.....	**6020, 9650**
1100-1130	Kol Israel.....	11605, 15560, 15643
1100-1130	Radio Australia.....	**5995, 6080, 7215, 9580, 9710, 9770**
1100-1130	Radio Finland.....	11945, 15400
1100-1130	Radio Japan.....	**6120**
1100-1130	Radio Sweden Int'l.....	9630, 15115
1100-1130	Sri Lanka Broadcasting Corp	11835, 15120, 17850
1100-1130	Swiss Radio International..	**9665, 9870**, 11795, 15570
1100-1130	Voice of America.....	**6110, 9760**, 15160, 15210, 15425
1100-1130	Voice of Vietnam.....	9840, 12035
1100-1156	Radio RSA, South Africa....	11900, 15220, 17780
1100-1200	4VEH, Haiti.....	4930
1100-1200	ABC, Brisbane, Australia....	**4920**
1100-1200	ABC, Perth, Australia.....	**9610**
1100-1200	AFRTS.....	**6030, 9580**, 9700, 11805, 15430
1100-1200	BBC, London.....	**5965, 6195**, 9410, **9510, 9740, 9750**, 11750, **11775**, 12095, 15070, 15280
1100-1200	B.S. Kingdom Saudi Arabia..	11855v
1100-1200	CFCX, Montreal, Canada.....	6005
1100-1200	CFRX, Toronto, Canada.....	6070
1100-1200	CFVP, Calgary, Canada.....	6030
1100-1200	CHNX, Halifax, Canada.....	6130
1100-1200	CKFX, Vancouver, Canada.....	6080
1100-1200	Radio Beijing.....	**9535**
1100-1200	Radio Japan General Service.	**9675**, 11815
1100-1200	Radio Korea.....	7275, 15575
1100-1200	Radio Malaysia, Sarawak.....	**4950**
1100-1200	Radio Moscow.....	**9600**, 9795, **11675**, 13665, 13680, 13705, 15135, 15150, 15475, 15550
1100-1200	Radio New Zealand.....	6100, 9600
1100-1200	Radio Pyongyang, N. Korea...	**7300, 9750, 9977**
1100-1200	SBC Radio 1, Singapore.....	5052, 11940
1100-1200	Trans World Radio Bonaire..	**11815**
1100-1200	Voice of Asia, Taiwan.....	5980, 7445
1100-1200	Voice of Nigeria.....	7255, 15120
1100-1200	WHRI, Indiana.....	**5995**
1100-1200 S	WRNO Worldwide.....	**6185**
1115-1130	Vatican Radio.....	17840, 21485
1115-1200	Voice of Islamic Rep. Iran.	**11790,** 15084
1130-1200	Radio Australia.....	5995, **6060, 6080, 7215, 9580**, 9645, **9710, 9770**, 11800
1130-1200	Radio Japan.....	**5960, 9755**
1130-1200	Radio Netherland.....	5955, 9715, 15560, 17575, 17605, 21480
1130-1200	Radio Thailand.....	9655, 11905
1130-1200	TWR Bonaire.....	**11815**
1150-1200 M-F	Radio Budapest Hungary.....	6025, 9585, 9835, 11910, 15160, 17710

1200 UTC	[7:00 AM EST/4:00 AM PST]	
1200-1210	Voice of Is.Rep.of Iran....	**15084**
1200-1215	Radio New Zealand.....	**6100, 9620**
1200-1215 M-A	Vatican Radio.....	15190, 17840, 17865, 21485
1200-1215 S	Vatican Radio.....	17840, 21485
1200-1215	Voice of People of Kampuchea	9693, 11938
1200-1215	Radio Finland.....	11945, 15400
1200-1225	Radio Bucharest, Romania....	9530, 11740, 15345
1200-1225	Radio Netherland.....	5955, 9715, 15560, 17575, 17605, 21480
1200-1225	Radio Polonia.....	6095, 7285
1200-1230	HCJB, Quito, Ecuador.....	**6075**
1200-1230	Radio Tashkent.....	7325, 9600, 9715, 15460
1200-1235	All India Radio.....	3905, 4800, 4920, 7280, 9565, 9615, **11620**, 15245
1200-1235	Radio Ulan Bator Mongolia..	12015
1200-1242	Trans World Radio Bonaire..	**11815**
1200-1250	Radio Pyongyang, N. Korea...	**9715**
1200-1300	4VEH, Haiti.....	4930
1200-1300	ABC, Wanneroo, Australia....	**6140, 9610**
1200-1300	ABC, Brisbane.....	**4920**

frequency SECTION

1200-1300	AFRTS.....	**6030, 6125**	
		9700, 15330	
		15430, 21670	
1200-1300	BBC, London.....	5965, 6195	
		9510, 9740	
		9750, 11710	
		11750, 11775	
		12095, 15070	
		17790, 21710	
1200-1300	B.S. Kingdom Saudi Arabia..	11855v	
1200-1300	CBC Northern Quebec Service.	6065, **9625**	
1200-1300	CFCX, Montreal, Canada.....	6005	
1200-1300	CFRX, Toronto, Canada.....	**6070**	
1200-1300	CFVP, Calgary, Canada.....	6030	
1200-1300	CHNX, Halifax, Canada.....	6130	
1200-1300	CKFX, Vancouver, Canada.....	6080	
1200-1300	FEN, Tokyo.....	**3910, 6155**	
1200-1300	GBC, Accra, Ghana.....	7295	
1200-1300	HCJB, Quito, Ecuador.....	11740, **11745**	
		15115, 17890	
1200-1300	KYOI, Saipan.....	11900	
1200-1300	Pt Moresby,Papua New Guinea	**4890**	
1200-1300	Radio Australia.....	**5995, 6060**	
		6080, 7205	
		7215, 9580	
		9770	
1200-1300	Radio Beijing.....	**9535, 9645**	
1200-1300	Radio Korea World News Svc..	7275	
1200-1300	Radio Moscow.....	**6000, 9575**	
		9820, 11675	
		13615, 13665	
		13790, 15155	
		15225, 15475	
		15595, 17645	
		17655, 17820	
1200-1300	Radio Tanzania.....	9685	
1200-1300	RAE, Argentina.....	15345	
1200-1300	SBC Radio 1, Singapore.....	**5010, 5052**	
		11940	
1200-1300	Voice of America.....	6110, 9760	
		11715, 15430	
		17790	
1200-1300	WHRI, Indiana.....	**5995**	
1200-1300 S	WRNO Worldwide.....	9715	
1200-1300	WYFR, Florida.....	**5985, 9680**	
		11875	
1210-1300	Voice of Nigeria.....	7255, 15120	
1215-1300	Radio Cairo.....	17675	
1215-1245	Radio Japan Regional Serv..	11875, 15235	
1215-1300	Radio Berlin International.	21465, 21540	
1215-1230	Voice of Islamic Rep. Iran.	**11895, 15085**	
1230-1300	Radio Austria International	**15320**	
1230-1300	Radio Australia.....	**15320, 17655**	
		17800	
1230-1300	Radio Bangladesh.....	15525, **17653**	
		21630	
1230-1300	R. Berlin Intl,E.Germany	**15240**	
1230-1300	Radio Polonia.....	**15190, 15430**	
1230-1300	Radio Sweden Int'l.....	9565, **11735**	
1230-1300	TES Radio Veritas,Philippns.	**6160**	
1230-1300	Sri Lanka Broadcasting Corp.	6075, 9720	
		15425	
1230-1300	Voice of Turkey.....	15255	
1230-1300	WYFR, Florida.....	9680	
1235-1245	Voice of Greece.....	11645, **15360**	
		15630, 17565	
1245-1300	Radio Berlin Intl.....	**15240**	
1255-1300 M-A	Radio Ulan Bator Mongolia...	7235, 9575	
		15305	
1255-1330 A-S	TWR, Bonaire.....	11815	

1300 UTC	[8:00 AM EST/5:00 AM PST]	
1300-1325	Radio Canada International.	**9715, 11955**
		11855
		15440, 17820
1300-1330	BBC, London.....	5965, **6195**
		9410, **9510**
		9740, 9750
		11705, **11775**
		12095, 15070
		15105, 17085
		17705, 17790
1300-1330	Radio Australia.....	**6080,** 7205
		9580
1300-1330	Radio Berlin Intl.....	**15240**
1300-1330	Radio Bucharest, Romania....	9690, **11940**
		15250
1300-1330	Radio Finland.....	15400, **11945**
1300-1330	Radio Korea.....	6135
1300-1330 S	Radio Norway International.	**15310, 15185**
1300-1337 A-S	TWR, Bonaire.....	11815
1300-1350	Radio Pyongyang, N. Korea...	**9345, 11665**
1330-1355 S	Radio Finland.....	11945, 15400
1300-1400	4VEH, Haiti.....	4930
1300-1400	ABC Waneroo, Australia.....	**6140, 9610**

1300-1400	AFRTS.....	**6125,** 9700
		15330, 15430
1300-1400	B.S. Kingdom Saudi Arabia..	11855v
1300-1400	CBC Northern Quebec Service	**9625,** 11720
1300-1400	CFCX, Montreal, Canada.....	6005
1300-1400	CFRX, Toronto, Canada.....	6070
1300-1400	CFVP, Calgary, Canada.....	6030
1300-1400	CHNX, Halifax, Canada.....	6130
1300-1400	CKFX, Vancouver, Canada.....	6080
1300-1400	CKZU, Vancouver, Canada.....	**6160**
1300-1400	FEBC, Manila.....	11850
1300-1400	FEN, Tokyo.....	**6155**
1300-1400	GBC, Accra, Ghana.....	7295
1300-1400	HCJB, Quito, Ecuador.....	**11745, 15115**
		17890
1300-1400 M-F	KTWR, Guam.....	9870
1300-1400	NBC, Port Moresby, Papua New Guinea.....	**4890**
1300-1400	Radio Australia.....	5995, **6060**
		6080, 9580
1300-1400	Radio Beijing.....	**4460,** 5320
		5860, 5880
		9550, 9730
		11660, 11755
1300-1400	Radio Moscow.....	**7230, 9575**
		9755, 9820
		11840, 13665
		13790, 15210
		15225, 15475
		15530, 15595
		17655, 17665
		17820
1300-1400	Radio RSA, South Africa....	15220, 21535
		21590
1300-1400 TES	Radio Veritas,Philippines...	**6160**
1300-1400	SBC Radio 1, Singapore.....	**5010, 5052**
		11940
1300-1400	Sri Lanka Broadcasting Corp.	6075, 9720
		15425
1300-1400	Voice of America.....	**6110, 7230**
		9660, 9760
1300-1400	Voice of Nigeria.....	7255, 15120
1300-1400	WHRI, Indiana.....	**11790**
1300-1400 S	WRNO Worldwide.....	9715
1300-1400	WYFR, USA.....	**5985, 9680**
		11830
		11875
1330-1400	All India Radio.....	11810, 15335
1330-1400	Laotian National Radio.....	**7113v**
1330-1400	BBC, London.....	**9750, 9760**
		12095, 15070
		17885, 21710
1330-1400 M-A	BBS, Bhutan.....	**6035**
1330-1400	Radio Berlin Int'l.....	**21465**
1330-1400	Radio Korea World News Svc.	15575
1330-1400	Radio Tashkent.....	**7325,** 9715
		15460
1330-1400	Swiss Radio International..	**9730, 9885**
		11905, 11955
		12030, 15570
		15585
1330-1400	U.A.E. Radio.....	**11940,** 17775
		17865, 21605
1330-1400	Voice of Vietnam.....	10040,15010v
1330-1400	WYFR, Florida.....	15055
1330-1355 M-F	BRT, Belgium.....	**15580, 15590**
1330-1445	BBS, Burma.....	**4725**
1337-1400 A	TWR, Bonaire.....	11815
1345-1400	Vatican Radio.....	7250, 9645
		11740

1400 UTC	[9:00 AM EST/6:00 AM PST]	
1400-1415	GBC-2, Accra, Ghana.....	7295
1400-1415	Radio Berlin International.	**21465**
1400-1415	U.A.E. Radio, Dubai.....	**11940,** 17775
		17865, 21605
1400-1430	Radio Australia.....	**5995,** 6035
		6045, **6060**
		6080, **9580**
		9710
1400-1430	Radio Finland.....	**11945, 15400**
1400-1430	Radio Japan General Service.	5990, 7140
		9675, 9695
		11815
1400-1430 S	Radio Norway International.	**9530, 15315**
1400-1430	Radio Polonia.....	6095, 7285
1400-1430	Radio Sweden International.	**15345**
1400-1430	Radio Tirana.....	9500, 11985
1400-1430	WRNO, Worldwide.....	**9715**
1400-1500	AFRTS.....	**9700, 11805**
		15330, 15430
1400-1500	All India Radio.....	11810, 15335
1400-1500	BBC, London.....	**7105, 9740**
		9750, 9760
		12095, 15070
		17705, 17790
		17885

1400-1500	CBC Northern Quebec Service.	9625, 11720
1400-1500	CFCX, Montreal, Canada.....	6005
1400-1500	CFRX, Toronto, Canada.....	6070
1400-1500	CFVP, Calgary, Canada.....	6030
1400-1500	CHNX, Halifax, Canada.....	6130
1400-1500	CKFX, Vancouver, Canada.....	**6080**
1400-1500	FEBC, Manila.....	**9665, 11815**
1400-1500	HCJB, Quito, Ecuador.....	**11740, 11745**
		15115, 17890
1400-1500	Kuching, Sarawak, Malaysia	**4950**
1400-1500	KVOH, California.....	11940
1400-1500	Radio Beijing.....	11600, 15165
1400-1500 S	Radio Canada International.	11955, 17820
		15440
1400-1500	Radio Korea, South.....	9570, **9750**
		15575
1400-1500	Radio Moscow.....	**6020, 6050**
		7160, 7265
		9820, 11705
		11840, 13665
		13790, 15225
		15320, 15475
		15585, 15595
		17665, 17820
		17850
1400-1500	Radio Pyongyang,N.Korea.....	**9555, 9750**
1400-1500	Radio RSA, South Africa.....	**21590**
1400-1500	Radio Veritas, Philippines	6160
1400-1500	SBC Radio 1, Singapore.....	5010, **5052**
		11940
1400-1500	Sri Lanka Broadcasting Corp.	6075, 9720
		15425
1400-1500	WHRI, Indianapolis.....	**11790**
1400-1500	WYFR, USA.....	**9680, 11830**
		11875
1400-1500	Voice of America.....	**6110, 7230**
		9760, 11715
1400-1500	Voice of Nigeria.....	7255, 15120
1415-1430 A,S	KTWR, Guam.....	**9870**
1415-1500 S,A	GBC-2, Accra, Ghana.....	**3366**
1415-1500	Radio Berlin Int'l.....	11795, 15445
		17700
1430-1500	Radio Australia.....	**5995,** 6045
		6060, 6035
		6080, 7205
		9580
1430-1500 M-A	Radio Budapest Hungary.....	9835, 11910
		15160, 15220
		17710, 21665
1430-1500	Radio Korea World News Svc..	7275, 11805
1430-1500	Radio Netherland.....	5955, 11735
		13770, 15560
		17575
1430-1500	Radio Yugoslavia.....	9620, 15240
1430-1500	WRNO, Worldwide.....	**11965**
1448-1455	Radio Vatican.....	**15090**
1445-1500	Radio Ulan Bator, Mongolia..	9575

1500 UTC	[10:00 AM EST/7:00 AM PST]	
1500-1505 M-F	Africa #1, Gabon.....	**15200**
1500-1520	Radio Ulan Bator Mongolia...	9615, 12015
1500-1525	Radio Finland.....	**15400, 17785**
1500-1530	HCJB, Quito, Ecuador.....	**11740, 11745**
		15115, 17890
1500-1530	Radio Bucharest.....	11940, 15250
		15335
1500-1530	Radio Netherland.....	5955, 11735
		13770, 15560
		17575
1500-1530	Radio Veritas, Philippines..	**9565, 15120**
1500-1530	TWR, Guam.....	9870
1500-1530	Voice of Nigeria.....	7255, 11770
1500-1550	Deutsche Welle.....	**15135, 17825**
1500-1556	Radio RSA, South Africa.....	**21590**
1500-1600	AFRTS.....	**9700, 11805**
		15330, **15430**
1500-1600	BBC, London.....	**9410, 9515**
		15070, 15260
		15390, 17885
		21710
1500-1600	CBC Northern Quebec Service.	9625, 11720
1500-1600	CFCX, Montreal, Canada.....	6005
1500-1600	CFRX, Toronto, Canada.....	6070
1500-1600	CFVP, Calgary, Canada.....	6030
1500-1600	CKFX, Vancouver, Canada.....	6080
1500-1600	CHNX, Halifax, Canada.....	6130
1500-1600	FEBC, Manila.....	9670
1500-1600 TEN	KVOH, California.....	11940
1500-1600	Radio Australia.....	**5995, 6030**
		6060, 6080
		6035, 7205
		9580
1500-1600	Radio Canada International.	**11955, 15440**
		17820
1500-1600	Radio Japan General Service.	5990, **9695**
		17785
1500-1600	Radio Moscow.....	**9895, 11705**
		11840, 13790
		15475
1500-1600	RTM, Sarawak, Malaysia.....	4950
1500-1600	SBC Radio 1, Singapore.....	**5010, 5052**
		11940
1500-1600	Sri Lanka Broadcasting Corp.	6075, 9720
		15425

frequency SECTION

1500-1600		Voice of America.....	**9535 LSB**
			6110, 15205
1500-1600		Voice of Nigeria.....	7255, 11770
1500-1600		Voice of Indonesia.....	11790, 15150
1500-1600		V. Revolutionary Ethiopia..	9560
1500-1600		WHRI, Indiana.....	**15105**
1500-1600		WRNO Worldwide.....	**11965**
1513-1600	F-S	FEBC, Seychelles.....	**11820**
1515-1600		Radio Berlin Int'l.....	**15204**
1530-1545		Radio Bangladesh.....	7195
1530-1600	M-A	Radio Budapest Hungary.....	9835, 11910
			15160, 15220
			17710, 21665
1530-1600		R. Prague, Czechoslovakia..	**9735, 11690**
			11990, 13715
			17705, 17840
			21505
1530-1600		Radio Yugoslavia.....	9620, 15240
1530-1600		Swiss Radio International..	**9735, 11690**
			15430
1530-1600		Voice of Asia, Taiwan.....	**5980, 7445**
1530-1600		WYFR, USA.....	**9680, 11830**
			11875, 15170
1540-1550		Voice of Greece.....	11645, 15630
			17565
1545-1600		Vatican Radio.....	11810, **15090**
			17730

1600 UTC		**[11:00 AM EST/8:00 AM PST]**	
1600-1605		SBC Radio 1, Singapore.....	11940
1600-1615		Radio Pakistan.....	9645, 11675
			11735, 11925
			15515, 15595
			17660
1600-1630		Radio Berlin Int'l.....	**15255**
1600-1630	S	Radio Norway International..	**9590, 15310**
1600-1630		Radio Polonia.....	6135, 9540
1600-1630	M-F	Radio Portugal.....	15105, 15330
1600-1630		Radio Sweden Int'l.....	**11705**
1600-1630		Voice of Vietnam.....	10040, 15010
1600-1645		TWR, Swaziland.....	3200
1600-1700		AFRTS.....	**9700, 11805**
			15330, 15430
1600-1700		BBC, London.....	**9410, 9515**
			11705, 12095
			15070, 15260
			15390, 17705
			17880
1600-1700	A	CBC Northern Quebec Service.	9625, 11720
1600-1700		CFCX, Montreal, Canada.....	6005
1600-1700		CHNX, Halifax, Canada.....	6130
1600-1700		CFRX, Toronto, Canada.....	6070
1600-1700		CFVP, Calgary, Canada.....	6030
1600-1700		CKFX, Vancouver, Canada.....	6080
1600-1700	TEN	KVOH, California.....	**17775**
1600-1700		KYOI, Saipan.....	9665
1600-1700		Radio Australia.....	6035, 6060
			6080, 9550
			9580, 15320
1600-1700		Radio Beijing.....	**9570, 11600**
1600-1700		Radio Canada International.	11955, **15440**
			17820
1600-1700		Radio France International..	6175, **9860**
			11705, 15315
			17620
1600-1700		Radio Jordan.....	9560
1600-1700		Radio Korea.....	**5975, 9870**
1600-1700		Radio Malawi.....	3380, 5995
1600-1700		Radio Moscow.....	**9895, 11840**
1600-1700		Radio Prague, Czech.....	**11990, 13715**
			15110, 17705
1600-1700		Radio Riyadh, Saudi Arabia..	9720v
1600-1700		Radio Tanzania.....	6105
1600-1700		Radio Zambia.....	9505
1600-1700		UAE Radio.....	**9640, 11955**
			15320, 1435
1600-1700		Voice of America.....	6110, **9575**
			9760, 15205
			15410, 15445
			15580, 15600
			17785, 17800
			17870
1600-1700		Voice of Asia.....	**5980, 7445**
1600-1700		Voice of Nigeria.....	7255, 11770
1600-1700		WHRI, Indiana.....	**15105**
1600-1700		WRNO Worldwide.....	**15170, 15420**
1600-1700		WYFR, Florida.....	**15440, 11830**
			11875, 17645
			17845, **21525**
1610-1620	M-F	Radio Botswana.....	4820, 7255
1610-1645		Radio Belem.....	3205
1630-1655	M-F	BRT Belgium.....	**9905, 11695**
1630-1700		KNLS, Alaska.....	**7355**
1630-1700		ELWA, Liberia.....	11830
1630-1700		Radio Nacional Angola.....	7245, 9535
			11955
1630-1700		Radio Netherland.....	6020, **15570**
1630-1700		Radio Polonia.....	7125, 9525
1630-1700		Voice of Africa, Egypt.....	15255
1645-1700		Radio Pakistan.....	**6205, 7100**
			9455, 9465

1700 UTC		**[12:00 PM EST/9:00 AM PST]**	
1700-1710		Voice of Lebanon.....	6548
1700-1720		Radio Netherland.....	**9515, 15570**
1700-1730		BBC, England.....	**9515, 11775**
			12095, 15070
			15260, 15400
			17880
1700-1730		Radio Australia.....	6035, 6060
			7205
1700-1730		Radio Japan.....	**5990, 11815**
1700-1730		Radio Norway International..	**9590**, 9655
			11850
1700-1730		Radio Portugal.....	15250
1700-1800		4VEH, Haiti.....	4930
1700-1800		AFRTS.....	**9700, 11805**
			15330, 15345
			15430
1700-1800		CBC, N. Quebec, Canada....	**9625, 11720**
1700-1800		CFCX, Montreal, Canada.....	6005
1700-1800		CFRX, Toronto, Canada.....	6070
1700-1800		CFVP, Calgary, Canada.....	6030
1700-1800		CHNX, Halifax, Canada.....	6130
1700-1800		CKFX, Vancouver, Canada.....	6080
1700-1800		CKZU, Vancouver, Canada.....	6160
1700-1800	S	KCBI, Texas.....	**11735**
1700-1800		KNLS, Alaska.....	**7355**
1700-1800	TEN	KVOH, California.....	17775
1700-1800		KYOI, Saipan.....	9665
1700-1800		Radio Beijing.....	**9570, 11600**
1700-1800		Radio Korea, South.....	5975, 15575
1700-1800		Radio Moscow.....	**9470, 9490**
			11840
1700-1800	MWF	Radio Nacional, Eq.Guinea	9535
1700-1800		Radio Nacional Angola.....	7245, 9535
			11955
1700-1800		Radio Pyonyang, N. Korea....	7105, **7205**
			7305, **9325**
			9960, 9977
			11665
1700-1800		Radio Riyadh, Saudi Arabia..	9720v
1700-1800		Radio Tanzania.....	6105
1700-1800		Radio Zambia.....	9505
1700-1800		Voice of Africa, Egypt.....	15255
1700-1800		Voice of America.....	**11760, 15410**
			15445, 15575
			15580, 15600
			17785, 17800
			17870
1700-1800		Voice of Nigeria.....	11770
1700-1800		WHRI, Indiana.....	**15105**
1700-1800		WINB, Pennsylvania.....	**15295**
1700-1800	TEST	WMLK, Pennsylvania.....	**9455**
1700-1800		WRNO Worldwide.....	**15420**
1700-1800		WYFR, Florida.....	**11830, 11875**
			15170, 17750
1730-1745		BBC.....	**15070**
1730-1800		Radio Australia.....	6035, **9580**
1730-1800		Radio Bucharest, Romania....	7145, 9640
			9690, 11830
1730-1800		Radio Polonia.....	6135, 9540
1730-1800		Radio Surinam.....	17755
1745-1800		BBC, London.....	**9410, 9750**
			11745, **12095**
			15070, 15260
			15400
1730-1800		Radio Sofia, Bulgaria.....	11735, 11840
			15310
1745-1800		Radio Berlin Int'l.....	**9730**
1745-1800		SLBC, Sri Lanka.....	**11800**

1800 UTC		**[1:00 PM EST/10:00 AM PST]**	
1800-1810		Voice of Kenya.....	6135
1800-1815		Kol Israel.....	**9385, 9860**
			11655, 13747
1800-1815		Radio Cameroon.....	4750, 4795
			4850, 5010
			9745
1800-1830		AWR, Italy.....	6205
1800-1830		Radio Berlin Int'l.....	**9730**
1800-1830		Radio Canada International.	**15260, 17820**
1800-1830		Radio Japan.....	7250, **9675**
1800-1830		Radio Mozambique.....	3340, 9620
1800-1830		Swiss Radio Int'l.....	**9535**
1800-1830		TWR, Monte Carlo.....	11965
1800-1900		Voice of Africa, Egypt.....	15255
1800-1830		Voice of Vietnam.....	**12020**
1800-1900		Deutsche Welle.....	7285, 9700
			9745, 11785
1800-1850		Radio Nacional do Brasil...	**15265**
1800-1900		4VEH, Haiti.....	4930
1800-1900		AFRTS.....	**15330, 15345**
			15430, 17765
1800-1900		All India Radio.....	**11620**, 11940
			15280
1800-1900		BBC, London.....	**6180, 6195**
			7325, **9410**
			11820, 12095
			15070, 15400
1800-1900		CBC, N. Quebec Service.....	**9625, 11720**
1800-1900		CFCX, Montreal, Canada.....	6005
1800-1900		CFRX, Toronto, Canada.....	6070
1800-1900		CFVP, Calgary, Canada.....	**6030**
1800-1900		CKFX, Vancouver, Canada.....	6080
1800-1900		CKZU, Vancouver.....	**6160**
1800-1900		KCBI, Dallas.....	**11735**
1800-1900		KNLS, Alaska.....	**7355**
1800-1900		KVOH, California.....	17775
1800-1900		KYOI, Saipan.....	9665
1800-1900		Radio Australia.....	5995, 6045
			6060, 6035
			6080, 7215
			9580
1800-1900	A,S	Radio Canada International.	15260, 17820
1800-1900	TES	R. Discovery, Dominican Rep	15045
1800-1800v		Radio Jamahiriya, Libya....	15450v
1800-1900		Radio Korea.....	5975, 15575
1800-1900		Radio Kuwait.....	11675
1800-1900	MWF	Radio Nacional, Eq.Guinea...	**9553**
1800-1900		Radio New Zealand Int'l....	11780, 15150
1800-1900		Radio Moscow.....	**7115, 7150**
			9825, 11840
1800-1900		Radio Riyadh, Saudi Arabia..	9720v
1800-1900		Radio Tanzania.....	6105
1800-1900		Radio Zambia.....	9505
1800-1900		RAE, Argentina.....	15435
1800-1900		TWR, Swaziland.....	9550
1800-1900		Voice of America.....	**11760, 11920**
			11580, 15445
			15580, 15410
			15600, 17785
			17870, 17800
1800-1900		Voice of Nigeria.....	11770, 15120
			17800
1800-1900		WHRI, Indiana.....	**15105**
1800-1900		WINB, Pennsylvania.....	**15400**
1800-1900		WMLK, Bethel, Pa.....	**9455**
1800-1900		WRNO Worldwide.....	**15420**
1800-1900		WYFR, Florida.....	**11580, 11830**
			11875, **15170**
1805-1830	A,S	Radio Austria Int'l.....	**9725, 12015**
1814-1817		Radio Suriname Int'l.....	17755
1815-1900		Radio Bangladesh.....	6240, **7295**
			7505
1815-1900		Radio Berlin International..	6080, 6115
1830-1855	M-A	BRT Brussels, Belgium.....	5910, **9905**
1830-1900		Radio Polonia.....	5995, 6135
			7125, 7285
			9525, 9675
			11840
1830-1900		Radio Sofia, Bulgaria.....	6070, 9700
			11720
1830-1900		Radio Sweden Int'l.....	**11845**
1830-1900		Radio Tirana.....	7065, 9480
1830-1900		Swiss Radio International...	**6165, 9535**
			9885, 11955
1830-1900		Radio Netherlands.....	6020, 9540
			17605, 21685
1830-1900		Spanish Foreign Radio.....	**7275, 9765**
			11840, 15375
1830-1900		Radio Abidjan, Ivory Coast.	11940
1830-1900		Radio Havana Cuba.....	**11795**
1830-1900		Radio New Zealand.....	11780, 15150
1840-1900		Voice of Greece.....	11645, 12105
			15630
1845-1900		All India Radio.....	7412, 11620

1900 UTC		**[2:00 PM EST/11:00 AM PST]**	
1900-1915		Radio Bangladesh.....	**6240, 7295**
			9855, 11555
1900-1925		Radio Netherland.....	6020, 9540
			17605, 21685
1900-1925		Radio Prague, Czechoslovakia	5930, 7345
1900-1930	M-F	Radio Canada International..	**5995, 7285**
			15260, 15325
			17820, 17875
			21695
1900-1930		Radio Japan.....	9505
1900-1930		Radio Kiev, Ukrainian SSR...	7230, 6010
			6090, 6165
1900-1930	S	Radio Norway Int'l.....	**9590**
1900-1930		Spanish Foreign Radio.....	**15375**
1900-1930		Voice of Vietnam.....	10040,15010v
1900-2000		4VEH, Haiti.....	4930
1900-2000		AFRTS.....	**15330, 15345**
			15430, 17765
			21620
1900-2000		All India Radio.....	7150, 9665
			11620, 11845
			15265

frequency SECTION

1900-2000	BBC, London.....	**3955, 7325** **9410, 11820** **15070, 15400**
1900-2000	B.S. Kingdom Saudi Arabia..	**9720**
1900-2000	CBC Northern Quebec Serv....	**9625, 11720**
1900-2000	CFCX, Montreal, Canada.....	6005
1900-2000	CFRX, Toronto, Canada.....	6070
1900-2000	CFVP, Calgary, Canada.....	6030
1900-2000	CKFX, Vancouver, Canada.....	6080
1900-2000	CKZU, Vancouver, Canada.....	**6160**
1900-2000	HCJB, Ecuador.....	**15220, 15270** **17790**
1900-2000	KCBI, Texas.....	**11735**
1900-2000	KNLS, Alaska.....	7355
1900-2000	KVOH, California.....	17775
1900-2000	Radio Australia.....	5995, 6045 6060, 6035 6080, **7205** 9580
1900-2000	Radio Beijing.....	9860, 11500
1900-2000 A,S	Radio Canada International..	7130, 9555 11945, 15325 17875
1900-2000 TES	R. Discovery, Dominican Rep	15045
1900-2000	Radio Havana Cuba.....	**11795**
1900-2000	Radio Kuwait.....	11675
1900-2000	Radio Moscow.....	**7115, 7150** **7195, 11840**
1900-2000 MWF	Radio Nacional,Eq.Guinea....	**9553**
1900-2000	Radio New Zealand Int'l....	11780, 15150
1900-2000	Voice of America.....	**9700, 15410** **15445, 15580** **11760,** 17785 **17800, 17870**
1900-2000	Voice of Nigeria.....	7255, 11770
1900-2000	V. Revolution.....	9595
1900-2000	WHRI, Indiana.....	**11705**
1900-2000	WINB, Pennsylvania.....	15400
1900-2000	WRNO Worldwide.....	**15420**
1900-2000	WYFR.....	**9510, 11830** **11875,** 15170 **15566, 21615**
1910-1920	Radio Botswana.....	3355, 4820
1920-1930 M-A	Voice of Greece.....	7430, 9395 9420
1930-2000	Radio Beijing, China.....	9440, 11515 11905
1930-2000	Radio Bucharest, Romania....	7145, 9690 9750, 11940
1930-2000	Radio Finland.....	6120, 11755
1930-2000	Radio Sofia, Bulgaria.....	**9700**
1930-2000	Voice of Islamic Rep. Iran..	9022
1940-2000	Radio Ulan Bator Mongolia...	7235, 15305
1950-2000	Vatican Radio.....	6190, **7250** **9645**

2000 UTC [3:00 PM EST/12:00 PM PST]

2000-2005	Radio Ghana.....	4915
2000-2005	Radio Ulan Bator Mongolia...	9575, 15305
2000-2010	Vatican Radio.....	**6250,** 7250 **9645**
2000-2010	Voice of Kenya.....	4808
2000-2015 M-F	Radio Cotonou, Benin.....	4870
2000-2015	Radio Togo, Lome.....	3220, 5047
2000-2025	Radio Beijing, China.....	9440, 11515 11905
2000-2025	Radio Bucharest, Romania....	7145, 9690 9750, 11940
2000-2025 M-H	Radio Polonia.....	7125, 7145 9525, 9695
2000-2030	Kol Israel.....	**7465, 9435** **11610, 12080**
2000-2030	Radio Australia.....	6060, 6035 6045, 6080 **7250,** 9580 9620
2000-2030	Radio Algiers, Algeria.....	**17745**
2000-2030	Radio Budapest Hungary.....	6025, 7220 9585, **9835** **11910,** 12000
2000-2030 M-F	Radio Canada International..	**5995, 11945** **15325,** 17820 **17875**
2000-2030 S	Radio Norway International..	**7125, 9525**
2000-2030	Radio Polonia.....	7125, 7145 9525, 9675
2000-2030	Radio Prague, Czechoslovakia	5930, 7345
2000-2030	Radio Yugoslavia.....	**6100, 7240** **9620**
2000-2030	Voice of Islamic Rep. Iran..	9022, 11930
2000-2030	Voice of Nigeria.....	7255, 11770
2000-2045	All India Radio.....	7160, 9665 9755, 9910 11620, 11865

2000-2100	AFRTS.....	11805, 15330 **15345, 15430** **17765**
2000-2100	BBC, London.....	**6180, 6190** **6195, 7320** **9410, 9765** **11820, 15070** **15260, 15400**
2000-2100	CBC Northern Quebec Service.	9625, 11720
2000-2100	CFCX, Montreal, Canada.....	6005
2000-2100	CFRX, Toronto, Canada.....	6070
2000-2100	CFVP, Calgary, Canada.....	**6030**
2000-2100	CHNX, Halifax, Canada.....	6130
2000-2100	CKFX, Vancouver, Canada.....	6080
2000-2100	CKZV, Canada.....	6160
2000-2100 M-F	KCBI, Texas.....	**11790**
2000-2100	King of Hope, Lebanon.....	6280
2000-2100	KNLS, Alaska.....	**7355**
2000-2100	KVOH, California.....	17775
2000-2100	KYOI, Saipan.....	**9670**
2000-2100	Radio Kuwait.....	**11675**
2000-2100	Radio Moscow.....	**7115, 7125** **7150, 7195** **7250, 9530** **9825, 9875** 11840, **17800**
2000-2100	R. Nacional, Equator Guinea	15106v
2000-2100	Radio New Zealand.....	11780, 15150
2000-2100	Radio Pyongyang, N. Korea...	6575, 7105 9345, **9960** 9977
2000-2100	Radio Zambia.....	9505
2000-2100	Voice of America.....	**6040, 6045** **9620, 9700** **9760, 11760** **15410,** 15445 **15580,** 17785 **17800, 17870**
2000-2100	WHRI, Indiana.....	**11705**
2000-2100 S,A	WINB, Red Lion, Penna.....	**15185**
2000-2100	WRNO Worldwide.....	**15420**
2000-2100	WYFR, Okeechobee, Florida..	**6100, 9510** **11875,** 15170
2000-2030	Kol Israel.....	**7465, 9009** **9435, 12077**
2005-2100	Radio Damascus Syria.....	**12085**
2015-2100	ELWA, Liberia.....	11830
2015-2045	RAI, Italy.....	7235. 9575 11800
2015-2100	Radio Cairo, Egypt.....	**9655**
2030-2100	Falkland Islands Bcast Svc..	2380 / 3958
2030-2100	IBRA Radio.....	6110
2030-2100	Radio Australia.....	6035, 6045 6080, 7215 9580, 9620
2030-2100	Radio Beijing.....	6955, 7480 9440, **11515**
2030-2100	Radio Netherland.....	9540, 9715 **9895,** 11740
2030-2100 M-F	Radio Portugal.....	**9605**
2030-2100	Voice of Nigeria.....	11770
2030-2100	Voice of Vietnam.....	**10040, 12020**
2045-2100	All India Radio.....	7160, 9550 9665, 9910 11620, 11870
2045-2100	Vatican Radio.....	9625, 11700 11760, 15120
2050-2025	Voice of Islamic Rep.,Iran..	**9022**

2100 UTC [4:00 PM EST/1:00 PM PST]

2100-2105	Radio Damascus Syria.....	7455, **9950**
2100-2110	Vatican Radio.....	**6200, 7250** **9645**
2100-2115	Radio Cairo, Egypt.....	**9655**
2100-2115	Radio New Zealand Int'l....	11780, 15150
2100-2220	ELWA, Liberia.....	11830
2100-2125 S-F	CBC Northern Quebec Service.	**9625, 11720**
2100-2125	Radio Beijing.....	9440, **11515**
2100-2125	Radio Netherland.....	9540, **9715** **9895,** 11740
2100-2130	Radio Finland.....	6120, 11755
2100-2130	Radio Australia.....	6080, **9580** 9620, 15160 15395
2100-2130	Radio Bucharest, Romania....	6055, 7145 7195, 9690
2100-2130	Radio Canada Int'l.....	**11960, 15325**
2100-2130	Radio Japan General Service.	7140, 9675 **11815**
2100-2130	Radio Sweden International.	11845, 11955
2100-2130	Swiss Radio International...	**9635, 9885** **11955, 12035**
2100-2130	WRNO Worldwide.....	**15420**
2100-2140	Radio Havana Cuba.....	**11725, 15300**
2100-2150	Deutsche Welle, West Germany	6010, 7130 9675, 9765 **11815**
2100-2150	Radio Pyongyang, N. Korea...	6575, 9360 11660 **11500**
2100-2155	Radio Beijing.....	**4810,** 7270
2100-2156	Radio RSA, South Africa.....	9585, **11900**
2100-2200	AFRTS.....	**15330, 15345** **15365, 15430** **17765**
2100-2200	All India Radio.....	7412, 9665 9910, 11620
2100-2200	BBC, London.....	**6005, 6175** **6180, 6195** **7320,** 9410 **15070, 15260** 15260
2100-2200	CFCX, Montreal, Canada.....	6005
2100-2200	CFRX, Toronto, Canada.....	6070
2100-2200	CFVP, Calgary, Canada.....	**6030**
2100-2200	CHNX, Halifax, Canada.....	6130
2100-2200	CKFX, Vancouver, Canada.....	6080
2100-2200	Falkland Islands Bcast Svc..	2380, 3958
2100-2200	FEN, Tokyo.....	15260
2100-2200	King of Hope, Lebanon.....	6280
2100-2200	KNLS, Alska.....	**7355**
2100-2200	KSDA, Guam.....	**7160, 11965**
2100-2200 TEN	KVOH, California.....	17775
2100-2200	KYOI, Saipan.....	9670
2100-2200	Radio Baghdad, Iraq.....	7170
2100-2200 M-F	Radio Canada International.	**11960, 15325**
2100-2200v	Radio Jamahiriya, Libya.....	6155, **7195** **9635,** 11815
2100-2200	Radio Moscow.....	**7130, 7150** **13665**
2100-2200 M-A	Radio Nacional Angola.....	9535, 7245
2100-2200	R. Nacional, Equat. Guinea.	15106v
2100-2200 F,A	Radio Zambia.....	9505
2100-2200	RTL, Luxembourg.....	6090
2100-2200	Voice of Africa (Cairo)....	15375
2100-2200	Voice of America.....	7445 LSB **6040, 6045** **9605,** 9760 **11760, 15205** 15410, **15445** **15580,** 17800 **17870**
2100-2200	Voice of Asia.....	**7445, 9845**
2100-2200	Voice of Nigeria.....	15120
2100-2200	Voice of Turkey.....	7215
2100-2200	WHRI, Indiana.....	**9770**
2100-2200	WYFR, Okeechobee, Florida..	**6100, 9535** **11830, 15170** **21525**
2105-2200	Radio Damáscus, Syria.....	9950
2115-2145	Radio Cairo.....	9805
2130-2200 T,F	BBC Falklands Service.....	**9915,** 11820 12040, 15390
2130-2200 S-F	CBC Northern Quebec Service.	9625, **11720**
2130-2200	HCJB, Quito, Ecuador.....	**11740, 15270** **17790**
2130-2200	KGEI, San Francisco, CA....	15280
2130-2200	Radio Austria International.	5945, 6000 **9870**
2130-2200	Radio Australia.....	**15150,** 15160 **15395** 17795
2130-2200	Radio Canada International.	11945, 15150 17820
2130-2200	Radio Prague.....	6055
2130-2200	Radio Sofia, Bulgaria.....	**6070, 7115** **7155**
2130-2200	WRNO Worldwide.....	**11705**
2145-2200	Radio Berlin International.	**6125**

2200 UTC [5:00 PM EST/2:00 PM PST]

2200-2205	Radio Damascus, Syria.....	**7455,** 9950
2200-2207	Voice of America.....	11740, 15160 17730, **17775**
2200-2210	Radio Sierra Leone.....	5980
2200-2225	BRT, Belgium.....	**5900, 5910**
2200-2225	RAI, Italy.....	9710, 11800 15330
2200-2230	All India Radio.....	7160, 9550 9665, 9910 11620, 11870
2200-2230 S-F	CBC Northern Quebec Service.	**9625, 9755** **11720**
2200-2230	Radio Berlin International..	**6125**
2200-2230	Radio Canada International..	5960, 9755
2200-2230 S	Radio Norway International..	**9525, 9605**
2200-2245	Radio Cairo, Egypt.....	9805
2200-2245	WINB, Red Lion, Penna.....	**15185**
2200-2300	AFRTS.....	**6030, 11790** **15330, 15345** **17765,** 21570
2200-2300	BBC, London.....	**3955,** 5975 **6005, 6120** **6175, 6180** **6195, 9410** **9590, 9915** **11750, 15260**

freq SECTION

2200-2300		CFCX, Montreal, Canada.....	6005
2200-2300		CFRX, Toronto, Canada.....	6070
2200-2300		CFVP, Calgary, Canada.....	6030
2200-2300		CHNX, Halifax, Canada.....	6130
2200-2300		CKFX, Vancouver, Canada.....	6080
2200-2300		CKZU, Vancouver.....	**6160**
2200-2300		Falkland Islands Bcast Svc..	2380 / 3958
2200-2300		King of Hope, Lebanon.....	**6280**
2200-2300		KSDA, Guam.....	**7160**
2200-2300	TEN	KVOH, California.....	**17775**
2200-2300		KYOI, Saipan.....	15405
2200-2300		Radio Australia.....	**15160**, 15240
			15320, **15395**
			17795
2200-2300	M-F	Radio Canada International..	6170, 7230
			11945, 15325
2200-2300		Radio Havana Cuba.....	11705
2200-2300		Radio Korea.....	6480, 7550
2200-2300		Radio Moscow.....	**5915**, **5945**
			6200, **7115**
			7310, **13665**
2200-2300		Radio Pyongyang, N.Korea...	**11735**
2200-2300		Voice of America.....	**6045**, **11775**
			15185, **15290**
			15445, **15580**
			17740, 17775
			17800, **17820**
2200-2300		Voice of Free China, Taiwan.	**6155**, **7355**
			9955
2200-2300		WHRI, Indiana.....	**9770**
2200-2300		WRNO, Louisiana.....	**11705**
2200-2300		WYFR, Okeechobee, Florida..	**11830**
2205-2230		Vatican Radio.....	6015, 9615
			11830
2215-2230		Radio Yugoslavia.....	6100, 7240
			9620
2230-2300	S	CBC Northern Quebec Service.	9625, 11720
2230-2300		Kol Israel.....	**5885**, **7465**
			9435
2230-2300		Radio Mediterran, Malta.....	6110
2230-2300	S	Radio Nacional Angola.....	7245, 9535
2230-2300		Radio Polonia.....	5995, 6135
			7125, 7270
2230-2300		Radio Sofia, Bulgaria.....	**11720**
2230-2300		Swiss Radio International...	6190
2230-2300		WRNO, Louisiana.....	**9852.5**
2245-2300		All India Radio.....	6035, 7215
			9595, 9912
			11765
2245-2300		GBC1 Ghana.....	**4915**

2300 UTC [6:00 PM EST/3:00 PM PST]

2300-2330		BBC, London.....	5975, **6005**
			6120, **6175**
			6180, **6195**
			7325, **9410**
			9515, **9590**
			9915
2300-2345		Radio Berlin Int'l.....	**6070**, **6125**
			6165
2300-2330		Radio Canada International..	**9755**, **11710**
2300-2330		Radio Sofia, Bulgaria.....	**11720**
2300-2330		Radio Sweden International..	**6045**, **9695**
2300-2330		Radio Vilnius, Lithuania....	**6200**, **7165**
			9765, **11790**
			13645, **15180**
2300-2345		WYFR, Okeeechobee, Florida.	15400
2300-2350		Voice of Turkey.....	6105, 7215
			9560, 9730
2300-0000		4VEH, Haiti.....	4930
2300-0000		AFRTS.....	**6030**, **11790**
			15345
2300-0000	A	CBC Northern Quebec Service.	**6195**, **9625**
2300-0000		CFCX, Montreal, Canada.....	6005
2300-0000		CFRX, Toronto, Canada.....	6070
2300-0000		CFVP, Calgary, Canada.....	**6030**
2300-0000		CHNX, Halifax, Canada.....	6130
2300-0000		CKFX, Vancouver, Canada.....	6080
2300-0000		CKZU, Vancouver.....	**6160**
2300-0000		Falkland Islands Bcast Svc..	2380 / 3958
2300-0000		FEBC, Manila.....	15320
2300-0000	TEN	KVOH, California.....	15250
2300-0000		KYOI, Saipan.....	15405
2300-0000		Radio Australia.....	**15160**, 15240
			15320, **17725**
			17795
2300-0000		Radio Clarin, Dominican R.	11700
2300-0000		Radio Japan General Service.	7140, **9645**
			9675, **15235**
2300-0000		Radio Korea, South.....	15575
2300-0000		Radio Moscow.....	**5915**, **5940**
			5980, **6070**
			7115, **7150**
			7195, **7215**
			7310, **7400**

2300-0000		Radio Prague, Czechoslovakia	6055, 9630
2300-0000		Radio Pyongyang, N. Korea..	11735, **13650**
2300-0000		Radio Thailand.....	9650, 11905
2300-0000		RTL, Luxembourg.....	6090
2300-0000		Spanish Foreign Radio.....	**6020**
2300-0000		Voice of America.....	9640, 11740
			15160, 15185
			15290, 17730
			17740, **17820**
2300-0000		WHRI, Indiana.....	**11770**
2300-0000		WRNO Worldwide.....	**9650**
2300-0000		WYFR, Florida.....	6300, 7485
			11830, **11855**
			15365
2330-0000		BBC, London.....	**5975**, **6005**
			6120, **6175**
			7325, **9515**
			9590, **9915**
			12095
2330-0000	S-F	Radio Canada International..	**5960**, **9755**
2330-0000	TES	Radio Veritas,Philippines...	**9740**
2330-0000		Voice of Vietnam.....	9840, 12035
2335-2345		Voice of Greece.....	9395, 11645
2345-0000		Radio Berlin Int'l.....	6080, 9730
2345-0000		Radio Korea, South.....	7275, **15575**

Want to advertise your hobby?

Arrange an SWL Exhibit with your Library

by Ruth M. Hesch

One way of publicizing the leisure time activity of SWLing is to have an exhibit in your local public library. Usually libraries are receptive to exhibits of various sizes.

First it is necessary to collect material such as one's own QSL cards, banners, pennants, decals, schedules, books, informational material from stations and clubs, catalogues from Gilfer, Grove and Radio West, and SPEEDX's bumper sticker, "Tune into the World," which costs $1.00. Posters and other materials can be secured from the following stations which have offices in North America (you may know of others):

Australian Broadcasting Commission
1 Rockefeller Plaza, NY 10020

Radio Canada International
P.O. Box 6000, Montreal, Canada H3C 3A8

Radio Free Europe
Radio Liberty Inc., 1775 Broadway, New York, NY 10023

Japan Broadcasting Corp.
1 Rockefeller Plaza, New York, NY 10020

Swedish Broadcasting Corp.
825 Third Avenue, New York, NY 102022

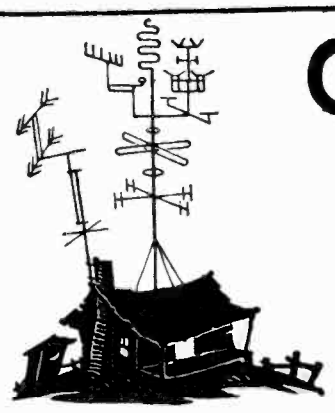
Next, if possible, make a cassette tape of a short segment of some various broadcasts in English and then across a band to show the many stations in various languages.

Now write to the Director of your local public library suggesting an exhibit of SWLing. Explain how it is of value to students of foreign languages, to residents whose first language is other than English, and to the general population who are interested in public affairs, and ask for an appointment to discuss the exhibit.

To the appointment bring the materials, tape and tape recorder to demonstrate. If the librarian is interested and you have a choice of locations, select one on the main floor where there is more traffic than an exhibit hall or a corner.

At the time of setting up the exhibit bring a friend to help as the library usually does not supply anyone. Also bring scotch tape, scissors and push pins, printed information about the name and address of ANARC to write for further information, and current copies of *Monitoring Times* and similar publications to show the many facets of SWLing.

I arranged a library exhibit for the month of February 1986; the librarian in charge of exhibits said in a letter that it "made the library brighter and more interesting for staff members and clients alike."



GETTING STARTED

Ike Kerschner
RD 1 Box 181-A
Kunkletown, PA 18058

The SWL Card

Ever since radio began listeners have been sending reports to the stations they hear. Usually these reports are printed on a post card and look like an amateur radio QSL (confirmation) card. Some are very simple containing only the required information, others are elaborate works of art.

Who do you send SWL cards to?

Amateur radio stations and utilities (two-way operations) are the major targets of the SWL card. Shortwave broadcasting stations often respond to the SWL card; however, broadcasters prefer the standard printed forms (SINPO).

If you provide a complete report on your SWL card you can expect about an 80% response from amateur stations. Hams enjoy receiving SWL cards and are normally happy to send a QSL in return.

Utilities are a bit more difficult to get QSL's from and 50% response is about average. There are tricks you can use to improve your return and we will get to those later.

Filling out the SWL Card -

Reports to an amateur station should include the call of the amateur station you are reporting to, the time in UTC, date, frequency, mode, signal report (see table one), and a brief description of what you heard (see samples).

Utility stations want the same basic information as the amateur station. When reporting to utilities do not get carried away with the description of what you heard. Just report that you heard them calling or working a particular station.

For example - "Heard you working WLB390 December 11, 1986, at 0332UTC on 2130 kHz USB, your signals were R5 S6." But do not repeat the text of any message you may be received!

Your identity!

Take a look at the card from Y2-9168-M52. The number on the face of the card is an SWL license number issued by the government of the German Democratic Republic. It identifies Jens Schulz as a licensed SWL making it easy to pick Jens out from the thousands of other SWLs in his country. So you see number identifiers are as essential to the SWL as they are to a transmitting station.

Where to get a number-

Because most countries do not license their SWL's, listeners often band together, form a club and issue numbers to their own members. Others devise their own ID.

For many years I used W3SWL-IK-4-9-38; the call simply meant I lived in the third amateur radio call area (W3); I was a short wave listener (SWL); my initials (IK); and my birthdate. Although most SWL's get an ID number from a club, making up your own ID is perfectly OK.

Information on where you can get your own number can be obtained from the Association of North American Radio Clubs (ANARC), P.O. Box 462, Northfield, MN 55057; send them a dollar for their information packet.

OMISSION

For those sharp-eyed readers who noted that the December edition of "Getting Started" referred to a Table A which was nowhere to be found, we apologize. Not only was that table inadvertently omitted, but so was the accompanying text to all the illustrations in that article. We have curtailed the illustrations for this February issue in order to bring you that missing text and table.

Figure 1 – A and B illustrate normal loop configuration. The Triangle at C is often called a Delta loop and the strange looking Fig. 1D shows you that nothing is sacred. Your loop can look pretty wild and still work fine.

The loop antenna will provide 2dB gain over a dipole in two directions near its design frequency; looking at figure 1, those directions are straight at you and away from you.

Aim the face of the antenna towards the area you wish to hear for best results. If you must go to something like figure 1D you may not get as much gain or directivity but the antenna will still work fine.

I suggest you make your loop as large as possible. Break it where convenient and feed it with TV twinlead for a nice all band antenna.

If you wish to design a loop for a particular band of frequencies, total loop length (circumference) in feet is equal to 1005 divided by the frequency in megahertz (circumference ft = $1005/F_{MHz}$).

Although the loop is bi-directional, it will let you hear plenty of signals from all 'round.

Figure 2(A) is a long wire fed at one end with an antenna tuner (AT). It is a good antenna and has worked fine for several generations of SWLs. Make the wire as long as possible and have fun chasing DX.

Figure 2(B) simply illustrates a bent folded long wire some of us must erect if we are to have any antenna at all. It, too, will do a good job.

Figure 3(A) is a conventional center-fed dipole antenna fed in the center with coax or TV line and an antenna tuner. Again a good antenna. Be sure both sides are the same length. If you wish to calculate the total length to be most efficient on a particular band, use the formula length in ft. = 458/freq. in MHz.

Figure 3(B) is the same dipole folded, bent and tortured so it can be erected in Joe's attic. Both sides are the same length (although it may not seem that way to the feedline) and again you have an antenna that will work reasonably well.

If the antennas illustrated in this article are to be suspended in the air, use insulators.

If you use fine wire and loop it around the frame of your home use silicone rubber like bathtub caulk to hold the wire in place and to weatherproof the feed line.

Stay away from electric wiring of any type and use caution when climbing!

TABLE A

Frequency	Reflector	Driven Element	Director 1	Director 2	Balun	Spacing
110-120 MHz	50.4"	48"	45.4"	45.1"	34"	20.2"
120-130	46.4	44.1	41.8	41.5	31	18.5
130-140	43	40.8	38.7	38.4	29	17
150-160	37.4	35.6	33.7	33.4	25	15
160-170	35.2	33.4	31.6	31.4	24	14

Designing your card -

Now that you have an ID number the next step is to make up a card. Cards run the gamut from simple hand-made designs to works of art. The average SWL card will be one or two colors with a cut or line drawing of some kind.

If possible look over an assortment of SWL or QSL cards to get some ideas that appeal to you. I have included a number of SWL cards with this column just to get you thinking.

An idea that I like is to use a photo postcard with a scene of something near your home. You can have the information printed or rubber-stamped on the back of the card. Most stores give you a small discount if you purchase postcards by the hundred.

Some amateurs and SWL's have photo postcards made from their own photos; the postcard company will print a certain number of lines on the back of the card at no extra cost.

QSL printers frequently offer a wide variety of cards from simple one-color to top-quality photo cards at reasonable prices. Check the advertisements in amateur radio and SWL publications for QSL/SWL printers and write for samples from a number of them.

It is not necessary to go to a special QSL/SWL printer for cards--many local high schools will print cards at reasonable prices. Printed by print shop students who appreciate the chance to show off their skill, most jobs turn out excellent.

Local newspapers, shopper papers and small jobbers are other good sources of cards.

Most amateurs like to see a rundown of the gear you use and a line or two about yourself on the card. Give your card personality!

"Getting Started" is one year old this month! In my first column I asked for suggestions of what you wanted in your column; the response has been great. Most "Getting Started" columns were the result of ideas generated by readers. Let's continue the tradition! Keep the cards and letters coming gang. 73, Ike. ■

Table One

RST System

RST means Readability, Strength and Tone. When reporting to radiotelephone stations use only the RS portion of the system. Tone is reserved for radiotelegraph stations.

(R) Readability
1 - Unreadable
2 - Occasional words can be understood
3 - Readable but difficult
4 - Very good readability
5 - Perfect 100% readable

(S) Strength of signal
1 - Faint almost no signal
2 - Very weak
3 - Weak but audible
4 - Fair
5 - Fair to good
6 - Good
7 - Moderately strong
8 - Strong
9 - Very strong

(T) Tone
1 - Very rough hissing sound and broad
2 - Very rough, some tonal quality (not much)
3 - Harsh AC tone (sounds like wishhhh)
4 - Rough note (buzz saw sound)
5 - Filtered rectified ac (door buzzer)
6 - Filtered tone, strong ripple (High pitched tone with buzzing sound)
7 - Near pure note (high pitch slight buzz or hum)
8 - Near perfect tone (a little hum)
9 - Perfect tone, no buzz or hum

Two other items you may include in your report if they apply are:

QRM Interference from other stations
QRN Interference from static, i.e., atmospheric noise (lightning)

MT HELPFUL HINTS

We welcome short, useful listening hints, tips on equipment use, hard-to-find sources, etc.; Let others profit by your hard-won experience!

RECONDITIONING FLEAMARKET SCANNERS

by Larry Wiland

Probably one of the best places to find a scanner for considerably less money than a new one is at a hamfest, a gathering of amateur radio operators and enthusiasts which almost always contains some sort of "flea-market" where radio gear is bought, sold and traded.

Being a hamfest "junky" myself, I almost always come home with some sort of scanner(s) or related accessories. But few of the bargains I find are of a nice enough appearance to be put right on my radio table. With a little inexpensive refurbishing, however, that scanner can look nearly new again.

Initial Clean-up

Most hamfest scanner had former owners who ate peanut butter sandwiches, chocolate bars and drank Kool-Aid while using them! Usually, warm water with a small amount of dishwashing detergent will remove most unidentified sticky substances from the case and facing. Apply it sparingly with a soft, lint-free cloth, and dry ***immediately*** with the same type of dry cloth.

Lighter fluid on a soft cloth can be used to remove sticky adhesives from tape or stickers on scanners with metal cases without damaging the paint. It can also be used on most plastic surfaces, but should be tried first on an inconspicuous place to assure no damage will be done. Rubbing lighter fluid repeatedly on a painted vinyl cabinet is likely to mar it.

For small crevices that a cloth can't reach, a soft-bristled toothbrush works wonders. Such places include knobs with tiny grooves, pushbutton controls with miniature spaces between them and joints where cases meet. Compressed air (available in spray cans at TV stores) works wonders in blowing out crud in slide switches and unreachable places, too.

While you're at it, buy a spray can of TV tuner cleaner and give each slide switch, pot control and switch a little shot to clean out the dirt which accumulates there by normal use.

Removing the outer case may help, but is not always necessary. The procedure does, however, facilitate easier cleaning and painting of the case.

Cotton swabs are a necessity for reaching sharp corners and to remove grease and dirt from push-buttons and controls. You can use lighter fluid, soapy water or rubbing alcohol with them to remove that really stubborn grime.

After you get the radio as clean as possible, wipe it again with a soft cloth to remove body oil it will have picked up from being handled.

Touch-Up

Anything packed in a box and transported from place to place without protective packing (as from home to hamfest by the original seller) will encounter some type of scratches or damage in transit. For scratches of a minor nature (surface scratches), lightly sand them with extra fine sandpaper (500-600 grit) and repaint with the proper color. Usually, flat black enamel looks most original, although flat black auto lacquer dries better and more smoothly.

Be sure to mask off or remove any pieces you don't want painted accidentally. Take your time and apply several light coats rather than one heavy one, holding the spray can four to six inches from the surface.

For many scanners, you can use black or flat black lacquer or enamel to duplicate the original finish; however, for brown-case Bearcat 211's, cream-colored BC250's and so on, the automotive industry has thoughtfully provided aerosol cans of touch-up paints which come so close to the original finishes that Betty Bearcat wouldn't know the difference. For example, 1984 G.M. code 68/Dark Sandstone Metallic nearly perfectly matches the color on my BC350!

Take the scanner case with you to the auto store to match to caps on the aerosol cans. If you intend to repaint the radio a different color from the original one, you can choose from *hundreds* of colors available for cars and trucks.

If you are attempting to repair a paint-damaged spot, it is advisable to paint the whole panel rather than trying to "spot it in." Auto gray primer matches many cases of equipment with gray covers and looks good on older scanners.

Scrapes and Gouges

For deep scratches or gouges, fill them prior to painting with auto body scratch filler, lightly sand them smooth (again with 500-600 grit paper), primer lightly with auto primer, then paint to the desired color(s). *Maahvellous*!!

Model enamels, found at hobby shops in small bottles, work great for "brush-touching" scratches not severe enough for a spray-paint job. They can be mixed to duplicate any color of the rainbow. And don't forget paint thinner and an assortment of small brushes available there before leaving the store.

Broken Pieces

Damaged knobs can be replaced with those available from electronic stores or they may be found at hamfests. Sometimes, it may be feasible to buy an identical broken radio for parts, as writing to the manufacturer for replacement pieces which cannot be glued, fixed or salvaged can take *centuries* if they even come!

Although "super-glues" work well on plastic pieces, sometimes they just don't hold. Try several types of carpenters' glues before giving up. They often work when super glue doesn't.

Lettering

For damaged lettering on controls, faceplates and keyboards, there are rub-on transfer decal kits available at many electronic stores. You are given a *huge* glossary of control functions from which to select the appropriate terms you need or make your own from the letters provided.

Merely set the sheet so the lettering lines up where you want it, rub over it lightly with a pencil eraser, remove the waxed-paper backing, and you have replacement lettering of ultra-professional quality.

You can also use a small paint brush to touch up raised lettering as found on many Bearcat volume and squelch controls. White or cream color gives the best appearance.

Final Finishing

If you have a scanner with a vinyl-covered steel case, use shoe polish of the same color to bring the case back to life. Apply and remove it the same way as on shoes, but polish it well to remove ***all*** the polish residue. On plastic-cased scanners, CLEAR (Yes, they make clear shoe polish) works wonders. You should use this on cases only and avoid control panels if possible.

For the plastic and clear Plexiglas© covers found on the digital displays, go to your local motorcycle shop and pick up a tube of Simichrome polish. It is an imported, German-made polish which removes scratches from aluminum, polishes chrome and removes scratches from plastic and Plexiglas.

Put a small amount on a soft cloth, lightly polish, and wipe off excess with another clean, soft cloth. The scratches and scrapes are GONE! A $4 tube will do a *bunch* of scanners *and* polish the wife's tea kettle, too! Don't however, use wax or other types of polish on scanner pieces without trying them on an inconspicuous place first; only God knows if the prior owner repainted or messed with it before.

Sit Back and Admire Your Work

In about two or three hours' time--often less--you can make something that looked like it was dragged behind a truck appear nearly new again (or, at least a heck-of-a-lot better!). You also might consider spending a little time doing some of these things to scanners or radio gear ***you*** are going to sell. It makes your equipment look better, work better and command a better price.

Believe me, it is all worth the extra effort and little time invested!!

SPURS ON THE HX1200

Reader William Dickerman was puzzled by spurious signals which seemed to pop up at random frequencies on his Regency HX1200 scanner in the 30-50 MHz low band range. Recently, he computed a formula for figuring out the relationship between the spur and the true received frequency.

The basic formula is: Received frequency=2 x spur + 64.2 MHz. For example, he was hearing a NOAA weather broadcast on 49.1 MHz; using the formula, he would double that frequency giving him 98.2 and add 64.2, giving him 162.4 MHz, the actual NOAA transmit frequency.

William also discovered images 910 kHz above the transmit frequency in the 144-174 MHz band which correspond to double the 455 kHz second IF of the scanner, a common occurence in conventional receiver design.

HX1200 owners are reminded that Regency provides a free modification service for those scanners which suffer from "wandering birdies'--erratic, internally-generated signals which pop up on various frequencies during the scanning sequency, locking up the scanner for a few seconds before mysteriously disappearing again.

IDENTIFYING THOSE LF BEACONS

by Gunner Danneels

I read with interest the short article that you printed in the January helpful hints column about finding LF frequency information. In case any of your readers are still struggling with IDing beacons, I would like to pass on the following tips:

The first thing a researcher should do is go to his local airport and find out who is selling the *World Aeronautical Chart* for that area. These charts cover about four states and list all of the communications and beacon frequencies for every airport within their coverage area.

Check to see if your state department of transportation publishes an airport communications booklet. Washington state publishes a booklet listing all frequencies in use by airports in Whasington, Oregon, Idaho, and British Columbia. These booklets are often available free from the FAA flight service station at the airport.

The next stop is a library with a well-stocked documents department. Most universities are part of a documents exchange program and can get any title published by the U.S. government.

The Coast Guard publishes a seven-volume list of all navigation aids in United States waters including radio beacons. A Department of Transportation book entitled *Location Identifiers* lists all of the unique two- and three-letter identifiers for every airport and airport beacon in the United States, Canada and Mexico.

The National Weather Service publishes *Worldwide Marine Weather Broadcasts* which lists every station broadcasting weather information in CW, SSB, FAX, RTTY, or VHF--a very good reference for the maritime stations in the 450-500 kHz area.

While at the library check the map department; I was surprised to find on file every World Aeronautical Chart.

With these tips and a little luck anyone should be able to build a good basic reference of beacon frequencies and locations. All it takes is a little time and some persistence.

FOR MORE TIPS AND HINTS, "ASK BOB." HE ANSWERS READERS' QUESTIONS ON PAGE 56

USING THE YAESU BAND-SCOPE WITH THE ICOM R7000

Many readers have inquired as to the availability of a spectrum display unit (SDU) or panadaptor for the ICOM R7000 VHF/UHF receiver. None exists. One *MT* reader, however, has found a novel approach.

John Biro recently attended a hamfest flea market and saw a good price on a Yaesu YO-901 "Band-Scope", an accessory for the popular FT-901 amateur transceiver. Equipped with the internal YO-901-01 module, it was an ideal SDU or panadaptor for the Yaesu. But could it be used with another receiver?

According to the manual, the YO-901 was designed to work at 8.9 MHz, but with a little "tweaking", oscillator coil Q516 was easily adjusted to 10.7 MHz, the IF output frequency of the ICOM R7000! Peaking TC501, a bandpass filter, for 10.7 MHz as well, the SDU was ready for the test.

John was delighted to see that the unit functioned perfectly, with the two tones of a packet signal on 145.01 MHz easily seen on the CRT display; other "pips" on the screen revealed more information about other signals up and down the band.

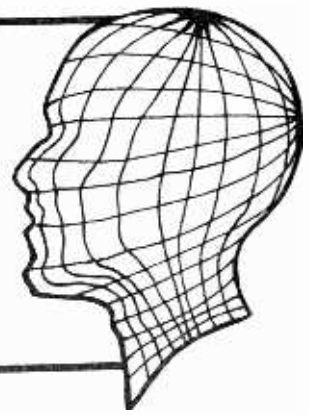
While the YO-901 samples a rather narrow swath of spectrum, its reasonable cost at hamfest flea-markets coupled with its adaptability makes it a useful accessory for the radio monitoring post. ■

Profiles

Listening in with the World's Most Famous SWL

Michael Gurdus--his fingertips span the globe!

by Bob Grove



His eyes focus intently on his receiver; a serious expression belies the usual friendly smile and quick laughter so characteristic of this 41-year-old master of monitoring. In the background a speaker crackles from a cluster of radios which span one wall of his stone house in Tel Aviv, Israel.

Michael Gurdus--"Miki", as his friends know him--is the undisputed champion of the airwaves, having snagged such radio catches as the ill-fated Iranian hostage rescue attempt, the Achille Lauro hijacking and the Shi'ite radicals' hijacking of the TWA aircraft.

Gurdus still shudders as he recalls the monitoring of cockpit communications from the Kuwait civilian aircraft that was taken over by terrorists and forced to Iran. He could hear the passengers screaming and even heard the shot as one was executed.

A favorite story is that of listening in on Air Force One which was carrying then-President Nixon to Saudi Arabia prior to his resignation. "Don't let them at the safe," he directed to the White House aide upon learning that the Watergate special prosecutor was on his way to pick up the infamous tapes. "Don't open the safe!" he reiterated.

It's easy--if you know how!

Gurdus listens about eight hours a day; his hobby is also big business. Working for Israel Radio and Television (Kol Israel), he also receives a sizable stipend from NBC who hired his talents away from ABC a little more than a year ago.

"Do you have any listening secrets that you would care to share with *MT* readers?" we asked. Not surprisingly, Gurdus was reluctant to reveal trade secrets. He does, however, admit to collecting publications which deal with monitoring and has amassed a considerable file of frequencies through his own dedicated listening.

An extensive knowledge of languages helps; Gurdus has fluency in Arabic, Russian, English, Hebrew, German, Polish, and French. Add to this a college preparation which concentrated on political science and Near Eastern history, plus a father who did radio monitoring and reporting for the French News Agency (AFP), and you have a set of unassailable credentials.

Wall to wall radios

As the photo he sent to us shows, Gurdus employs considerable electronic assistance in his monitoring post. An inventory of his equipment includes:

3 Kenwood R2000 receivers
1 Drake R7 receiver
1 Yaesu FRG7000 receiver
1 Collins 51S1 receiver
2 Yaesu FRG9600 scanners
1 Bearcat BC220 scanner
1 HAL Telereader
2 Drake Satellite receivers
1 STS satellite receiver
1 10-foot satellite dish
1 16-foot satellite dish
...and a cluster of dipoles and beams.

Clearly, Michael Gurdus is a contender for the "world's best listener" award! Next time the news bulletin flashes across your TV screen, rest assured--Miki will be monitoring!

Gurdus as he appeared six years ago in the International Herald Tribune

Wall-to-wall radios is about what you'd expect of professional monitor Michael Gurdus

(WORLD RADIO NEWS from p.7)

Portuguese and Arabic. Their English schedule for February 1987 is as follows:

February 22:
1100-1130 7210 (Europe)
1700-1730 7210 (Europe)
February 23:
0740-0757 9560 9885 11905 15570 (Australasia)
1040-1057 9665 9870 11795 15570 (Far East)
1100-1130 7210 (Europe)
1310-1327 9730 9885 11905 11955 15570 (S & SE Asia)
1700-1730 7210 (Europe)
1710-1727 9535 9670 9665 11955 12035 (Africa-inc some French)
February 24:
0310-0327 6135 9625 9725 9885 12035 (N.America)
February 26:
0740-0757 9560 9885 11905 15570 (Australasia)
1040-1057 9665 9870 11795 15570 (Far East)
1310-1327 9730 9885 11905 11955 15570 (S & SE Asia)
1710-1727 9535 9670 9665 11955 12035 (Arica-some French)
February 27:
0310-0327 6135 9625 9725 9885 12035 (N.America)

Turkey

Turkish Radio and Television - One Turkish service is heard at 6025 kHz in parallel with 9660 kHz around 1900-2300 UTC, while different program in Turkish is broadcast on 5980 kHz at roughly the same time. Both have six pips on the hour and ID as TRT. As far as I know, Ankara has only one Turkish-language program, the General Service. Something new? (B. Hill, Sharon, MA 12-2)

United Arab Emirates

Voice of the United Arab Emirates, Abu Dhabi, appears to have dropped 4905 kHz in favor of 7195 kHz, noted around 1800 UTC on 12-4 and subsequent days. Not a happy choice as VOA, Bucharest and Kiev also inhabit 7195. Personally, I miss 4905 kHz, which served as a handy propagation beacon--appearing as early as 1745 UTC on good days! (B. Hill, Sharon, MA)

United States

One hundred and fifty to 195 mile an hour winds ripped across the island of Saipan (a U.S. Commonwealth) in the Pacific in early December. Saipan, part of the Northern Mariana Islands, is home to two shortwave broadcasters, **KFBS** and **KYOI** (pronounced "Choy" as in La Choy brand Chinese food). The winds not only damaged the station's antennas, but completely knocked out the island's power grid, breaking fifty percent of the utility poles. While KYOI was able to do some patch work on the antennas and get its power from a back-up generator, KFBS was not so lucky. None of its transmitters were damaged but it relies exclusively on local power, which is expected to be out of service at last a month. Meanwhile the station switched some of its programming over to sister stations FEBC in the Philippines and KGEI in California.

Still, according to KFBS representative Jack Books, the station will continue to add transmitters to its cliff-top site, a mere 400 feet above sea level. Along with its current four 100 kW transmitters, the station already has one more on order from the U.S. manufacturer, Continental, as well as an application with the U.S. FCC for two more antennas. *(Media Network)*

WCSN, the proposed shortwave station of the Christian Science Monitor, did not, as previously reported, meet its original sign-on deadline of January 1, 1987. Instead, says ODXA's Fred Waterer, the station will begin broadcasting in February 1987. The station will also sign on from a transmitter in Saipan (KYOI--curious how the recent typhoon affects this agreement, if at all) at the same time. According to the

report, the station will broadcast "news and features from the *Monitor* as well as religious programming to an area extending from northern Europe to the tip of South Africa." The official sign on date is February 15 but transmitter tests were to begin in late December or January. The official dedication of the station occurred on December 14.

How much does it cost to run a shortwave station? Well, you've got me. But Ian McFarland of **Radio Canada International** did say recently that it costs $80.00 an hour to power and staff one of Radio Canada International's 250 kW transmitters in Sackville, New Brunswick. Imagine the amount of profit one would reap it, say, you owned **NDXE Global Stereo Radio** and got $5,775.00 for a 30 second commercial (see December *World Radio Report*)!

Just think about it. If Mr. Harry Dickson Norman sold just ten minutes of commercial time each hour--20 thirty second spots--it would bring in a revenue of $115,500.00 an hour. Now, assume that he was able to maintain this level over a twenty-four hour period each day. That would come to $2,770,080.00 a day in revenue!

Wishful thinking? You bet. But like the old joke, you'd only have to sell one day's worth of spots at that rate and you'd never have to broadcast again!

Meanwhile, Glenn Hauser interviewed Charles Brigg of the U.S. Federal Communications Commission about NDXE.

Narrator: Is their construction permit still valid?

Brigg: Yes, the permit is valid. It was issued in 1985 and would have expired in 1986 but prior to its expiration, Mr. Norman filed what we call an "extension of time" request, which, until we act on it, automatically extends the time period and we have not yet acted on that request.

Narrator: What is preventing you from acting on it?

Brigg: We did not feel that Mr. Norman had provided sufficient information in his extension application to justify extending the construction time and we have asked him for further information--clarifying information.

Narrator: What information is still lacking?

Brigg: We wanted assurances from Mr. Norman that he had actually ordered his transmitters...We are trying to give him the benefit of the doubt.

Narrator: From the very outset (Mr. Norman) has been using what appears to be a callsign, NDXE. Could you tell us exactly what the status of that is as far as you're concerned.

Brigg: You speak of the letters NDXE. I would assume that they are a logo rather than a call sign. In our country, we assign a prefix of "K" and "W" for broadcast stations. So NDXE is not his callsign.

Narrator: Is there any way he could possibly arrange to have that assigned as an exception to the rules?

Brigg: I think he'd have to go through a few hoops to accomplish that...To my knowledge, we have never assigned a broadcast station a call sign other than "K" or "W," at least in the recent past.

Look for **KVOH**, Rancho Simi, California, to appear in the local evenings on the 9 and 11 MHz bands shortly (11930 kHz until 0300 UTC and after 0300 on 9852.5 kHz, respectively). The station has been having some problems with its transmitter but hopes to have the bugs resolved shortly.

KRSP, the proposed Salt Lake City, Utah-based shortwave station is still planning to go on the air, "as soon as possible" according to *World of Radio*.

WMLK, Bethel, Pennsylvania, on 9455 kHz in English from 1930-2000 UTC. Sermon by Jacob Meyer. Meyer, who claims everyone else uses the wrong names for God, incorrectly referred to Muslims as "Mohammedans." (J. Santosuosso, Highland City, FL)

Special thanks to Bob Hill for some exceptional reports.

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Making Waves

AM/FM/TV DXing with

Paul Swearingen
P.O. Box 4812
Panorama City, CA 91412

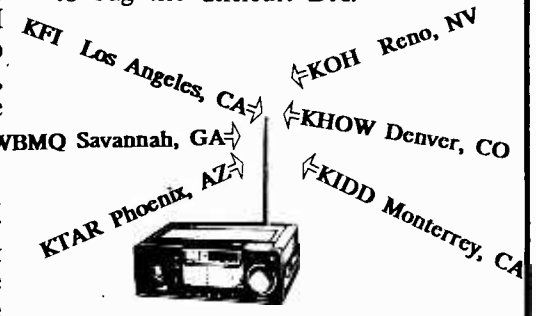
DXing SMART

I've always said that patience is the DXer's most important virtue, but there's something to be said for DXing smart, too. By that term, I mean not trusting Lady Luck to bring the next DX to your receiver, but instead planning ahead to be able to control the variables.

Let's pick a frequency, say, 1250 kHz. You're a Southern Californian DXer who makes DX tapes and does not send reception reports, so your prime DX time is around the top of the hour when stations are required to give legal IDs (call letters and city of license) so that if you tape such an ID your two-out-of-three (calls, city, or frequency) requirements to be on the DX tape are satisfied. You've already taped nearby KTMS Santa Barbara, and tonight you consult a night pattern book and decide that KWSU Pullman, WA, is a prime target for your next catch on 1250 kHz because its non-directional pattern is likely to make it to southern California. Are you in control of all the variables?

Not yet. If you don't have a directional antenna, such as a box loop or ferrite loop, you won't be able to null out KTMS. Your local on adjacent channel 1260, KGIL San Fernando, plays an SID (singing ID) at the top of the hour, splattering 1250 to the point of inaudibility, but at other times airs talk shows which offer little co-channel interference. If you consult your logbook, you know that KWSU is an educational station, which likely airs classical music. Knowing that the FCC allows a ten-minute leeway around the top of the hour for stations to give their legal ID and that most classical programming will not end exactly at the top of the hour, you'll be able to null both KTMS and KGIL, listen for classical music, and be ready to tape an ID at the end of the selection if it is not coincident with KGIL's ID. That's DXing smart.

Most DXers will spend some time just spinning the dials, surveying conditions to see what sections of the country seem to be coming in best. Especially when auroral conditions occur, this technique has its advantages, as if you stick to one or two frequencies waiting for elusive DX targets to pop up, you might not realize that upper midwesterners have disappeared, leaving some channels wide open for Latin Americans normally covered by domestic stations. But choosing DX targets and then DXing smart will help you to bag the difficult DX.



Let's say for some reason you've targeted WBMQ-630 Savannah, GA as your next DX target. You've taken care of projected interference from KOH-Reno, NV; KIDD-Monterrey, CA; and KHOW-Denver, CO by using a beverage antenna pointed directly east at Savannah from Los Angeles, your QTH, knowing that most signals from other directions will be attenuated. What other plans will you need to make?

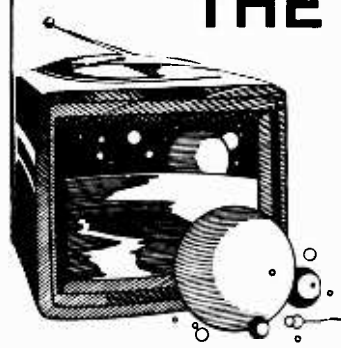
You'll experience some co-channel splatter from KTAR-620 Phoenix and KFI-640 Los Angeles, but you can live with that. What you need to do is pick the time of day that WBMQ is most likely to send a readable signal to southern California.

Now, WBMQ at night sends a 5 kW signal directly at New Orleans, but its daytime pattern is non-directional, according to your references. You determine that in February, WBMQ will change patterns at 4:00 AM PST from your Sunrise-Sunset charts, sending its day pattern on west through a darkness, skywave path to your location, at least during the first part of the month. So the best time to listen is immediately after the pattern change until the daylight terminator moves west and the signal fades, and if you can obtain exact, daily sunrise times for Savannah, you can even plan to the minute the amount of time you have to DX a darkness path between pattern change and sunrise.

Targeting such stations is not just idle wishing either; flea-power 250 kW CJFT-530 Port Erie, ON, has been heard as far west as Colorado now, and I fully expect a Pacific coast DXer to report it by the end of the month, if not sooner, as DX conditions improve and interference quiets down. Keep in mind, also, that low-power, low-band stations shoot shoot groundwave signals farther than stations above, say, 1500 kHz but those upper band stations are more prone to skywave propagation. Theoretically, a domestic upper-band station should easily be audible at your QTH, if the channel is quiet and if it pushes any kind of signal in your direction.

As the weather grows warmer, you might consider DXpeditions to locations away from electrical interference. We're lucky in southern California to have quiet, warm, dry deserts in which we can set up beverage antennas. On the other hand, one of our prime locations happens to be in the vicinity of an abandoned landing strip used by drug traffickers and several of us had to do some fast talking to San Bernadino deputy sheriffs with riot guns who checked us out one evening last spring. DXing smart doesn't always apply to radio listening techniques! ■

THE OUTER LIMITS



Dr. John Santosuosso
P.O. Box 1116
Highland City, FL 33846

Scott McClellan
P.O. Box 982
Battle Creek, MI 49016

Tales of Buccaneers:
Is pirate activity about to increase? Well, maybe or maybe not, but there are several interesting developments at the moment. Several years ago a now defunct pirate station had a loyal and happy audience because of its clever programming. It was of the quality of that produced by Radio Clandestine and the Voice of Laryngitis. It never got busted, but the operator got involved in other things and the station became part of radio history.

Recently we learned, however, that it may be preparing for a comeback. If this is the case, pirate fans will be in for a real treat. We cannot say more at this time, but we will keep you posted if and when we get the "green light" to tell you more.

We have always been grateful to "Raunchy Rick" of Tangerine Radio as he is one pirate who has kept us up to date about what goes on at his station. With its political anarchist philosophy, Tangerine Radio has been one of the most fascinating and controversial stations around. Unfortunately, it hasn't been the easiest to hear.

Now Rick says that the station is in the process of improving both its equipment and antenna system. Hopefully you may find this one easier to hear in the future. Look for it in the 41 meter band weekends and when the moon is full. Both AM and SSB are used. Normally broadcasts begin about 0500 UTC. Reception reports go to Box 5074, Hilo, Hawaii 96720. Be sure to enclose three mint first-class stamps. A dollar (cash only) will get you a sample copy of the station's fascinating publication, "The Wave."

From Connecticut, Greg Bares sends along word that a CB operator with the handle, "Long Winded Larry" has turned himself into a cable TV pirate by deliberately interfering with programming on cable channel 5 in the central part of Connecticut. It appears, however, that cable TV subscribers did not find Larry all that entertaining.

The sad thing is that this type of piracy tends to give all pirates a bad name. The vast majority of those on shortwave try very hard not to interfere with any kind of broadcaster.

Our thanks to Frank Simmsen of British Columbia who sent along a newspaper article from "The Province" about the closing of Canadian pirate TNFM.

And since we are on the subject pirate stations, it's time to to call in Scott McClellan for his timely report on what everybody has been hearing out there.

The McClellan Report:
Steve Forst of Pennsylvania checks in with his latest loggings. He caught a transmission from WHOT on 1629 kHz from 0210 until he tuned out at 0600 UTC. He had a poor signal at first, but by 0430 it was fairly loud and clear. The format was rock music, and they claimed to be coming from Brooklyn, NY. Steve called the phone number given and was promised that a QSL card would soon be in the mail.

Steve also reports a station that has been around for quite a while but it is rarely reported. It is called The Global American Network. He thought that it was a licensed station when he first ran across it on 7475 kHz at 0501 UTC. They had a "real" newscast, and features such as "the History of Magnetic Recording," "Profile of Radio Caroline" and an "Interview with Charlie Daniels. "No parodies or jokes," says Steve, "just regular stuff!" This unusual station also claimed to be transmitting on 7375 kHz but he didn't hear that

frequency. I'm sorry to say that I know of no address for this station.

Jim Williams of writes to share his logging of The Voice of Communism. the pirate that makes its living poking fun at Radio Moscow. It was on the somewhat unusual frequency of 3410 kHz at 2139 to 2201 UTC. Some pirates have suggested using this frequency range but this is one of the few who have actually gone forward with the plan. Most stations should do so if Jim's reception quality is any indication -- he reports and excellent signal. He also enjoyed the parody of Radio Moscow which spent a considerable amount of time comparing the USA with the USSR. They make some outrageous claims, which have to be heard to be believed!

Greg Doerschler of Connecticut reports hearing Radio Clandestine on 6143 kHz at 0703 UTC. "Unfortunately," says Greg, "the excitement was short lived. The station signed off two minutes later. Better luck next time, Greg. Radio Clandestine will QSL reports sent via P.O. Box 982, Battle Creek, MI 49016.

Roger Clayton has been hearing what seems to be a new pirate, WROX, on 1620 kHz, generally between 0500 and 0800 UTC. He has heard this station several timers with fairly good reception in Massachusetts. They play a variety of rock oldies, sometimes sending out dedications. They have a mailing address but unfortunately Roger couldn't copy it.

That's it for this month. Thanks to all who have written in; your letters are very encouraging. Remember that if you desire a personal reply, a stamp or SASE is requested. See you next month.

Radio Venceremos:
This anti-El Salvadorean government clandestine is one of the best known of all clandestine stations. However, recently it appears to be up to something. DXer Steve Reinstein reports in DXSF that he's heard a Radio Venceremos program being broadcast over Radio Huancavelica, Peru, on 4885 kHz. While there are a number of unlicensed shortwave broadcasters in Peru, this one does possess a government license. Steve heard the broadcast between 1031 and 1052 UTC and it included the Venceremos theme song as well as the usual "yanqui propaganda."

This may be an isolated case or it could be a significant development in Latin American broadcasting. If any of our readers hear anything similar on this or other stations, please let us know!

And some frequencies:
Finally, a contributor who wishes to remain anonymous suggests you might like to tune in the following frequencies: 26905, 27165, 27295, 27355, 27455, 27515, 27665, 27695, 27765, and if propagation conditions are unusually good, also 29705 to 29995 kHz. With a little patience, you will be well rewarded. See you next month. Thanks for your help, everybody. ■

RADIO SIGNALS PLAGUE PILOTS

The abundance of two-way radio equipment is proving to be a headache for FCC officials and to legitimate licensees as well. Two recent incidents underscore the problem.

In Atlanta, two Boeing 727s carrying 168 passengers and crew, narrowly missed colliding with one another because their assigned frequency was blocked by a transmitter left on with a stuck microphone.

We personally heard an identical malfunction two nights ago during which an aircraft transmitted "dead air" for several minutes and only background flight compartment noises could be heard.

In Miami, aircraft are being deliberately misguided by a perpetrator with a radio who knows the lingo. Fake transmissions have resulted in at least one premature descent and airlines have been warned of the huckster air controller.

A call to the Federal Aviation Administration (FAA) regional headquarters revealed that the transmissions had not been heard since early November 1986.

(Items from Robert Eisner, Wheaton, MD)

Like to have a by line in MT?

Send us timely, radio-related clippings and news notes and see your name in print!

MT UTILITY INTRIGUE

Don Schimmel
516 Kingsley Road SW
Vienna, VA 22180

Answering the Mail

I want to thank the several readers who pointed out I had neglected to name the source of the U.S. Government books I had described in the November issue of *MT*. The books are obtainable from the "Superintendent of Documents, Washington DC 20402." Sorry about the omission.

For those who are interested, I have noted the 26 and 27 MHz bands are again providing voice activity from south-of-the-border. In the past these frequencies have yielded military, other governmental, and business type voice nets of some Central American and South American countries.

Bill Frantz of Georgia advised that he had picked up an interesting phone patch from AF-2 with Senator John Heinz aboard. The phone patch was through Andrews AFB to VP Bush and various matters were discussed regarding the November elections. The frequency in use was 11180.2 kHz LSB.

Bill also had intercepted calls "Raspberry Pensacola" and "Spartan" on 8771 kHz USB with a phone patch to Midway Island inquiring about parts and parts numbers.

A request for information on 27560 kHz was received from Chris Rumbaugh of California. Chris heard a RTTY signal on that frequency from 1400-1430 UTC. I am sorry I do not have any positive identification for that particular frequency. My data shows 27555 kHz assigned to DOE Oakridge, Tennessee, and 27565 assigned to various Army, Navy, Commerce, and DOE units of the U.S. Government.

Recent coverage of the U.S. Navy radio station at Balboa, Panama, provided additional RTTY routing indicators and here they are:

RUCBIPA	COMAR ASUNCION PA (Paraguay)
RUTADS	USDAO DAKAR SG (Senegal)
RUEDAKA	NAVRESREDCOM REG 5 Ravenna, OH
RHJNSA	NAVRESREDCOM REG 7 Charleston, SC
RUCBSAA	CINCLANT Norfolk, VA
RUCBIPE	OCA PERU
RUCBICI	OCA SANTIAGO CI (Chile)
RUCBICO	CFNA CARTAGENA CO (Colombia)
RUEHPE	USDAO LIMA PE (Peru)

The traffic containing the above Routing Indicators was copied on 13371.5 kHz with the RTTY transmissions being at 75 baud and 850 Hz shift.

SPECIAL MORSE CHARACTERS

In answer to several requests I am listing some special Morse Code letters I have seen in Latin American traffic. In certain other languages the Morse Code characters represent different letters of the respective alphabet:

LETTER	MORSE	SOUNDS LIKE
A	. - . -	AA
A	. - - . -	WA
CH	- - - -	OT
E	. . - . .	UI
N	- - . - -	MW
O	- - - .	OE
U	. . - -	IM

Last month in the column I commented on the Spanish language activity present in the 14.4 MHz region. It is suspected that some of this is smuggling-related, some possibly terrorist-related, and yet another kind of communication which has not as yet been tied in with either of the other two types.

I checked back in my logs and it was interesting to note that many of the identifiers used several years ago are still in use today. Here is an extract from those old logs which shows the various frequencies along with the identifiers utilized.

14464	Leone, Mono, Elephante, Poppi
14667	Gorilla, Poncho, Margarita, Paloma, Bronca, Fuero, Gato, Negro, Conde, Manolo, Paranta, Figero, Gordo
14451	Primo
14466	Leone, Elephante, Mono
14452	Carlo, Primo, Leunto, Ramo, Monterey, Roma
14452	Caliman, Poncho, Negro, Primo, Cuarenticinco, Ganoso
14450	Primo de Carlo
14452	Compadre de Pequena, Carlos de Primo, Picando de Carlos, Primo de Cajaco, VJ de Indio
14452	Gato de Pequeno, Muni, Carlos de Pequeno, Sandra de ?, Ganoso de Primo, Central de?
14466	Gordo, Elephante, Junio de Ricky, Cisco de Boy, Compadre, Leon de Morena

Since this is voice activity (usually USB), the spelling of the identifiers is as they sounded to me. Traffic is usually in cryptic conversational format, so it is often very difficult to make sense out of what they are talking about.

MYSTERY ACTIVITY

For a number of months I have been following periodically the net on 6243.3 kHz and I have mentioned my observations in the column. During November I checked the frequency eight different days which revealed a possible connection with another net on other previously heard frequencies.

On 13 November the use of callsign LIA was noted; it has since been seen in use on 4536, 4548, 6097, 6252, 6898, and 7487 kHz. Some of the frequencies have apparently been abandoned.

The traffic passed has been either five digit groups or has consisted of five character groups composed of letters, the Spanish Nyeh (MW) and digits 2, 3 and 8. More recently it has been noticed that the letter traffic still utilized the Spanish Nyeh but has dropped the use of the three digits.

November callsigns included LIA, PLA, HAS, ADO, WSA, DEL, TRU, and ABA. I am not certain but it appeared that WSA replaced LIA as the callsign for the control station.

The callsign ABA has also been intercepted in the past on 3463.6 kHz where he is presumably the net control with out stations MSU, KAN, CAB, ELE, DAR IDE, JAR, LAC, NSB,RIZ, FOG, GAL, and HUM. There may be a few more whose callsigns I do not have yet. There are many operating similarities between these nets and some Cuban communications I have recently seen. At this point it is difficult to say what purpose these networks serve but they may very possibly be connected with Cuban Naval activity.

On 21 November at 2220 UTC a RTTY transmission of 50 baud and 425 Hz shift was copied on 10595 kHz with 5L groups, but with what appeared to be a digital heading of one group of 5-digits followed by four groups of cut numbers. After a few lengthy messages the station went down with"QRU QRU SK SK."

"OP5Z DE QQLA" callup was heard on 13555 kHz on 25 November at 0058 UTC. QQLA kept sending QSX NR 3 BT followed by ZBR R K. QQLA had a very strong signal and, after a few callups, he evidently went down. I am unable to identify these callsigns.

Another case of a repetitive transmission, this CW station was intercepted on 12 November at 1404 UTC on 13558 kHz sending over and over the dinome 06 followed by the 5-digit group of 52719. I frequently checked back on this frequency and the same groups continued to be sent.

I did not get any callsigns for the RTTY (50-170) traffic of 5F groups which I heard on 13778.5 kHz on 30 November at 1241 UTC. There was very bad hum on the carrier and the message heading consisted of a message number and group count only. Some traffic had a heading with MF preceding the message number.

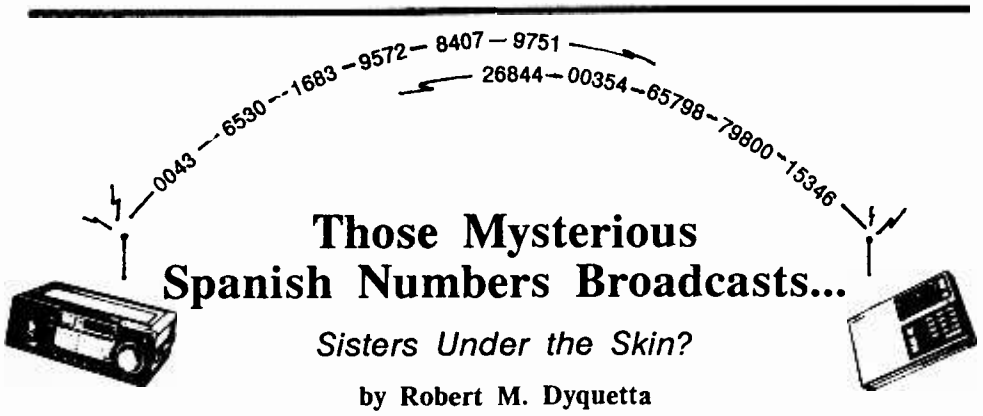
Cut number traffic was seen on 13795 kHz on 25 November at 1633 UTC. This CW message was preceded by a lengthy callup of DRN AAW followed by BT sent three times and into the message. Upon conclusion of the text, AR and VA were each sent three times and the signal terminated. The group count was 115 groups and this seems to indicate a cut number system of A B D Y W R U G N T for the digits 1-0.

That RDF Antenna

I have revamped my Adcock antenna and plan to put it in place of ▶

NOVEMBER 1986 LOGGINGS

KHZ	DTOI	MODE/IDENTIFICATION/COMMENTS
227	290308	CW/GDX Beacon, Upperville (Goodwin Lake) VA
340	290310	MCW/BQG Beacon, Woodbridge, VA
347	302250	MCW/IA Beacon, Decorah (Municipal) IA
353	301142	MCW/FME Beacon, Ft. Meade (Tipton AAF) MD
360	301145	MCW/RW Beacon, Camp Springs (Andrews AFB - Kirby) MD
3245	260251	CW/No calls/Digit grps of various lengths
3273.4	260255	CW/MARS Training Net
3445	260308	AM/YL-SS with 5F grps, hum in backgnd
3458	250330	CW/YUB DE RVN (both uniden)/Digit grps of various lengths
4143.3	301230	USB/KGW347 (SONAT Marine, Inc., Phila., PA) wrkng uniden stn, bad QRM, lots of stations up at same time
4245	301223	CW/DE VIS (Sidney, NSW, Australia)
4312	302242	CW/DE FUG (La Regine, Castelnaudry) France with WX in English re Gale Warning
4403.9	301212	CW/KMI (San Francisco, CA)/with traffic list
4487.3	302240	RTTY 50-425/No calls/Coded WX
4584.5	302234	USB/Various LOWLAND calls/this is CAP Net located in West Virginia
4637	301207	USB/No calls/Barge tfc, one barge ready to enter uniden lock
5425	302220	CW/DE KRH50 (US Embassy, London)
5438	270136	CW/? DE 38 NIL K (Unidentified)
5857.3	302225	RTTY 50-425/ADN - East German Press Svc with press in Spanish
6273	161526	CW/? de JGGP (Japanese ship)
6506	302214	USB/Miami Weather Center with WX for Caribbean Ocean area
8716.3	16122	CW/DE HPP (Panama) with channel guard information
11570	301449	RTTY 75-850/NBA (US Navy Balboa, Panama)/running test tape
12417.4	302204	USB/Conversation between two OM in what appears be Greek language
14406	061945	RTTY 75-170/MARS msg from Osan AB, Korea, relayed through Hickam AFB, Hawaii to recipient in Mechanicsburg, OH
15103	301716	CW/DE CTP (Oeiras Naval Radio, Portugal) with QSX 4 8 12 MHz
15729.1	301719	RTTY 50-425/Arabic text
17230.5	301722	CW/GKQ6 (Portishead, England) with callsign marker
20350	301501	RTTY 75-850/NBA (US Navy, Balboa, Panama) with test tape



Those Mysterious Spanish Numbers Broadcasts...

Sisters Under the Skin?

by Robert M. Dyquetta

For many long years, number transmission buffs have attempted to unravel the enigma that surrounds the "spy numbers" broadcasts. Of the many basic formats, two are most frequently reported by North American listeners: one is the four-digit Spanish female (4D SS/YL) who uses a ten count in the preamble and "fin" for signoff; the other is a five-digit SS/YL who utilizes "atencion" in the preamble and "final, final" in the signoff.

Those of us who were bitten by the curiosity bug have attacked these two number types from virtually every available aspect. Attempts were made to decipher the texts and to log all oddities that occurred prior, during and after a given transmission.

Some chose to chase the transmissions down and eventually came up with day, time and frequency schedules. Even agencies of the U.S. government were canvassed in a futile attempt to obtain some information. Number transmissions were tape recorded, transcribed, examined, and re-examined for data.

While these and other avenues of investigation all provided tantalizing clues, in the end all that was uncovered scarcely seemed worth the effort. Among the basic discoveries was that the voice is not human but rather the by-product of electronic voice synthesis.

A Breakthrough

In the April 1984 issue of *Monitoring Times*, a number investigator revealed that he was able to D/F at close range the four-digit SS/YL transmissions; they came from a transmitter site within a large U.S. government communications complex. Officially called the "Warrenton Training Center," the four-digit transmissions originated near the Culpepper/Remington, Virginia, area.

As for the five-digit transmissions, no concrete data has surfaced except that most D/F attempts place them as originating from Cuba.

The FCC Replies

Even armed with this new information, subsequent inquiries to various government agencies failed to secure any additional data. The FCC did, however, state that the frequencies being employed were within allocated fixed service bands and therefore those engaged in their transmission had the right to utilize communications security measures to ensure the privacy of their transmissions.

As for the possibility of the five-digit transmissions coming from Cuba, this was outside the jurisdiction of the FCC and number buffs would have to take that matter up with the Cuban communications agency.

After the *MT* location story broke, many listeners believed that this proved that, whereas the four-digit number broadcasts were a U.S. government operation (meaning of an intelligence nature) it seemed natural that the five-digit number transmissions were the work of the Cuban/Russian intelligence counterpart.

If the allegation is true, the possible QTH for the five-digit SS/YL transmissions was probably the large, multipurpose Cuban communications complex at Batu, just west of Havana.

This was a very plausible scenario, considering that the U.S. government agencies still refused to comment on the four-digit transmissions. We apparently had the game of spying, played out by opposing intelligence organizations.

But there remained one piece of evidence that every number buff encountered while monitoring, yet no one really appreciated it for what it was worth.

A Little Detective Work

These voice-synthesized transmissions are probably computer controlled; this would account for the timed precision of the vocalized numbers. Both types have a flowing rythmn to them, so much so that when you conduct any intensive monitoring, you subconsciously lock onto the cadence of the vocalizations.

For instance, each four-digit group occupies an identical time frame and follows the silent interval of the preceding group. A similar format occurs with the five-digit transmissions. But what everyone had previously overlooked was to compare the two.

The Experiment

To examine this aspect, two simple pieces of equipment were required: a digital stop watch which measures in 1/100th of a second and a two-speed tape recorder.

A four-digit and a five-digit transmission were taped at normal speed, then played back at the lower speed, allowing more accurate time line measurements of:

1) The time required to vocalize an entire group;
2) the time interval between the start of one group and the start of the next group; and
3) the time required for each numeric vocalization in a group.

To accomplish this analysis, 25 five-digit groups were surveyed and 31 four-digit groups received the same treatment. Each examination was conducted three times and then averaged out to minimize errors in hand-tripping the stopwatch.

The figures were rounded off to the nearest tenth of a second after being divided in half to represent the actual normal speed of the transmissions.

Startling Similarities...

The results of this survey are as follows:

1) Average time per group:
   a)5-digit (Cuban)→300/100=3 seconds
   b)4-digit (U.S.)→238/100=2-4/10ths seconds
2) Average group to group times:
   a)5-digit (Cuban)→465/100=4-7/10ths seconds
   b)4-digit (U.S.)→466/100=4-7/10ths seconds

Clearly, the four and five digit transmissions have ***identical*** group-to-group time lines. Even more startling are the time-line averages required to vocalize each numeric:

a) 5-digit (Cuban)→300÷5=60 or 6/10ths second

b) 4-digit (U.S.)→238÷4=59 or 6/10ths second

These four- and five-digit broadcasts, assumed to be the handiwork of opposing intelligence agencies, operate with ***identical*** time lines. The only real differences are in language and voice pitch, number of digits, and transmitter locations.

...with Tantalizing Implications

Let's speculate. If the four-digit is a U.S. intelligence operation and the five-digit is a Cuban/USSR intelligence operation, then each side would be using their own electronic equipment. For both to end up with identical time line parameters is highly improbable.

For one side to copy the audio time frame of the other also seems improbable; it would not fool the opponent. While it may fool hobby listeners, they are of no concern to those government agencies.

But what if these two agencies are a cooperative operation--not opposing one another, but working together? Since so much secrecy surrounds these numbers transmissions, they might involve diplomatic correspondence.

The USA and Cuba publicly state that they have no formal diplomatic relations. Could these, then be of a more practical nature such as air traffic control or radiotelephone coordination? This conjecture has a glaring weak point: The absolute secrecy that prevents any agency from divulging pertinent information on these transmissions suggest national security rather than a civilian project.

Some Other Possibilities

The five-digit transmissions might come from EAST of Havana--specifically, Guantanamo Bay. Gitmo is a U.S. Naval installation in Cuba and a prime communications-gathering intelligence source for eavesdropping on Cuban/USSR clandestine, military and diplomatic activities.

This could easily explain why both the four- and five-digit transmissions have identical parameters--they both use the same equipment.

Some researchers have suggested that the five-digit transmissions originate from within the U.S., with Florida or the Keys being the most probable, or from an island (nation) within the area of Cuba.

If the four- and five-digit number stations are engaged in a mutual effort, then why have two different presentation formats? Perhaps to instantly ID their point of origin.

An Inescapable Conclusion

The bottom line is that both the four- and five digit SS/YL number transmissions exhibit identical time-line envelope parameters, and it is inconceivable that this similarity came about by sheer coincidence. Are the five- and four-digit SS/YL number stations holding hands in an as-yet-unknown venture which, up to now, has been very effectively kept from the public? ■

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the loop antenna. I want to make some slight changes in the loop configuration and, after a period of experimentation with the Adcock, will again check out the loop.

I am hoping that I will arrive at a workable DF antenna that, while it will not provide fixes down to a gnat's eyebrow, will give some meaningful bearings that will be useful in determining the country of origin of desired targets.

It certainly seems to be true that DF work is not a science but rather is an art. If the results are promising I will pass on the details in an upcoming column. ■

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READING RTTY

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Receiving FDM: The Hardware

by Jack Albert

Since my article "Monitoring Buzzsaws" appeared in the December issue of *MT* I have received letters from persons asking if they have the proper receiver or TTY setup for copying FDM. In order to clear up many of these questions I have compiled a list of equipment needed to copy FDM which includes a receiver bandpass of 270Hz wide or less; most receivers under $700 do not meet this requirement.

I.F. Filters

A bandpass of 240Hz is recommended for FDM. A single 270Hz or 250Hz wide second I.F. may work. A 500Hz second I.F. with either a 2.4 kHz or 500Hz third I.F. is a good choice (see diagram below).

RECEIVERS	I.F. FILTER	
	FIRST I.F.	SECOND I.F.
ICOM R70 OR R71	FL63 (9MHZ)	FL44 (455kHz)
ICOM R70 OR R71	FL32 (9mHz)	FL44 (455kHz)
KENWOOD R5000	YK88CN (8.83mHz)	
KENWOOD R5000	YK88C (8.83mHz)	YG455C (455kHz)
TRANSCEIVERS (HAM ONLY)	**I.F. FILTERS**	
	FIRST I.F.	SECOND I.F.
ICOM 751	FL63 (9mHz)	FL53A (455kHz)
ICOM 745	FL54 (9mHz)	FL53A (455kHz)
ICOM 735	FL63 (9mHz)	
KENWOOD 940 AND 930	YK88C-1 (8.83mHz)	YG455CN-1 (455kHz)
KENWOOD 440, AND 430	YK-88CN (8.83mHz)	

I use the 500Hz (9 MHz) second I.F. and the 2.1 MHz (455 kHz) third I.F. filter from International Radio Inc (751 S. Macedo Blvd, Port St. Lucie, FL 33452) in my ICOM R71. The IRI filters perform better than the stock filters in my ICOM R70.

Audio Notch Filters

The audio filter is connected between the receiver's audio output and the TTY decoder's input.

1) Autek QF1-1A
2) Heathkit HD-1418
3) MFJ-7528 Dual Filter
4) Palomar FL-4

I use a homebrew dual diquad notch filter with a "split audio" modification in the ICOM R71.

RTTY Decoders
or TU's (tuning units)

A variable shift should be adjustable to 50Hz.

1) AEA CP-1
2) AEA ATU-1000
3) Kantronics Challenger TU
4) Kantronics UTU
5) Kantronics UTU-XT
5) MFJ-1229

I use a homebrew decoder with a variable shift control, a switched capacitance filter and a frequency counter for precision shift readout.

Computer Programs

The computer program should have a variable baud rate adjustment.

1) AEA SWL Test (for VIC-20 or C64, this is the best for shortwave listening)
2) AEA MBA Text (for VIC-20 or C64)
3) Kantronics Hamtext (for Apple, Atari, C64 and Vic-20)
4) Macrotronics RM series software for Apple, Atari, IBM and Radio Shack.

I use the SWL Text and the Commodore C64 with a disk drive and a Commodore MPS-803 printer.

Addresses:

Amateur Electronics: 4828 W. Fond du Lac Ave., Milwaukee, WI 53216; PH (800) 558-0411

Autek Research: Box 302 Dept. J, Odessa, Florida 33556

(AEA) Advanced Electronics Applications Inc: P.O. Box C-2160, Lynnwood, WA 98036

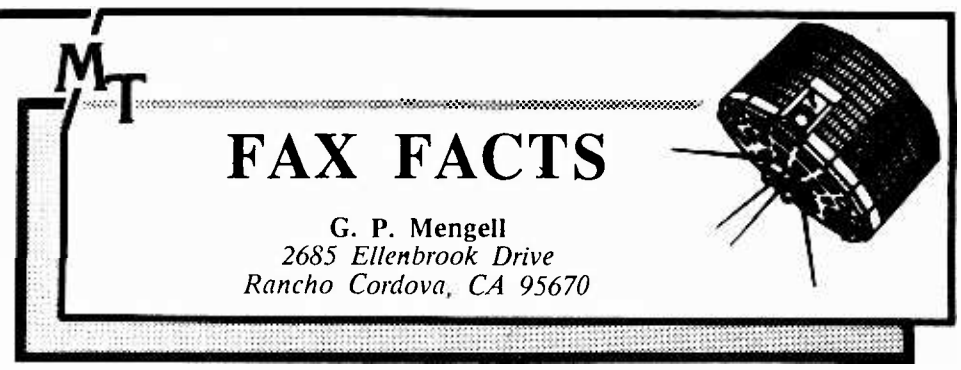
(Heathkit) Veritechnology Elect. Corp.: P.O. Box 167, St. Joseph, MI 49085

International Radio Inc: 364 Kilpatric Ave., Port St. Lucie, FL 33452

Kantronics: 1202 E. 23rd St., Lawrence, KS 66044

MFJ Enterprises, Inc: Box 494, Mississippi State, MS 39762

Palomar Engineers: 1924-F W. Mission Rd., Escondido, CA 92025 ■



TIROS

When attacking this article, I was beset with the journalistic dilemma: What is it my readers need to know about Tiros? Depending upon your response, we can spend several columns on it alone.

Tiros is our low-earth-orbit weather satellite. It gives breathtaking close-ups of both the earth's weather systems and very good geographic detail. If you need to know what weather is heading your way, this is the "now-casting" format for you!

Most often when one conjures up visions of satellite stations, he envisions racks of equipment, large dishes on pedestals and so on for Tiros. Those days are past.

Thanks to the inventiveness of RCA and government designers, A.P.T. (automatic picture transmitting) became the format of use,enabling many users of land facsimile equipment to make minor modifications to receive the 137 MHz satellite signals. Reception became remarkably simple as time progressed; now it is almost down to black-box technology in its approach.

The results of an aircraft band antenna, a $40 Vanguard pre-amp and an under-$200 Vanguard FM receiver running into an Alden 9225 or 9244T printer are exceptional, giving coverage from the tip of Baja, California, to Prudhoe Bay, Alaska. A truly remarkable view.

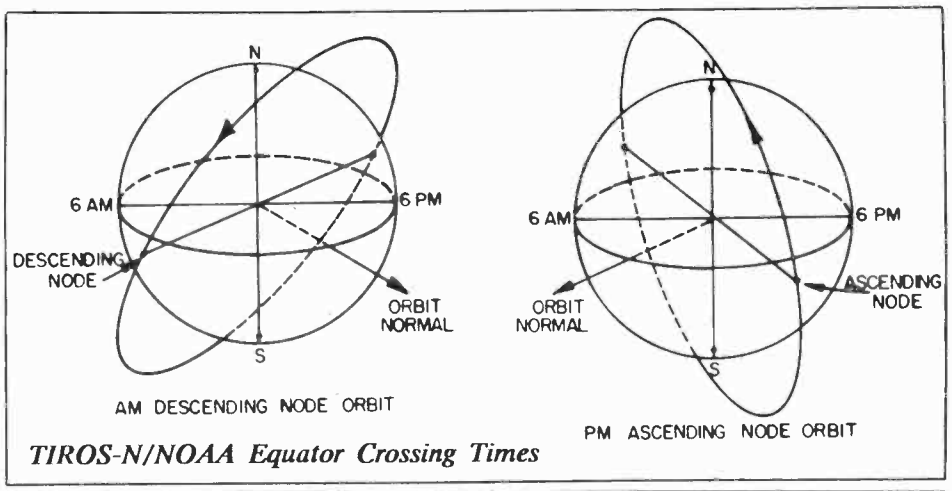
The Tiros satellite transmits on 137.5 and 137.62 MHz (NOAA is designated the 137.62 frequency, while the new NOAA 10 "Super Bird" is on 137.50). The NOAA 10 bird is a morning satellite which is northbound with acquisition of signal usually around 7:30 local sun time; NOAA 9 is an afternoon orbit.

It is possible to receive orbits prior to your region and past your region of interest (see diagram); for example, here in California we receive passes over the midwest and out to sea on a regular basis. We then piece them together to make a mosaic for forecast use.

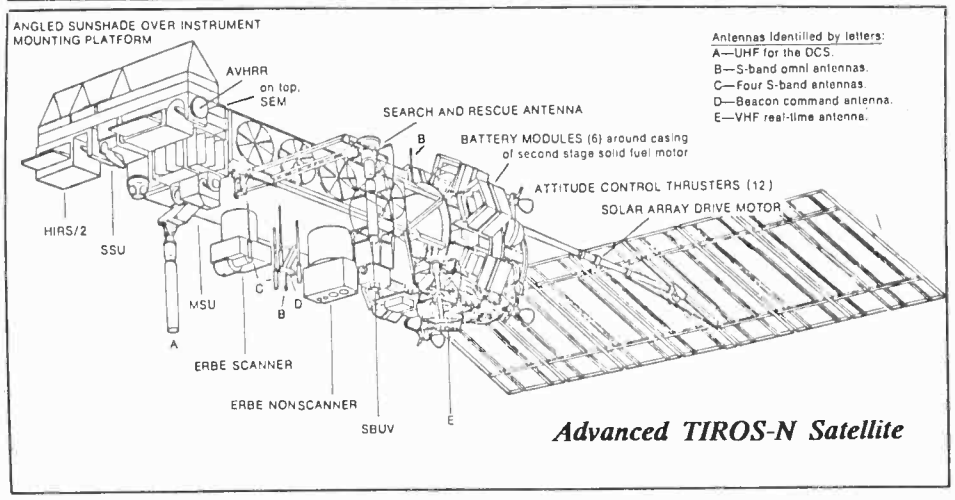
If you are interested in this approach, you should probably go for a steerable antenna array. KLM has a very good circularly polarized Yagi. Ours is steered by a Kenpro KR-5400A rotor-controlled combination (see illustration).

All rotor controls and dials are on one box with large dials and user-friendly paddle controls. Response time is quick, so losing the bird during the orbit is rare. If a steerable system appeals to you it is the one I would heartily recommend.

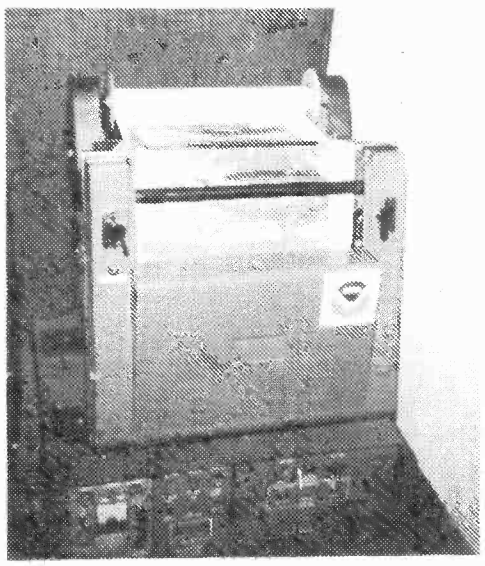
Another method involves an omni-directional antenna for regional passes. Usually standard



TIROS-N/NOAA Equator Crossing Times



Advanced TIROS-N Satellite



The equipment shown on the left is an Alden 9705 TIROS machine (which is contrarily turning out a weather picture from the USSR's Meteor satellite in this particular photo!).

For a steerable (directional) antenna array, we can recommend something like this circularly polarized Yagi from KLM steered by the Kenpro KR-5400A motor pictured on the right. Further to the right you will also see pictured our omni-directional antenna used for TIROS (and Meteor!) reception.

To complete the set-up, the lower right photo shows a Vanguard receiver (this one is used with a Muirhead printer).

surplus aircraft air-to-ground antennas with preamps do a superb job. One mounted above our shop picks up two "Meteor" (Soviet equivalent to Tiros) passes a day--south of Baja to Alaska with no preamp!

No discussion of weather satellites could be complete without a mention of GOES (geostation orbiting environmental Satellite) originating with the A.T.S. series in the late 1960's and operating on the 137 megahertz band. The GOES system was upgraded in the 1970s to operate at 1691 MHz.

GOES sounds early hurricane warning, severe weather monitoring and global relays of weather data, retransmission of the European "Meteosat," as well as relay of polar orbit mosaics from areas normally out of range of U.S. based stations (such as weather over Iran or India).

(Continued next month)

Interview:

MT's Larry Miller talks with MT's Bob Grove about

MONITORING TIMES

Miller: So how is *Monitoring Times* going? We've seen -- how many issues since we merged *MT* with *International Radio* magazine -- eight issues now.

Grove: Basically, we find that the magic seemed to be when we sent out the January issue. The number of new subscriptions coming in from people who got a sample copy is just staggering. We still haven't caught up. We're days behind in trying to get their names into the computer. We picked up many hundreds of subscriptions -- maybe a thousand or more.

Miller: And the month isn't even out yet.

Grove: So we still haven't seen the full impact of the merger, the new thrust that *MT* has in virtually all aspects of listening; now with the exposure that we've gotten from sending out those free samples to people who are just casually interested in radio we've seen an overwhelming response.

Miller: What is the number of subscribers now?

Grove: It was at 10,000 but now it's taken the great big surge again. So let me guess that our subscription rate is now around 11,000.

Miller: Are you generally happy with the progress of *MT*?

Grove: Yes. Yes. I'm very happy with the progress of it. One of the most important things we've ever done is this reader survey. There are some things that have come back that indicate that overall -- 80% of what we're doing is right on the money -- right smack on target. But there's a few percent there that we can play with that will improve it considerably in the eyes of the readers.

Miller: Isn't a survey of *MT* readers -- and I'll use Jonathan Marks' favorite question about such surveys -- kind of like going to the bus station and asking people what mode of transportation they take? Of course they're going to say, "The bus."

Grove: (Pause) There's no question that some questions on the survey are weighted. For example, the very first question: "To what magazines do you subscribe?" Well, obviously, the larger number is going to be *Monitoring Times* because the survey went to *MT* readers. But I was impressed that *Popular Communications* came up as well as it did. Sixty-seven percent of *MT* readers are also *PopCom* readers.

Miller: What changes have you seen since we merged our two magazines?

Grove: *Monitoring Times*, for a number of years, through trial and error, writing, and marketing techniques, reached stability and sure growth. But we were seriously lacking in our shortwave broadcasting because, quite frankly, that is not the strength of the publisher and its writing staff.

International Radio magazine, which had enjoyed a reputation of credibility with some top names in the field, had not reached the marketing potential that it had hoped to, either.

The combination of the two together was a blend that culminated in an extremely successful venture for all listening interests.

Miller: It was two "almost" publications that got together and the mix was magic. God knows both of us had doubts in the beginning.

I look back at old issues of *International Radio* and *Monitoring Times* -- as recently as June, 1986 -- and I'm aghast that either of us put out these publications.

Grove: It shows what people will put up with in order to get their information! [laughter]

Miller: Well that's honest enough, Bob. But why look back? What's ahead for *MT*?

Grove: As our poll shows, we know where people are learning the most about *MT* and where they're learning about radio listening. As a result we'll penetrate that market heavier with advertising.

Miller: The survey has obviously impressed you. How will that information impact on Grove Enterprises on a larger scale? The survey has shown a strong emphasis on shortwave. Are we going to see Grove Enterprises go more into shortwave?

Grove: We'll see Grove Enterprises take a stronger stand in the shortwave market in the months to come. Also in the scanner market--you're going to see some stronger merchandise availability. We know what people want now. There was a very clear mandate.

Miller: What about the impact of the survey on the magazine? There are indications that certain columns are not hacking it and others that are showing very well...

Grove: There are some columns that are not making it and some subjects showing very little reader interest -- oddly enough, some that are the best written. And there are some directions we need to go; for example, I get a lot letters saying that I'm sacrificing scanner listening for shortwave -- a lot of that came through.

I know scanner listeners want more profiles on VHF-UHF stuff: What they can hear, what types of systems, and they want to know more about the typical scanner hobbyists. What do they hear?

The term "vicarious fulfillment" seems to be realized in shortwave and scanner listening. And we have to cater to that. A guy sits there and pretends that he, too, is a Michael Gurdus and that the next time there's a hijacking he's going to tune up and he's going to hear that pilot saying "My life is threatened. He's standing here with a gun." By getting *Monitoring Times*, you people are going to be in the know about what's going on out there and you're going to be one of these guys.

I'm not talking yellow journalism. We can provide nothing but facts but in a way that is exciting and fulfilling.

Miller: That's entertainment...

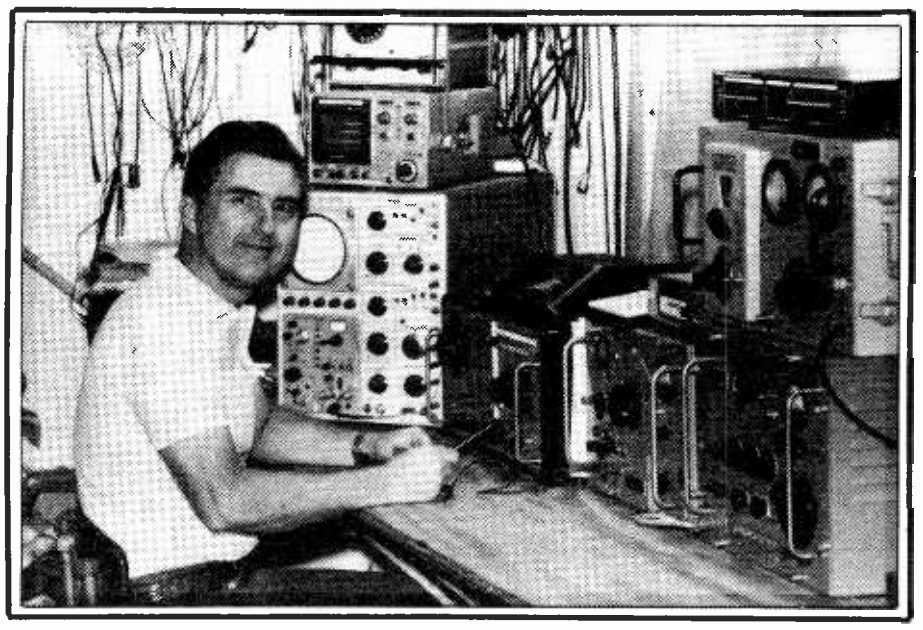
Grove: Educational entertainment. That's essentially what our field is.

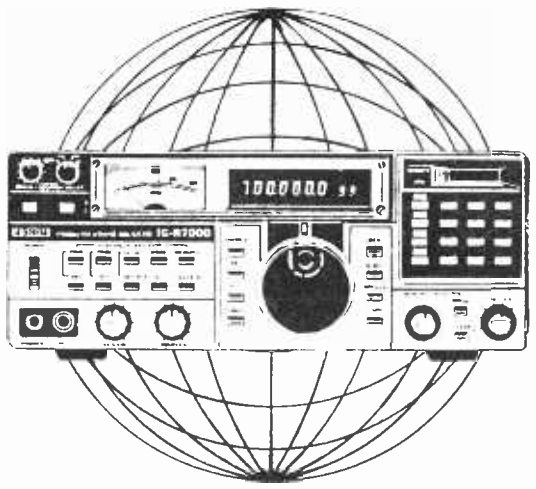
Miller: I tell that to people all the time. They say, "You're a journalist." And I say, "I'm not a journalist anymore. I'm an "entertainment journalist" and there's a hell of a difference, primarily in approach. There's a big difference between what I did when I was a news broadcaster/reporter in Philly and what I do now. It's worlds apart.

In any case, the general philosophy is working to some degree, though I don't agree with the vicarious fulfillment concept.

Grove: There's no question that *Monitoring Times* is now considered a leading and major tenable force out there. The other day, we had Norm Schrein, who heads up the repeaters that are going to be used at the Dayton Hamvention and they're doing what they call "celebrity IDs." They're getting Barry Goldwater, Chet Atkins, who's a ham, the head of the ARRL, Ronnie Milsap, who's also a ham. And they want Bob Grove, too. So they're thinking that we obviously mean something out there.

So this largest amateur convention in the world, the most highly respected convention of amateur radio in the world, called me to record my voice welcoming people to the convention. And of course, I'll be conducting forums there and we get awards for that. Obviously, they consider *MT* and what we have to say, of vital importance. ■





Worldwide Scanning with Norm Schrein

Fox Marketing, Inc.
4518 Taylorsville Rd.
Dayton, Ohio 45424

ANATOMY OF A HOBBYIST-TURNED-PRO

(MT's Norm Schrein, when not writing for us, assembles frequency directories for Fox Marketing. This month we talk a look behind the scenes to see just what is involved in publishing such directories.)

Many times I have received questions on how I got started putting frequency directories together and how I go about putting them together today.

I began by collecting frequencies in late 1976 when I found that some of the frequencies I wanted to hear were not listed in available directories.

I began with the obvious--public safety, which I gleaned out of the existing directories. I placed this information on 3x5 cards along with any notes. Next, I started calling around to other places that had two way radio systems and asked what frequencies they were using.

The second method was solely dependent upon the knowledge of the person to whom I spoke; it was also dependent upon their willingness to divulge the information!

Eventually, I came up with 3x5 cards on approximately 400 frequencies that I could hear quite easily from home. My first frequency directory was not a directory at all, but a pile of 3x5 cards!

Some of my friends wanted copies so I typed up columns of data and grouped them by service. The result was fourteen pages of frequency information.

My typewritten lists were photocopied and passed out among friends. Soon, strangers were calling wanting copies of the frequencies.

I knew a fellow who ran a small printing business so I had him print up about 50 copies of the lists which I stapled together into book form. I called it "Scanner Radio Listings, Dayton and Montgomery County Areas." The directory was first "published" on April 1, 1977, and copies were sold for $.50 each. Needless to say, since then the page counts have gone up and, alas, so have the prices!

By the end of the 1977 Dayton Hamvention, I had sold over 150 copies of this directory and word was now getting to dealers and distributors of scanners in the Dayton area about the directory. It was not long before I was approached by a local distributor who wanted me to put a revised directory together for him; however, he wanted it to include the Cincinnati area as well. He was willing to order 1,000 copies.

I was quite surprised that my personal frequency file was popular enough to warrant 1,000 copies! I told him I would deliver the product...but now I had to figure a way to get frequency information on Cincinnati.

At that time the FCC had an office in Cincinnati and had copies of their microfiche on file there. I was able to stop in, look through their files and compile a book for the distributor that included frequencies from both the Cincinnati and Dayton areas.

After I delivered the order, I still had no interest in expanding the project; however, I got used to the idea of making a little extra cash out of my hobby. I found another distributor that was interested in doing the same thing as the first and he bought another 1,000 copies of a revised directory which included even more frequencies for the Cincinnati and Dayton areas.

I had found out by this time that the microfiche were available and I purchased one of the microfiche lists and a reader. Now I was able to take my time at home and research the data more thoroughly.

Then fate struck. Both distributors got out of selling scanners, and I could not locate any other distributors in the Dayton area. I decided to go out on my own with my Cincinnati/Dayton frequency directory, looking around for dealers who were willing to sell the product.

Eventually, I decided to start other directories; my second was for the Lima, Ohio, area (eventually expanded to include Fort Wayne, Indiana), then I went on to Toledo, Ohio, Columbus, Ohio, and the Louisville and Lexington areas in Kentucky.

"The traffic's the same; only the names have changed."

Needless to say, by this time I really had quite a pile of 3x5 cards! I had added cross references for "Alphabetical by Licensee Name" and by "Call Letters," as well. The 3x5 cards were really getting out of control; I had to hand type all the lists and that got to be quite time consuming!

COMPUTERS TO THE RESCUE!

I found a computer programmer, showed him a copy of my directory and told him what I wanted a computer program to do. He said he could do it and he would work it around a Radio Shack computer (I still use this computer today, although the number of computers devoted to the project has multiplied). Soon I was able to develop the books much faster and that led me to my first computerized directory.

It was a bit of a project managing these books, revising them, shipping orders, collecting accounts, and finding new dealers, all of which was being done as a part-time project in addition to my full-time job. I had reached the point that I was going to have to do the project on a full-time basis or give up the whole thing.

FATE STRIKES AGAIN!

This time fate was in the form of a scanner manufacturer who wanted to take the line of frequency directories and use them to promote their scanners. I would work on the insides of the book and they would develop the covers and market the directories. Thus arose the Fox "Scanner Radio Listings."

The local directories expanded to cover 30 different markets and while I still work with Fox on frequency directories, I now have an opportunity to work on the development of scanners and scanner-related products.

As far as directories go I now not only work with the local frequency directories but a selection of regional directories which required modification of the computer program that would cover several states rather than a small local area.

RESEARCH...RESEARCH...

I first start with the FCC or IRAC files to get raw frequency information which is entered into the computer. This list is compared to other available data to make the listings as complete as possible.

In the case of the local directories, I will go to the area with a whole bank of scanners and personally monitor the activity; this way I can tell if the system is operated as a repeater, simplex or is being used for paging. I might even be able to find a police department hiding in the local government portion of the frequency allocations.

I can also get together with local scanner buffs and dealers and refine the listings even further. Then I come back home and revise my listings along with my notes of what I hear. The final copy is sent off to the printer.

It is really quite interesting traveling all over the country listening to all the various radio services; I have listened to radio services from Alaska to Florida and California to New York. One thing stays quite the same, however. The geographical names may change, but the radio traffic is just about always the same.

It is easy to tell if a radio transmission is coming from a police of fire unit, or from a taxi dispatcher of from an FBI agent. No matter where I travel in the country (or Canada for that matter) it seems that everyone is having the same types of problems to attend to.

Until next time -- Good Monitoring.

PLANE TALK

Jean Baker, KIN9DD
213 W. Troy Ave. 4C
Indianapolis, IN 46228

NAVAIDS

As aeronautical communications monitors, we hear references to both ground-based and airborne navigational aids made on a daily basis. This month's "Plane Talk" will look at the major ground-based navaids and clarify their usage.

The next installment will feature the corresponding airborne navigational instruments and also talk about state-of-the-art navigational systems currently in use. All background material, diagrams and pictures contained herein are courtesy of the FAA.

VHF/UHF Omni-Directional Facilities

VORs (Very-High Frequency Omnirange)

The VOR, or omnirange, is the primary navigation facility for civil aviation in the National Airways System. VORs operate within the 108.0 to 117.95 frequency band and assignments between 108.0 and 112.0 are in the even tenth decimal to avoid any conflict with ILS localizer frequencies.

VORs identify by continuously transmitting a standard three-letter identifier in Morse code; most VORs also have voice ID capability and provide scheduled weather broadcasts and severe weather information for pilots on the same frequency.

A VOR transmits directional information to the aircraft, providing 360 magnetic courses *to* the VOR station. These transmitted signals are called radials and are oriented *from* both azimuth and distance information.

TACAN is a pulse system and operates in the UHF aero band (225-400 MHz) and is assigned channel numbers. TACAN requires special equipment and does not operate through conventional VOR equipment. The TACAN ground systems identify by transmitting a standard three letter identifier in Morse code at regular intervals of 37.5 seconds. They do not have voice capabilities.

VORTACs

Integrated facilities, consisting of both TACAN and VOR components, are called VORTACs. Although consisting of more than one component, incorporating more than one operating frequency (VHF & UHF), and using more than one antenna system, a VORTAC is considered to be a unified navigational aid.

Both components of a VORTAC operate simultaneously, providing the three necessary services (VOR azimuth, TACAN azimuth, and TACAN distance [DME: distance measuring equipment]) at one site. One component (VOR or TACAN) can fail and the other still operate.

Transmitted signals of VOR and TACAN are each identified by three letter code transmission and are interlocked so that pilots using VOR azimuth with TACAN distance can be assured that both signals being received are both definitely from the same ground station.

Where the recorded voice identification is used for the VOR portion, it consists of the name of the facility followed by the word VORTAC. The frequency channels of the VOR and the TACAN at each VORTAC facility are paired in accordance with a national plan to simplify airborne operation.

Distance Measuring Equipment (DME)

The DME is an airborne pulse instrument used in conjunction with VOR, TACAN, VORTAC, and ILS. It transmits a beam toward an appropriately equipped VOR station, then receives a response from the station which tells the pilot his distance from the station in nautical miles, his ground speed in knots, or the time to the station in tenths of hours by measuring the time between interrogation and response.

DME signals may be reliably received up to 199 nautical miles at line-of-sight altitude with an accuracy of better than 1/2 mile or three percent of the distance, whichever is greater, DME operating on frequencies between 962 MHz and 1213 MHz. Try hearing them on 1090 MHz using AM mode.

Some VORs and ILSs have colocated DME/glide slope facilities and are designated as VOR/DME's or ILS/DME's. At a VOR/DME, the UHF DME frequency is paired to the VHF VOR frequency. Aircraft equipped with only a VOR receiver must have a separate DME unit to receive DME information from a VORTAC.

Nondirectional Radio Beacons (NDBs)

These facilities normally operate between 190 and 535 kHz, transmitting a continuous, omnidirectional signal, with either 400 or 1020 Hz modulation. All of these radio beacons transmit a three-letter identifier in Morse code. Some NDBs are also capable of voice transmission for weather and air terminal information.

NDBs are installed mostly at or near airports to aid aircraft which are appropriately equipped to home in on the airport.

Directions Finding Stations (DF)

DF stations are ground based radio compasses which provided aircraft with directional guidance or position fixing services. They can be utilized by controllers to locate lost aircraft and guide aircraft to an airport or to an area within radar coverage or to an area where VFR (visual flight rules) exist.

DF stations are used by lost or misplaced pilots to give themselves a heading to reach a known point ("DF steer") or by establishing their position.

MF and HF stations can provide bearings up to 500 nautical miles. VHF and UHF stations, the most common, are limited to line-of-sight and have a maximum range of from 150 to 200 NM.

Instrument Landing Systems (ILS)

Instrument Landing Systems are among the most precise navigation systems in use today. They provide a path for exact alignment and descent of an aircraft on final approach to a runway.

The ILS is a precision approach--it has lower minimums and can be used under lower visibility conditions than nonprecision approaches.

The functional parts of an ILS consist of: guidance information (localizer and glide slope); range information (marker beacons, compass locators, and ILS-related DME); and visual information (lighting systems).

Localizer Transmitter

The localizer transmitter provides the pilot with horizontal course guidance; consequently, it is an extremely important component of the ILS system, if not the most important. If an ILS's localizer transmitter fails, an ILS is not authorized.

A localizer transmitter operates on one of the 40 ILS channels within the frequency range of 108.10 to 111.95 MHz on the odd tenths. It identifies in Morse code with the letter I (. .) followed by a three-letter identifier.

Situated on the extended centerline at the back end of the approach runway, the localizer transmitter provides the pilot with course guidance throughout the descent path to the runway threshold from a distance of 18 NM from the antenna between an altitude of 1,000 feet above the highest terrain along the course line,and 4,500 feet above the elevation of the antenna site.

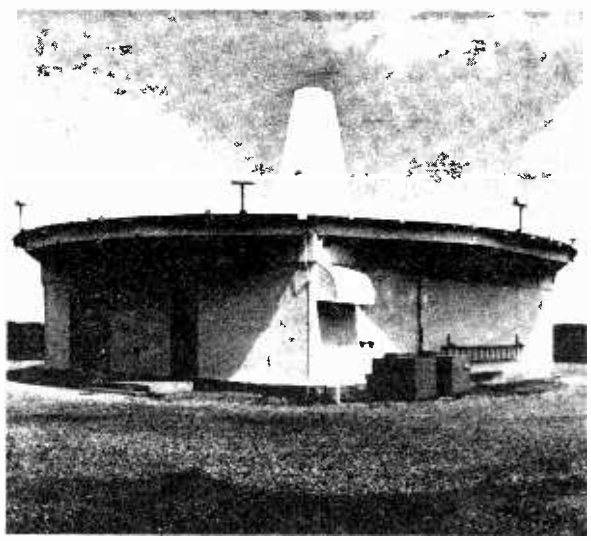
Glide Slope Transmitter

The glide slope transmitter provides the pilot with vertical guidance along a correct descent angle; if the glidescope fails, the ILS reverts to a nonprecision localizer approach.

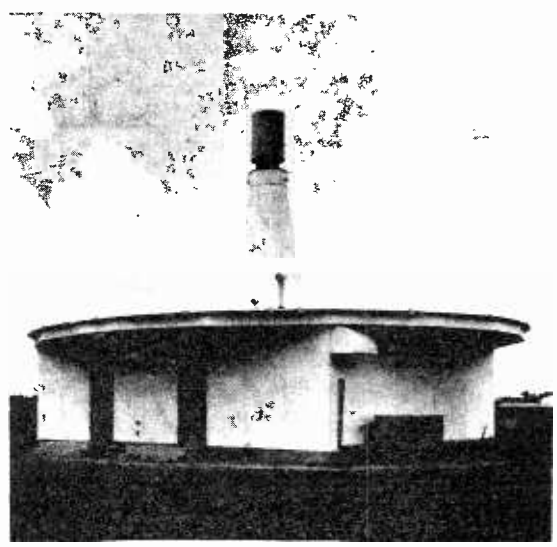
The glide slope transmitter is located between 750 feet and 1,250 feet beyond the approach end of the runway centerline. The glide slope operates in the UHF band (329.3-335.0), paired with frequencies in the VHF band; selecting the VHF localizer frequency automatically tunes in the paired UHF glide slope frequency.

Marker Beacons

ILS directional marker beacons identify a particular location in space in the approach to an instrument runway. This is done by a 75 MHz



VOR installation (Courtesy FAA)



VORTAC installation (Courtesy FAA)

transmitter which transmits a directional signal upward that is received by aircraft flying overhead. These beacons identify themselves by a coded letter, a series of dots and dashes, or both.

There are two beacons ordinarily associated with an ILS: The outer marker,which is located four to seven miles from the end of the runway; and the middle marker, which marks the aircraft approximately 3,500 feet from the landing threshold.

In addition, some locations also have an inner marker which is used to indicate the point at which the height decision should occur.

Compass Locator

Situated usually at the middle and outer marker sites, these transmitters have a power of less than 25 watts, a range of at least 15 miles and operate between 200 and 415 kHz. At some locations, higher-powered radio beacons (up to 400 watts) are used as outer marker compass locators.

Compass locators aid in transitioning from the airway systems to the ILS; in other words, from the enroute system to the instrument landing system of the destination airport. ID is in two-letter Morse.

Instrument Approach Light Systems (ALS)

These visual systems are divided into: approach lights for transition from instrument flight to visual flight and landing; runway edge light systems to outline the edges of runways during darkness and restricted visibility; and runway end identifier lights (REID) to provide identification of the approach end of a runway.

Other ILS lighting components include touchdown zone lighting (TDZL), runway center lighting, runway remaining lighting; and taxiway turnoff lights.

That's all for this month. Next time, we will look at how navigational instruments on the flight deck utilize the ground-based navaids; and also examine some of the navigational systems in use today.

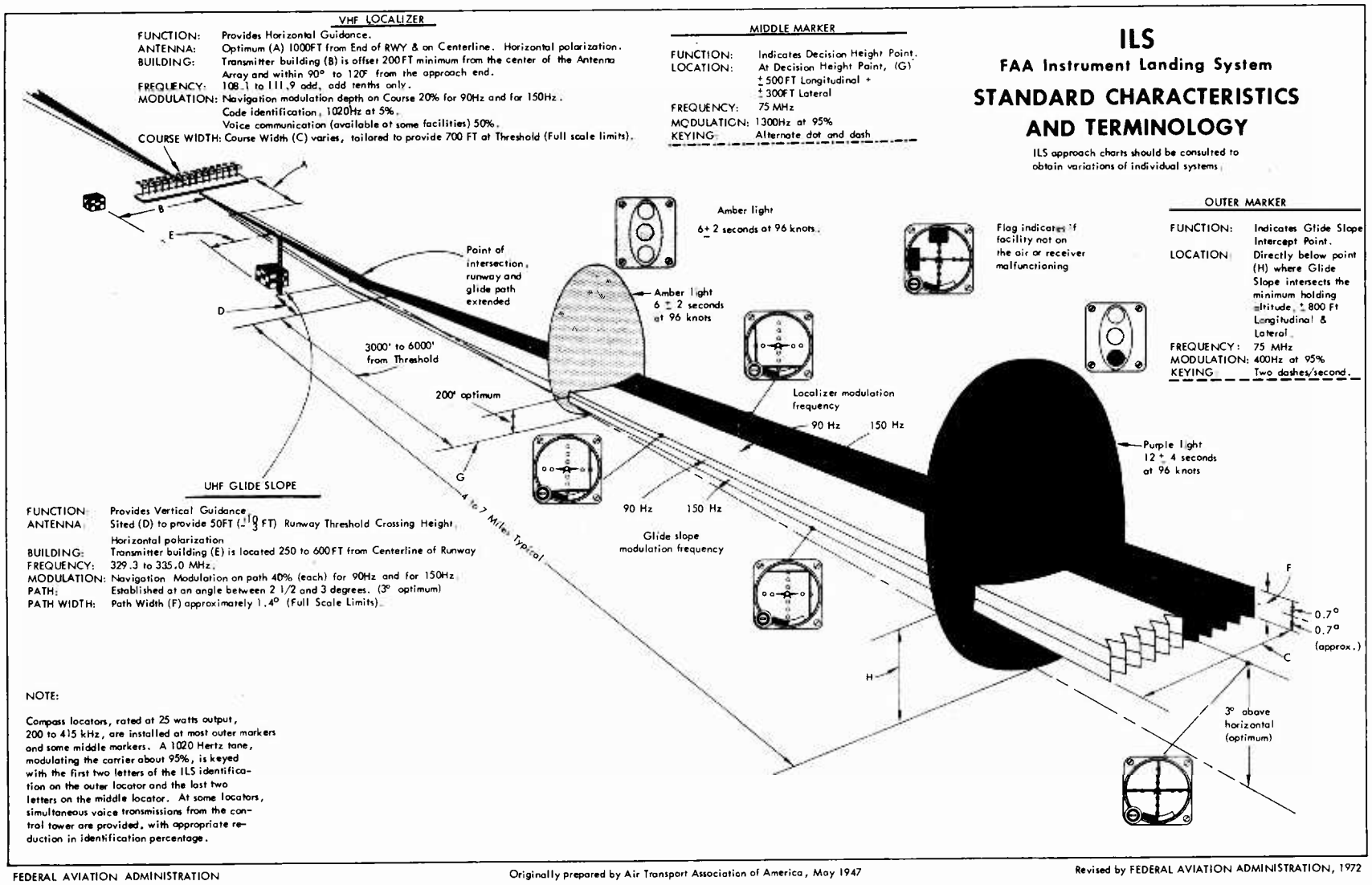
73s and out. ■

NAVAID CHARACTERISTICS

(Courtesy FAA)

NAVAID	CLASS	BAND	FREQUENCY	NM RECEPTION DISTANCE		DIRECTIONAL	IDENTIFICATION		USE	
NDB	COMPASS LOCATOR	L/MF	190 to 535 kHz	ALL ALTITUDES	15	NO	2 LTR	STANDARD IDENTIFIER IN MORSE CODE-VOICE POSSIBLE	USED WITH ILS	
	MH				25		3 LTR		AIRBORNE DIRECTION FINDING, INSTRUMENT APPROACHES AND HOLDING	
	H				50					
	HH				75					
LRR		L/MF	200 TO 550 kHz	ALL ALTITUDES FROM 40 TO 75 DEPENDING ON POWER OF TRANSMITTER		YES			L/MF AIRWAYS IN ALASKA	
MARKER BEACON	FM, LFM AND Z	VHF	75 MHz	BONE, ELLIPTICAL, OR CIRCULAR PATTERN		YES	R (or K,P,X,Z) IN MORSE CODE		NORMALLY ALONG L/MF AIRWAYS	
	ILS			ELLIPTICAL PATTERN, 2400' WIDE - 4200' LONG AT 1000' ABOVE THE ANTENNA		STRAIGHT UP	OM-DASH/BLUE LIGHT		RANGE INFORMATION ON ILS APPROACH	
							MM-DOT DASH AMBER LIGHT			
							IM-DOT/WHITE LIGHT			
VOR	T	VHF	108.0 to 117.95 MHz EXCEPT BETWEEN 108.0 AND 112.0 MHz ASSIGNED ONLY ON EVEN TENTHS	12,000 AND BELOW	25	YES	STANDARD THREE LETTER ID IN MORSE CODE VOICE POSSIBLE		TERMINAL APPROACH AID	
	L			BELOW 18,000	40 *				ESTABLISHED LOW LEVEL AIRWAYS (+ # BELOW)	
	H			BELOW 18,000	40 **				ESTABLISHED HIGH LEVEL AIRWAYS + #	
				14,500 *** TO 17,999	100				# AIRBORNE DIRECTION FINDING, INSTRUMENT APPROACHES AND HOLDING	
				18,000 TO FL 450	130					
				ABOVE FL 450	100					
TACAN	SAME AS VOR	UHF	960-1215 MHz IN CHANNELS	SAME AS VOR		YES	SAME AS VOR BUT NO VOICE		SAME AS VOR BUT NOT USED FOR AIRWAYS	
VORTAC	SAME AS VOR	VHF/UHF	VOR FREQUENCY & TACAN CHANNEL	SAME AS VOR		YES	SAME AS VOR/TACAN VOICE ON VOR		SAME AS VOR	
DME		UHF	962-1213 MHz	UP TO 199		NO	NONE		SLANT RANGE DISTANCE	
ILS	LOCALIZER	VHF	108.1-111.9 MHz ON ODD TENTHS	18		YES	STANDARD THREE LETTER ID IN MORSE CODE PRECEDED BY LETTER I		HORIZONTAL COURSE GUIDANCE	PROVIDE EXACT PATH FOR PRECISION APPROACH
	GLIDE SLOPE	UHF	329.15-335 MHz PAIRED TO LOCALIZER	10			NONE		VERTICAL GUIDANCE	

** GENERAL INTERFERENCE FREE USABLE DISTANCE. ***APPLICABLE WITHIN CONTINGUOUS U.S. ONLY.



SIGNALS FROM SPACE

Larry Van Horn
160 Lester Drive
Orange Park, FL 32073

FLEETSATCOM F7 LAUNCHED

After eight delays from its original launch date of May 22, 1986, the sixth Fleet Satellite Communications satellite was launched from Cape Canaveral Complex 36 on December 4, 1986. Liftoff aboard the Atlas Centaur rocket occurred at 9:30 p.m.

Launch came 26 minutes into a three hour window, following a delay to recycle the count after redline values were exceeded in spacecraft telemetry readings. These readings were quickly stabilized and the count resumed without incident.

The spacecraft was injected into a transfer orbit of 35948 km by 152 km 28 minutes after launch. December 6 the satellite was placed into geosynchronous orbit. The military communications satellite will be allowed to drift into its final orbital slot at 105°.

Once the satellite is on station, testing should commence and operational control of the satellite will be turned over to the navy from TRW, the manufacturer of the satellite.

Now in orbit, this satellite has been designated Fleetsatcom F7. Similar to earlier Fleetsatcoms, F7 also carries an extremely high frequency (EHF) communications package which will be used to test ground stations for the Milstar advanced military communications satellite system.

The EHF package, built by the MIT Lincoln Laboratories, operates on 20 watts of power with an uplink at 40 GHz and a downlink of 20 GHz. These numbers are approximate due to low and high rate frequency hopping that will be used.

The Fleetsatcom satellites are the spaceborne portion of a worldwide DOD network to enable communications between naval aircraft, ships, submarines, ground stations, Strategic Air Command elements, and presidential command networks. The Fleetsatcom program is managed by the Naval Warfare Systems Command.

The Fleetsatcom structure weighed 5,061 pounds at liftoff, has a span of 43.4 feet between the tops of its solar panels. The main body is 7.5 feet wide and 22.8 feet high.

The main body consists of three hexagonal modules, the payload, spacecraft, and EHF package. The solar arrays extend from the spacecraft module which contains the hydrazine reaction control system thruster and propellant tanks, Sun and Earth sensors and reaction wheel.

The payload module contains three antenna systems, transponders for 23 channels and communications electronics. The offset mast is the UHF (240-270 MHz) transmitting antenna. A separate conical helix antenna on the central mast is the S-band tracking, telemetry and control antenna.

The super-high-frequency (SHF) antenna horn protrudes through through a hole in the UHF antenna mesh. The EHF antenna consists of a 5 degree steerable spot beam and an Earth coverage aperture, look-through cutouts in the center portion of the UHF transmitting antenna.

Power for the spacecraft is produced by solar arrays (2,200 watts). Three 24-cell nickel-cadmium batteries power the spacecraft when it is in the Earth's shadow.

Fleetsatcom F7 replaced F6 when the launch was postponed to check vehicle components and to rework suspected parts. The decision to launch the more advanced spacecraft was made by the Navy. Fleetsatcom F6 and the final Fleetsatcom, F8, are scheduled to be launched this month and May respectively by the last two Atlas Centaurs with manifested payloads.

Fleetsatcoms F6, F7 and F8 are all scheduled to be inserted into parking orbits to replace current operational Fleetsatcoms as required. These satellites all have a design lifetime of ten years.

All four operational spacecraft now in orbit have lifetimes of five years and have exceeded those lifetimes. The EHF test capability aboard the new Fleetsatcoms is estimated to have a two year lifetime.

At this time it is not known which Fleetsatcom bandplan is carried aboard F7; however, it is known that this satellite will probably replace Fleetsatcom F1 when it is retired from service.

The breakdown of each of the 23 transponders is outlined in Table I (downlinks only, all frequencies in MHz). Table II presents a breakdown of current operation Fleetsatcom spacecraft.

MT military satellite monitors might also want to keep an eye on the area of 263.050-263-550 MHz for wideband activity from the new Fleetsatcom satellites; this range was filed with IRAC but, to the best of my knowledge, has never been used.

All reports on Fleetsatcom/ Leasat/ Gapfiller satellite intercepts are always welcomed. Please send them via the address in the column masthead.

For more information and a detailed breakdown of all milcomsat activity, SFS readers are encouraged to obtain a copy of the editor's book *Communications Satellites*, available from Grove Enterprises.

SOVIET SHUTTLE TEST

The Soviet Union had completed their first test with its space shuttle on the launch pad at Tyuratam. This is considered a significant milestone toward first flight of the vehicle.

U.S. imaging recon satellite pictures showed the first Soviet orbiter was mounted piggyback to its heavy expendable launch vehicle for a series of fit checks. The shuttle was removed from the pad following the test.

It is now believed the Soviets will attempt the first launch of the heavy expendable booster during 1987, unmanned, using its piggyback cargo pod. The first manned launch, with orbiter mounted to the booster, is expected in 1988 at about the same time the U.S. shuttle returns to flight.

As this edition of SFS goes to print, I fully expect that a manned crew will be sent to the Mir space station in January or February 1987. *MT* readers are encouraged to monitor 143.625 MHz for any activity from the orbiting space station.

Next Month: The Flight of the Voyager; a communications profile!

Table I

Freq Plan Alpha	Freq Plan Bravo	Freq Plan Charlie
Chan 1: Fleet Broadcast		
250.450	250.550	250.650
Chan 2: 500 kHz wideband channels		
260-350-260-850	261.450-261.950	262.050-262.550
Channels 3-11: Navy relay channels		
Chan. 3		
251.950	252.050	252.150
Chan. 4		
253.650	253.750	253.850
Chan. 5		
255.350	255.450	255.550
Chan. 6		
256.950	257.050	257.150
Chan. 7		
258.450	258.550	258.650
Chan. 8		
265.350	265.450	265.550
Chan. 9		
266.850	266.950	267.050
Chan. 10		
268.250	268.350	268.450
Chan. 11		
269.750	269.850	269.950
Channels 12-23: AFSATCOM Narrow band channels		
Chan. 12		
243.945	244.045	244.145
Chan. 13		
243.955	244.055	244.155
Chan. 14		
243.960	244.060	244.160
Chan. 15		
243.965	244.065	244.165
Chan. 16		
243.970	244.070	244.170
Chan. 17		
243.975	244.075	244.175
Chan. 18		
243.980	244.080	244.180
Chan. 19		
243.985	244.085	244.185
Chan. 20		
243.990	244.090	244.190
Chan. 21		
243.995	244.095	244.195
Chan. 22		
244.000	244.100	244.200
Chan. 23		
244.010	244.110	244.210

Table II

Spacecraft Designator/ Name	Intl Desig	Launch Date	Orbital Location	Band-plan
F1/Pacific East relay	78-16A	1/9/78	100° W	Alpha
F2/Indian Ocean relay	79-38A	5/4/79	75° E	Charlie
F3/Atlantic Ocean relay	80-94A	1/17/80	23° W	Bravo
F4/Pacific West relay	80-87A	10/30/80	172° E	Bravo
F5/In-orbit spare *	81-73A	8/6/81	44° W	Charlie
F6/In-orbit spare	---	2/87	44° W	Charlie
F7/In-orbit spare	86-96A	12/4/86	105° W	Unknown
F8/In-orbit spare	---	5/87	Unkown	Unknown

** Note: Satellite inoperative. The Atlas Centaur nose cone shroud collapsed during launch destroying the primary antenna.*

Help solve...

The Case of the Mysterious Signals

by Dave Beauvais KB1F
Magic Media Services
P.O. 695
Amherst, MA 01004

Have you ever heard strange and recurring VFO-like "sweeping noises" between 26 and 29 MHz--even when the band is completely closed to long-distance propagation? This is an inquiry to see if any *MT* readers would like to help document a most puzzling and bizarre signal--which my summer travels have led me to believe may actually be originating from a geosynchronous satellite!

I first became aware of this persistent phenomenon some three or four years ago. I have VHF communications receivers both at my home here in western Massachusetts and in my car. I've discovered during these last few years that if you leave an AM receiver idling on an open frequency (such as an unused CB channel) just about anywhere in the 26 to 29 MHz range, it's only a matter of minutes before you'll hear a faintly tone-modulated carrier swishing back and forth across the frequency.

The signal strength is generally about S3, and the tone modulation characteristic, which is the infallible "signature" of this phantom signal, is very easy to spot. It's a relatively pure tone with square-wave harmonics, which appears to have a fundamental frequency somewhere between 200 and 300 Hz. The audio modulation level is generally about 20 percent of the carrier. If another signal is present on the channel, the appearance of the phantom carrier will produce several rapid "zero-beats" as it heterodynes back and forth across the frequency.

The absolute limits of the sweep are not known. It has been found occasionally as high as 30 MHz,and as low as 25 MHz, though its center of gravity appears to be in the 27 MHz Citizen's Band. Once it appears--you normally only have to wait about ten minutes for it to show up--the signal will make an average of seven or eight quick passes across the frequency to which the receiver has been tuned. Those quick passes are separated by intervals of less than a second. The signal will then vanish from the frequency for another ten minutes or so. The rate of sweep is also variable. Sometimes it will approach slowly and dwell on the chosen frequency for a second or two. At other times, it will sweep very quickly and be gone in a flash.

Among its more bizarre characteristics, one has to note the fact that the signal has been heard even at 3 a.m., when all long-distance propagation is completely shut down, and the likelihood of a maniacal hobbyist playing with a VFO is virtually nil!

Stranger still is the fact that during this three-to-four year period, I had considered this to be a purely local phenomenon. The most likely explanation seemed to be high-power OTH radar or ionosonde experiments originating at Hanscom Air Force Base in Bedford, Massachusetts, some 80 miles away. Hanscom is the home of a major electronics research laboratory, and the signal strength was consistent with the ground wave contour for a high-power transmitter operating at that distance.

This theory was shot full of holes during the summer, when I spent two weeks camping in the Allegheny Mountains of Western Pennsylvania, and found to my utter astonishment that the ***same*** signal, with the ***same*** modulation and sweep characteristics,was appearing on my hand-held 40-channel CB!

This combination of bizarre characteristics (the presence of the signal on a "dead" band, and its wide geographical spread) points to a source which would have seemed implausible at first. A logical inference, based on its behavior, is that the signal may well be geosynchronous satellite-based. If so, the questions multiply. Whose satellite is it--one of ours or one of the Soviets? Is it conducting ionosonde or long-distance radar experiments? Is it a broad spectrum sweeper operating to gather radio intelligence in the HF and VHF range (since these "radio spy" satellites are known to exist)? Or is it a malfunctioning communications satellite with a runaway parasitic oscillation--a kind of super-birdie whose milliwatt-level output is propagating over vast line-of-sight distances?

Perhaps readers around the country would be interested in helping to track this "phantom" tone-modulated carrier, to see how widely dispersed the signal contour is, and whether is seems to have any directional peak.

One interesting note: There is another signal--a loud, musical sawtooth-wave envelope which is all modulation and no carrier--that sometimes creeps up as high as 30 MHz. It's also been heard (at least here in New England) as low as 1.8 MHz. This signal is easy to spot, because it moves slowly, and steps up the HF spectrum in approximately 50 kHz increments. You can actually follow it with your receiver, if you have the patience! Its purpose also is unknown--but it should not be confused with the quick-moving and somewhat cleaner signal (definitely a tone-modulated carrier) that we've been discussing here. It's not impossible that the signals originate from the same device, whatever and wherever it is. But the two signals certainly do have different modulation and frequency tracking characteristics.

Any help in solving the mystery will be appreciated. C'mon, all you super sleuths--have at it!

Satellites Bring English News to China

English-speaking people living in China's capital city will now be able to view English language TV shows, according to the paper, China Daily. China Central Television (CCTV) began broadcasting a 40-minute English program in late December.

The broadcasts, called "CCTV International" will be restricted to the Beijing area until the scheduled launch of a Chinese telecommunications satellite later in 1987. Once that is accomplished, the broadcasts will be available nationwide.

Included in the program will be documentaries about reforms and developments currently in progress in China, travelogues, and Chinese films dubbed into English along with national and international news -- the international news coming from the satellite services of Worldwide Television News in New York, Visnews in London and Asiavision in Tokyo.

At present, there are only 20 people on the staff of CCTV International, most of whom are in their mid 20s. Says Director Kong Lingduo, "Radio Beijing has more than 60 employees to make a half-hour news program. We'll have to make do with one third that many for a program twice as long."

ON THE HAM BANDS

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P.O. Box 20279
Seattle, WA 98102-1279

THE HISTORY CONTINUES

Spark versus CW

With World War I over, and yet another fight to keep control of the radio waves in civilian hands won, amateur radio was back on the air as of November 1919. And using the latest in spark technology, plus Audion detectors, the bedlam and interference was renewed on a national scale.

But in the wings, awaiting the wider availability of high power transmitting tubes, was the new narrow band technology called continuous waves (CW). In addition to the advantage of a narrow bandwidth, CW could be heard as far with 40 to 50 watts output as a spark with 1 kW output.

A CW signal covers about 1% of the equivalent spark signal bandwidth; combine that with the lower power of CW and you can imagine the tremendous reduction of interference obtained with CW.

There were a few CW signals on the air in 1920, mostly because their owners were testing tubes or were associated with manufacturing companies. Transmitting tubes were very expensive and hard to come by.

Another problem was the receivers. Tuners designed for spark needed fine tuning to hold the narrow CW signals, and they didn't have it. Due to their design, they reacted a lot to body capacitance; if you tuned in that much desired CW signal you couldn't move a muscle or you would lose it!

So until the CW operations increased (with high power transmitting tubes), the price came down on CW tubes and parts, and improved tuning was developed, spark remained the primary amateur communications technology.

The ARRL grew rapidly as did amateur radio. Relay nets were quickly activated, division conventions held and amateur police radio was started. In many localities, hams would broadcast descriptions of stolen vehicles and the like with the descriptions being passed on to the police in nearby towns. Eventually, the police got their own radios, but in many urban areas this amateur service continued very successfully for some years.

By 1921, RCA and GE had "affordable"(?) transmitting tubes on the market; a ham (John Reinartz) had designed some tuners which worked well with CW, and the battle was joined.

CW expanded at a good clip as did the amateurs themselves--there were over 10,000 of them by mid-1921. With all these hams, the government was looking to increased enforcement of the radio regulations to prevent interference. Fortunately, the ARRL stepped in and pushed self-regulation which was somewhat successful and thereby helped to prevent the biggest interference of all...government interference!

All this was just in time. In 1921 the American people contracted "broadcast fever"; it spread like the plague to every corner of the country. Overnight, everyone was trying to listen to music, boxing matches and commercial advertising! Only fast action on the part of the ARRL and many hams who brought order to the ham bands (and a resulting reduction in interference) kept ham radio alive.

In 1922 the Department of Commerce held a conference which resulted in frequency regulations which clearly separated amateurs and broadcasting. A 2-1/2 hour quiet period (no amateur transmitting) each evening plus Sunday mornings was declared, and a clear definition of what constituted amateur radio was written.

Spark was dying fast (except for a few diehards) and new regulations finally sounded the death knell by outlawing it in July 1924. More about the 1920's next month!

What's Happening on 160 Meters

The 160 meter band seems a strange place to many hams and monitors alike, sitting there just above the broadcast band, partly shared with radiolocation and spread spectrum, and requiring those long antennas just like in the days of spark. I mean, it's not even HF shortwave (3 to 30 MHz), for crying out loud!

All True. But what it is, is the last frontier of DX. When HF DXCC and all the other HF challenges have been met, there is 160 just waiting for you. "So what's it like?" I hear you cry. Glad you asked!

To begin with there is a lot of activity on 160. Dennis Peterson, N7CKD, maintains a list of call sign prefixes which have privileges on 160 and it includes over 275 out of a possible 315 DXCC countries.

By the way, Dennis writes a really good 160 meter column in *Radiosporting* magazine which also has a whole lot of neat ham/SWL stuff (a subscription for 12 issues is $18.00 in U.S. Write Box 282, Pine Brook, NJ 07058).

There are contests, DX, ragchewing, phone, and lots of CW on 160. The band seems crowded at times, but that's only because of the challenges involved with getting through the QRN (atmospherics). Hamming and SWLing is fun, but the people up on the "top band" seems to have more fun than the rest of us! Maybe it's just because they have to work harder to achieve their goals that they appreciate them more.

But that brings up another interesting subject--the mystique that surrounds 160. Everyone who hasn't tried it seems to think it's too hard or impossible to work. You hear mumblings about antennas (especially space for them), equipment, RF power, etc., but nothing you can really pin down.

However, with just a little education, reasonable expectations and a realistic understanding of what is different about the band, it is not hard to get on 160 and join in the fun. Some of the "big guns" and many of the "little pistols" on the band live on city lots. Obviously they have managed to solve the antenna problem (one fellow in Texas operates 160 mobile with a home-brew 17 foot whip!).

Most modern HF transceivers cover 160, so the equipment really isn't that hard to get. A lot of people work decent DX on 160 with 100 watts, so while a 1,500 watt amp would be nice (and that's true of any band!), it isn't absolutely required.

Excuses, excuses...

Maybe the problem is that most people are F,D&H (that's "fat, dumb and happy") with their local repeater and are too lazy or afraid to try 160. After all, it does require more effort than saying, "W7WHT monitoring!"

Oh yes I forgot---You're right--it must be *time*. You haven't got the time to fix up a simple antenna and try it out. It would be a shame to spend all your time tuning across that huge band searching for a signal down in the noise (in fact, most of the best DX on 160 occurs during

CONVENTION CALENDAR

Date	Location	Club/Contact Person
Feb 7-8	Miami, FL	Florida State/ Evelyn Gauzens, W4WYR 2780 NW 3 St., Miami, FL 33125
Feb 14-15	Jackson, MS	Mississippi State/ Don Elder, KC5VD P.O. Box 4860, Jackson, MS
Feb 15	Melville, NY	Long Island Mobile ARC/ Henry Wener, WB2ALW 53 Sherrard St., East Hills, NY 11577
Feb 15	Kansas City,MO	Mid-America FM Assn/ Robert Atkeisson PO Box 188, Raymore, MO 64083
Feb 15	Elkin, NC	Briarpatch & Foothills ARC/ Danny Walker Rt.6 Box 137, N.Wilkesboro, NC 28659
Feb 15	Mansfield, OH	Intercity ARC/ Jack Weeks, K8RT 773 Andover Rd., Mansfield, OH 44907
Feb 21	San Antonio,TX	San Antonio Radio Club/ Melvin Anderson PO Box 690648, San Antonio, TX 78269-0648
Feb 22	Vienna, VA	Vienna Wireless Society/ Warren Bain, N4MWU 2802 Grovemore Lane, Vienna, VA
Feb 22	Fayetteville,WV	Plateau ARA/ Bill Wilson, WA8YTM Box 228, Oak Hill, WV 25901
Feb 22	Tallmadge, OH	The Cuyahoga Falls ARC/ Bill Sovinsky, K8JSL 2305 24th St., Cuyahoga Falls, OH 44223
Feb 22	Davenport, IA	Davenport RAC/ Don Schneider, WD0ANA 518 W. Locust, Davenport, IA 52803
Mar 1	Winchester,IN	Randolph ARA/ Herb James, WB9UZZ RR2 Box 90, Ridgeville, IN 47380
Mar 7	Cave City, KY	Mammoth Cave ARC/ Joe Taylor, N4NAS Box 858, Glasgow, KY 42141
Mar 7	Ft. Myers, FL	Ft. Myers ARC/ Harry Arnold, K9ALX 5414 Brandy Circle, Ft. Myers, FL 33907
Mar 8	Rostraver, PA	Two Rivers ARC/ Mike Kowalcheck Box 184, Zimmer Rd, Greenock, PA 15047
Mar13-15	Orlando, FL	Southeastern Division, John Lenkard, W4DNU 1046 Turner Rd., Winter Park, FL 32789
Mar 14-15	Lafayette, LA	Acadiana ARA/ June Bodensteiner 129 Patricia Anne, Lafayette, LA 70508
Mar 15	Sterling, IL	Sterling-Rock Falls ARS/ Susan Peters, KA9GNR 511 8th Ave., Sterling, IL 61081
Mar 20-21	Muskegon, MI	Michigan State/ Henry Riekels, WA8GVK 95 W. Webster, Muskegon, MI 49440
Mar 21-22	Mecklenburg,NC	Roanoke Division, Meck. ARS/ Gerald Hutchinson 2109 Princeton Ave., Charlotte, NC 28207
Mar 22	Toledo, OH	Toledo Mobile Radio Assn/ Brian Harrington 4463 Holly Hill Dr., Toledo, OH 43614
Mar 28-29	Kearney, NE	Nebraska State/ Timothy Loewenstein, WA0IVW Box 998, Kearney, NE 68848-1231
Mar 28-29	Elizabethtown, KY	Kentucky State Convention/ Jack Polk, WB4VFW 66 Tall Oak Ct., Elizabethtown, KY 42701
Mar 29	Grayslake, IL	Libertyville & Mundelein ARS/ Marc Abramson 1312 Millcreek Dr., Buffalo Grove, IL 60090

MONITORING TIMES IS HAPPY TO RUN ANNOUNCEMENTS OF RADIO EVENTS OPEN TO OUR READERS. Send your announcement at least 60 days before the event to: Monitoring Times Convention Calendar, P.O. Box 98, Brasstown, NC 28902.

sunset and sunrise, concentrated between 1820 and 1840 kHz), when you could be making really great conversation on the repeater. I mean, who wants to talk to the likes of CN2AQ, VK6LK, ZL4BD, G2PU, SM6EHY, YU7PFR, OZ8BV, UA3QPV, TI5EWL, KG7D (how did he get in there?) and others of that ilk. Nope. What's happening is on the repeater, right?

For those of you who monitor, 160 can be real fun. If you think international and domestic broadcast listening for those rare ones is a real challenge, just wait until you try 160. The real secret (for both hams and SWLs) on 160 is listening...really listening.

You won't get the hang of 160 in just a few nights; it really is different from the higher HF bands. Since receiving antennas for 160 are easier to put up than those for transmitting, that shouldn't hold you back.

For more info on 160, go through the back issues of *73, CQ, Radiosporting*, and *QST* (use the December issue indexes) for the last few years. If I get enough requests, I'll make up an info sheet and send it to you (include an SASE).

Bits and Pieces

Goodbye GMT

The world-renowned Greenwich Mean Time (GMT) has died for lack of budget. The high cost of maintaining the atomic clocks at Greenwich Observatory near London was just too much. Fortunately, Universal Coordinated Time (UTC), which is maintained by some 150 atomic clocks around the world, will carry on the tradition of keeping time to within a second or so every 100,000 years.

Personally, my quartz watch, which keeps time to within ten seconds or so a month is good enough for me; but what do I know?

FCC and RFI

Even though the FCC has refused to consider placing labels on consumer electronics equipment regarding its high susceptibility, they have come out with a booklet on radio frequency interference. Call or write the FCC for a copy.

Once you have checked out your transmitter and are using a filter, give a copy to the complaining person pointing out the part in it that shows the complainant how to modify his equipment and tells him to contact its manufacturer if the problem persists. He may think you're trying to put something over on him at first, but not when he reads it in an FCC booklet.

Always be sure you can show him that your own entertainment equipment is not bothered by your hamming. Clean up your own act first!

I really do want this column to be a dialog, so Keep Those Cards And Letters Coming. See you next month. ■

WHAT'S NEW?

M6000 UPDATE

The popular InfoTech M6000 multimode demodulator has enjoyed a sellout, outpacing projected sales figures for 1986, according to Fred Osterman of Universal Shortwave, distributor of the product. But new 1987 models are now in production with additional features.

Some of the new perks include packet reception (300/1200 baud), baud rate readout, ten format memories, improved automatic tuning and status line. There is no increase in price since the upgrade merely involves the substitution of a new memory chip (ROM).

Present owners who wish to upgrade their earlier M6000s may wish to call Grove Enterprises (704-837-9200) for information. Grove also carries the new M6000 at the old price: $849 including UPS shipping.

A/S UNVEILS CB ANTENNA

A mobile CB antenna strikingly similar to the company's "On-Glass" cellular telephone antenna has been introduced by The Antenna Specialists Co. Like its cellular counterpart, the new Model M-906 antenna couples the antenna to the coaxial cable through window glass, providing a secure, fast, no-holes installation.

The whip is protected by Duracoat®, a new high-resiliency formulation especially resistant to abrasion and extreme environments. For further information contact The Antenna Specialists Co., P.O. Box 12370, Dept. MT, Cleveland, OH 44112-0370.

NEED A HOMEBREW BOX??

These handsome custom cabinets are available for your homebrew projects from Energy Engineering. See the November issue of *MT* for a full description or write them at Route 4 Dept. MT, Fayetteville, AR 72701. Ask about the EDEK-R series.

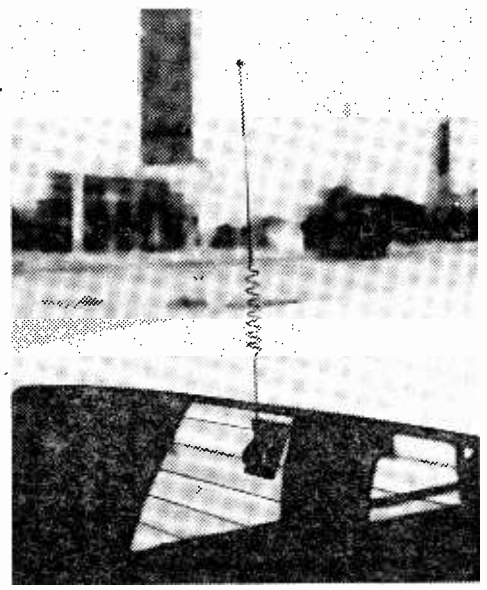
SOME GOOD NEWS ON THE AR2002

A new addition to the Grove catalog is the advanced AR2002 programmable scanner, made by a Tokyo-based firm, A.O.R.--the same company that made Regency's popular MX5000 and MX7000 scanners.

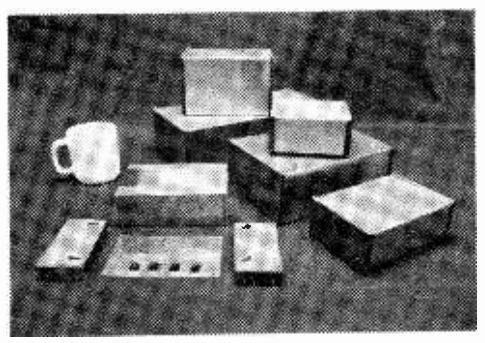
Orders have been pouring in for the new 2002 and initial shipments are expected by the time you read this. While the low price of $479 is very attractive, we have even better news: The price has been lowered to $455 which has been passed on to all original customers!

The manufacturer has indicated that the unit will be in short supply for a month or two; only 200 pieces came over in the first (January) shipment, 50 of which were to be delivered to Grove Enterprises to satisfy early orders.

A complete review of the AR2002 appears on page 51.



M-906 Mobile CB antenna



A box for every project!

LOW AND MEDIUM FREQUENCY RADIO SCRAP BOOK (5th edition) by Ken Cornell, W2IMB (138 pages, 8-1/2" x 11", paperbound offset; $15 including U.S. postage from the author, 225 Baltimore Ave., Point Pleasant Beach, NJ 08742)

To VLF experimenters and beacon enthusiasts, the name Ken Cornell has become synonymous with homebrew projects. Ken's latest edition is nearly 20 pages thicker than the last and has been updated to include the fruits of more recent experimentation.

As with all previous editions, emphasis is placed on hardware rather than operating, specifically in the areas of coil winding, loop antennas, receivers, converters, and antennas. Additional subjects include active VLF frequencies, solar flare detection, power supply considerations, and even a complete reprint of the FCC rules and regulations regarding license-free operations.

For anyone interested in the VLF band, Cornell's reference book, gleaned from years on hands-on experience, is must reading.

BASIC GEAR BULLETIN *Return with us now...* Many old-time hams and SWLs alike resent the intrusion of high-tech into the simplicity of the early days of radio. Can we return to those less-cluttered, non-digital days of yesterday? Perhaps through the efforts of Radio Archives.

Arnold Timm's newsletter, *Basic Gear*, offers crystal set construction projects, regenerative detector circuits, all sorts of delightfully-reactionary subjects from the first half of the twentieth century.

Swap stories from the early days of radio or simply sit back and enjoy the frolicsome antics of others who were there. A sample copy is only $1 and a subscription for six bimonthly issues is a mere $6.

Arnold is especially interested in assisting elderly and low-income experimenters. For further information write to Arnold Timm, KA0TPZ, 2308 Garfield #304, Minneapolis, MN 55405. ■

THE CREAM OF TODAY'S RECEIVER CROP

by
Lawrence Magne, Editor-in-Chief
Radio Database International

It's a pain to have the sand and tan of summer behind us, but at least the best shortwave listening conditions of the year have arrived and the 11-year sunspot cycle seems to be on an upward swing. So let's see what tempting goodies there are in world-band radios so that we can snare these juicy catches.

Why We're Here

Before we get to this, though, I'd like to give you some of the history of how these equipment reports have come to appear each month in *Monitoring Times*.

I've been on the air with equipment reviews each month over Radio Canada International's popular *SWL Digest* program since 1980. No sooner did the first of these reviews hit the airwaves than requests poured in to RCI and *Radio Database International* alike for copies of the manuscripts.

As RCI is a successful broadcaster, and therefore not interested in turning itself into a publishing house -- and as we at RDI simply don't have the resources to disseminate thousands of monthly 'scripts -- another avenue was sought to serve those North American radio aficionados that constitute the majority of listeners to *SWL Digest* at 8:00 PM Eastern Time each Saturday night. When, in 1986, *Monitoring Times* merged with Larry Miller's *International Radio* magazine and became the first large-circulation radio monthly to devote much of its space to world-band radio, the solution became obvious.

The rest is history. As our monthly RCI manuscripts are prepared for broadcast, not print, the corresponding MT reports are altered somewhat from what you may have heard over the air.

Additionally, for those considering communications receivers or premium portables, RDI now offers, directly and through its network of dealers, the new *RDI White Paper* series. Each *RDI White Paper* consists of a lengthy and exhaustive analysis covering a single item of equipment right down to the most intricate measurements of performance. They're available from dealers worldwide.

Finally, we also prepare a report on the latest equipment news for the new *World Radio Report*.

We at *Radio Database International* are delighted to be able to perform these public services for the shortwave listening community. As always, the most rigorous ethical standards, comparable to those I have required of other organizations -- including RCI and, until it moved to Holland this year, the *WRTH* -- are adhered to in all our reports. I hope you find the results to be helpful.

Best Buys for 1987

The newly released 1987 *Radio Database International* book evaluates and rates by brand and model some fifty receivers, which is a bit much to try and summarize here. But we can poke through a few of the highlights to get an idea of what the wisest purchases are as a result of the laboratory and "hands-on" testing by RDI's team of grouchy analysts. At least this way we're not left at the mercy of hyped-up claims and optimistic performance reports.

First, though, you might want to ask yourself three questions. What are you willing to spend? What kind of listening are you planning on doing? And is portability important?

In general, you're fooling yourself if you expect to get anything worthwhile under the equivalent of 100 US dollars unless you're willing to restrict yourself to hearing only very powerful stations. For this limited role, something like Magnavox's new D1835 compact portable (under $60 at such stores as Crazy Eddie's, per MT's Joe Hanlon) may suffice. On the other hand, you don't have to spend over the equivalent of $200 unless you're looking for very superior performance.

As to the kind of listening you do, if you tune in the major international broadcasters, some of the cheaper sets will actually sound better than many of the "supersets". On the other hand, if you're into tuning in faint little stations, then the more sophisticated communications receivers are for you, even if most tend to have pedestrian audio quality.

In the 1987 *Radio Database International*, we picked three basic sets -- all portables, but they also run off house current -- as best buys: The Philips D2935, available thus far only outside North America; the General Electric World Monitor, available only within the US; and certain advanced variations, e.g. from Electronic Equipment Bank and Radio West, of the Sangean ATS-803. All of these sell for between the equivalent of $100-200. Although the specifics of performance differ among these sets, each is more than adequate for all but the most demanding needs, and the Philips and GE have good audio quality, too.

The Cream of The Crop

Now, presumably anybody reading *Monitoring Times* for information on the latest change in Kiribati's transmissions is going to want equipment as exotic as the stations he's trying to hear. The only portable that really cuts the mustard for this is Sony's snazzy ICF-2010, sold as the ICF-2001D outside North America. In many ways, this is the most advanced set -- portable or otherwise -- on the market today. It's a real honey, but it does costs about twice as much as the bargain portables mentioned above, and even then isn't equal to a good communications receiver for serious DXing.

So most active DXer's are going to want a tabletop communications receiver. With these, price is a big factor. To start with the cream of the crop, Japan Radio's new NRD-525 receiver now sells in the US for under $1200. That may seem a bit ridiculous, but the price of a '525 translates to less than $300 in constant 1960 dollars. Back then, that was what you paid for a decent communications receiver that did far less.

Of course, there are some other very interesting DX receivers on the market that are much cheaper. You may still have a chance to pick up Sony's excellent ICF-6800W, which is being discontinued as of the end of 1986. It sells for around $500-600, but it's being discontinued as of early 1987. I really don't see anything now or on the horizon that should quite equal it for serious shortwave listening. Even for DXing it performs well.

Another gem is the ICOM IC-R71A. This is a great DX set, but at

$949 it's awfully pricey and its distorted audio isn't the most pleasant for program listening. Looking ahead, Trio-Kenwood's new R-5000 receiver lists at $899.95, which makes it head-to-head competition with ICOM's 'R71A. We're in the process of putting it through the paces now and will be reporting on it in a coming issue of MT, as well as in complete detail in a separate *RDI White Paper.*

Another goodie is Yaesu's FRG-8800. Unlike the ICOM, the '8800 is not particularly well-suited to DXing. But its audio quality is better and it's quite good for serious shortwave listening. At $599.95, before discounting, it's also a good value.

We talked with the product designer at Lowe's Electronics in England recently. He indicated that a small quantity of the forthcoming HF-125 receivers will be produced around February or March of 1987. As of now, Lowe's feels it can sell this interesting receiver for 350 pounds sterling, which is the equivalent of about $525. Eventually, they hope to sell the unit in North America, as well as Europe.

Remember that before you buy you should give some thought as to what you want a new world-band receiver for. This might seem like a silly point but, if you're largely a program listener to reasonably good signals, you don't need -- or even want -- to spend a fortune. This is not only a question of economics. It's also a question of performance.

Certain models -- such as the Sony ICF-6800W; Grundig Satellit 650; the Philips D2935 and D2999; and the General Electric World Monitor -- have excellent audio quality...even if, of these, only the Sony '6800 is also favored by DXer's.

On the other hand, costly hot-rod sets -- such as the Japan Radio NRD-525 and ICOM IC-R71A -- provide excellent results for the avid DXer, but have audio that is poorer than sets costing far less. This is especially true of the ICOM.

World-Band Radio Better Performers -- and Beter Values Than Ever

To put all this into perspective, it's amazing how far shortwave radios have come in recent years. Fifteen years ago, shortwave portables were simply abominable contraptions, and table-model receivers were largely oriented to hams. Ten years ago, only one decent world-band portable -- from South Africa, of all places -- existed, and that was all but impossible to obtain. Table-model receivers for shortwave listening were scarcer than ever.

Now look at what we've got. During the past few years, we've had nearly one new model coming on the market every month. Many of these run circles around what was available back then; yet, in constant prices, they're a lot cheaper. No wonder world-band radio is catching on!

 ■

Monitoring Radio for Earthquakes

An earthquake warning system that involves monitoring radio broadcasts has been patented by two California engineers, Joseph Tate and David Brown.

The invention is being tested at five locations along the San Andreas fault line by the U.S. Geological Survey, with administration by the University of California. Samples of the radio signals are taken every minute and averaged by the hour. The seismic early warning apparatus includes a receiver, a computer, a meter and a recorder. A pronounced depression detected in broadcast power is said to predict a quake several days later.

Thanks to Harold Sellers of Newmarket, Ontario, for sending in this item from the Dec. 17 Globe and Mail.

MT BEHIND THE DIALS

Russell Industries Scanner Whip Versus the Grove ANT8: *A Test Comparison*

Russell Industries, long a supplier of antennas for a host of portable applications, has introduced a three-band (low, high VHF and UHF) replacement flex antenna for popular hand-held programmable scanners.

The "rubber duckie" measures slightly over 10 inches in height, about three inches longer than the flex antennas supplied by the scanner manufacturers. It should provide improved performance.

The BNC base connector makes it a direct replacement for the Bearcat 50, 100 (late model) and 100XL; the Regency HX1000, 1200 and 1500; and the Radio Shack PRO30, 31 and 32. We selected a Bearcat 100XL for our test.

The Grove ANT8 extendable whip is a proven performer; in use by the thousands, it has shown to be of considerable help in reaching out to extend the listening range of hand-held scanners. We were eager to try it against its contender.

Our Test:
Entering several active frequencies from our area we swapped antennas back and forth at various locations--in the house, at the office, out in the yard, setting the scanner atop an automobile roof for a ground plane--and noted any differences in reception.

While the differences were certainly not profound, there were some trials in which the Russell antenna improved reception over the stock flex whip--but just barely. As might have been expected, the greatest improvement was in the 30-50 MHz low band region.

It is quite possible that an even greater improvement over stock antenna reception might be noted on scanners of other manufacture; the Bearcat flex whip is particularly well designed.

The Grove ANT8 telescoping whip, on the other hand, offered considerable improvement over the stock flex whip at just about any frequency. It can be extended to a full 46 inches offering a profound improvement at low band, compressed to a scant 7 inches for UHF, or set at any length in between for resonance and gain over the stock flex whip.

In some cases signals came up from inaudible to readable; in other cases a noticeable decrease in background hiss verified signal stregth improvement. Rarely was there little or no difference in signal strength when using the Grove ANT8.

We would conclude that, while the Russell replacement antenna is not a miracle worker, it might be a worthwhile investment for use in a fringe area where even a slight improvement in signal strength is useful, and an extendable whip like the high-performance Grove ANT8 is not practical.

Russell Industries offers a considerable variety of antennas; readers may wish to write for their catalog.

(Tri-band whip model DUCK-QUINTBNC, $24.50 plus shipping from Russell Industries, 3000 Lawson Blvd. Dept. MT, Oceanside, NY 11572; ANT8, $12.95 plus $1.50 shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902).

The Regency R1070 Programmable Scanner

by Larry Wiland

Regency Electronics finally did their homework when they introduced this 10-channel, digital-readout, programmable scanner to replace their less-than-adequate R1040, 1050 and 1060 predecessors. A 15-channel version, the R1075, is also available.

The three earlier models were plagued with rolling heterodynes, a squelch circuit which would suddenly "open up" at random (even when set fully closed!) and a multitude of other little quirks which can drive even the most patient scanner listener into fits!

Basically, these scanners were designed to be competitively priced with similar Bearcats and were designed to sell for around $100 to $150. It was a nice try, but the problems which arose from cost vs. features ruined what could have been a decent scanning receiver for about $100.

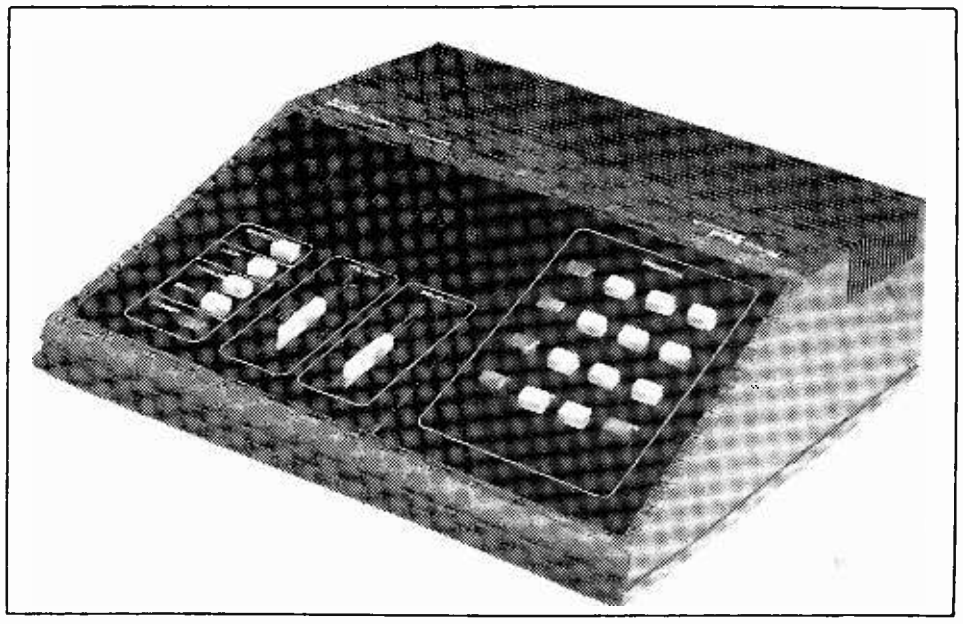
Enter the R1070:
Similar in appearance to the 1040, '50 and '60, the R1070 sports a flourescent digital frequency readout which displays both channel number (when scanning) and frequency (when reviewing channels and searching). Unlike the competitive scanners in the $100 price bracket, this one is capable of searching between two programmable limits not unlike radios costing more than twice as much!

Programming it is nearly the same as other Regency's. But best of all, the "random-opening squelch" and severe noise problems encountered by its predecessors is now non-existent! Audio is clear (though a little more would help) and the keyboard buttons are easy to use with the right "feel" to them.

The radio is housed in a woodgrained plastic cabinet with black brushed aluminum trim. keypad buttons control all functions except volume and squelch which use slide-type lever controls.

The R1070 covers all the basic VHF-lo, VHF-hi, and UHF bands, but does not cover the aircraft band. Scan speed is about 14 channels per second and the radio operates from 120 VAC only. No provisions are made for mobile mounting or for any external speaker. A Motorola antenna jack is provided on the rear apron of the unit which is supplied with a collapsible whip.

All in all, the R1070 is a good scanner for the beginner or for the listener who wants a lot of features for the best price. It would also be a good second scanner for a multi-radio listening post.



Scanners Banned? Hardly!

A persistent rumor that winds its way to the *MT* offices on a regular basis is that scanners are going to become illegal to own, especially those that cover the 800 MHz cellular band. Even more persistent are stories that manufacturers will be withdrawing from the 800 MHz scanner market.

All of these stories are untrue; the Electronic Communications Privacy Act (ECPA) of 1986 merely prevents listening to specific types of radio transmissions (notably mobile telephones) and illegalizes the manufacture and/or use of equipment designed primarily for the purpose of illegal monitoring. No scanner falls into that category.

To the contrary, we hear by the grapevine that several manufacturers are planning to release new scanners with 800 MHz coverage in the near future.

AR-2002 WIDE COVERAGE SCANNER

by Bob Grove

First came the Regency MX-5000, the first mass-merchandised total coverage programmable scanner--25 through 550 megahertz with no gaps. Later, an internal converter was added and the MX-7000 was introduced, adding 800-1300 megahertz as well.

Negotiations between Regency and A.O.R., the Tokyo-based manufacturer who private-labelled the first two scanners for Regency, led to the development of the AR-2002 which was to be introduced in this country as the Regency MX-8000.

Unfortunately, devaluation of the U.S. dollar in the face of the rising yen forced Regency to reach two painful decisions: They would not only forego introduction of the MX-8000, but they would drop the MX-7000 as well.

In the meantime, A.O.R., a prominent Japanese manufacturer with large U.S. electronics accounts like RCA and Harris, was not standing still; the AR-2002 was released to non-U.S. markets where it met emminent success.

LIMITED AVAILABILITY

Fortunately, U.S. monitors will no longer be deprived of this competent little scanner; recent FCC certification allows the 2002 to be sold in this country. Some 200 units are being flown in at this writing, at least 50 of which are destined for Grove Enterprises and the balance to the American importer, ACE Communications.

This initial allotment will probably be exhausted by the time you are reading this, but another larger shipment is due within two months. But let's take a closer look at this little programmable and see just what it does.

AN MX-7000 IN DISGUISE?

The AR-2002 is electronically identical to its predecessor, the very popular--and now discontinued--Regency MX-7000. A look at the keypad reveals no new functions, but a number of substantial improvements:

- The old membrane keypad has been replaced with tactile keys;
- a rotary tuning knob allows frequency dialing
- a ten-segment LED light-bar S-meter shows received signal strengths;
- a front panel earphone jack has been added;
- an optional RS232C interface allows external computer control;
- and the volume, squelch and on/off switch are all separate controls.

FIRST IMPRESSIONS

As soon as the box arrived, it had a ring of familiarity about it; even the styrofoam packing was identical to the MX-5000 and 7000. The radio's cabinet is the same as its forebears as well.

Plugging the AC adaptor into the wall and connecting the antenna, I was ready to go. Sure enough, the 2002 performed flawlessly, exhibiting the same high sensitivity as the more expensive ICOM R-7000 with which it was being compared. Audio was strong through its bottom-mounted speaker.

A REVIEW OF THE PANEL

The specification chart will provide a quick look at circuit parameters, but we need to call out the keypad and display functions separately. Essentially, the AR-2002 is a continuous coverage (25-550, 800-1300 MHz), multimode (AM, narrowband FM, wideband FM), programmable scanner with 20 memory channels (with storable frequency to four decimal places and mode).

A protective adhesive film covers the keypad and upper identification label and may be removed when it starts to wrinkle. Those of you with MX-5000s and MX-7000s may wish to do the same--many owners think their scanner merely has a rotten finish!

The LCD displays frequency, mode, channel, delay, tuning increment, time, search/scan status, lockout, and priority. It is edge-illuminated for night viewing.

The keypad provides, in addition to the functions already mentioned: 5/12.5/25 kHz tuning/search increments; slow/fast scan or search; keypad lock; 24 hour clock display and set (hours, minutes and seconds); automatic up/down search and tuning; and channel one priority.

A BNC antenna connector is provided on the rear panel; a switchable 10-dB attenuator may be selected to prevent strong signal overload. Power is supplied by an AC wall adaptor or a mobile DC cord (provided). An attachable telescoping whip is included.

Optional accessories available at additional cost are the MM-1 mobile mounting bracket and RC-PACK remote control (an RS232C computer interface).

PRICE REDUCTION!

First announced to the U.S. marketplace in the new Grove Enterprises catalog, the R-2002 was to carry a $499 price tag (discounted to $479 in the Grove catalog); now, the manufacturer has announced a price reduction to take a more aggressive position in the competitive marketplace (new Grove price: $455).

SO WHAT'S THE BAD NEWS?

Every scanner has shortcomings which you and I wish had been anticipated by the manufacturer; the AR2002 is no exception. As with its predecessors, command entry is sluggish, making rapid keypress sequences impossible; even the tuning dial responds slowly, requiring s-l-o-w tuning.

Scan and search speed is only 4 increments per second--and that's in its fast mode! Fortunately, Grove Enteprises has a high-speed modification available for $20 at the time of purchase.

There is no search hold; if a signal is discovered during the search routine, the squelch must be closed manually to retain the frequency. If the search key is re-pressed, the frequency resets to its lower limit to begin again.

The keys and their legends are quite tiny, requiring keen eyesight, tiny fingers and memorization for efficient use.

The delay function controls all 20 channels at once, not selectable for each channel.

But in spite of these minor foibles, the A.O.R. AR-2002 is a welcome addition to the hobby market. It answers the needs of the majority of serious VHF/UHF enthusiasts who want wide frequency coverage but don't want to spend twice as much for the ICOM R-7000.

A.O.R. AR-2002, $455 including shipping from Grove Enterprises. Call for availability: 1-704-837-9200).

SPECIFICATIONS

Receiving frequency	25-550 MHz, 800-1300 MHz
Receiving sensitivity	Narrow FM 0.3uV (12 dB SINAD) Wide FM 1.0uV (12 dB SINAD) AM 0.5uV (10 dB S/N)
Receiving selectivity	NFM +-7.5 kHz @ 6 dB +-20 kHz @ 70 dB WFM +-50 kHz @ 6 dB +-250 kHz @ 60 dB AM +-5 kHz @ 6 dB +-10 kHz @ 70 dB
Image and spurious rejection	-50 dB
Intermodulation	-50 dB
Receiver circuitry	PLL Synthesizer
Scanning rate	5 channels/sec.
Searching rate	1 MHz/6 sec.
Audio output	1 W at 10% distortion
Power requirements	12-14 V DC
Dimensions	138 x 80 x 200 mm
Weight	1.2 kg

ANTENNA TOPICS

W. Clem Small, KR6A/1, CET
R.R.1, Box 181, Salisbury, VT 05769

ONE MAN'S ANTENNA FARM

As regular readers of this column know, I recently moved from California to Vermont. And, as any of you radio buffs who have moved know, moving means taking down existing antennas, and then even more work in erecting a new batch of them at the new home. You learn something each time that you go through this process, and so I thought that I'd share with you some of my experiences from a few of the moves I've made.

Because I am interested in antennas, I usually put up several skywires at any location where I settle for any length of time. But there have been times when I have been lucky to be able to erect any antenna at all.

Many years ago, moving from my parent's home to college, I found that I had no place of my own to mount an antenna. Luckily, I had access to an unused animal laboratory room housing an old crematory furnace! Why was that lucky? Because the furnace had a brick chimney about forty feet tall. Down that chimney I dropped a vertical wire antenna which gave many pleasant contacts.

I recall another time, back in 1954, when I was lucky to be allowed to erect any antenna at all. I was in the U.S. infantry, stationed near Anchorage, Alaska. Having just obtained my ham ticket, I was eager to get on the air.

Those of you who may have been in the infantry in those days know that individuality of expression was not encouraged by your officers. Everyone's living quarters was just like everyone else's. Very little variation was allowed.

But chalk one up for heart to the infantry! I was allowed not only to have a radio transmitter and receiver in my living area, but to mount a half-wave, forty-meter dipole antenna on the roof of our barracks. I look back with fondness on that, my first amateur radio antenna.

Meanwhile, down on the farm:

If we put up enough antennas that it appears that they are just "sprouting out of the ground," other radio buffs may start to speak of our home as an "antenna farm." At my home in California, I had a good bit of area at my disposal, and I could not resist putting up an antenna at just about every location where one would be expected to function reasonably well.

There were three Beverage antennas going off from my house in different directions. The Beverage is a very directional antenna; it was an amazing experience to tune in an AM broadcast station and switch between those three antennas. At time I would bring up an almost unreadable signal to good quality while simultaneously nulling out a stronger interfering signal.

Another favorite which I had there was a 400 foot longwire which was strung over the tops of trees by means of a bow-and-arrow with a fishing reel and line. Using a weighted arrow, the fishing line was shot over the tops of tall trees; then the line was used to pull up a light rope which, in turn, pulled up the antenna wire.

The antenna wire was a long piece of discarded coaxial cable! Only the outer braid of the coax was used as the antenna, nothing was attached to the inner wire. As the the coax was well insulated, it did not make contact with the trees.

That antenna was forty feet above the ground in some place and as low as fifteen feet in other places. The antenna was connected to a 4-to-1 balun which was attached to my rig via a length of 52-ohm coax cable.

It was a great all-band antenna using an antenna tuner at the rig; it would usually give equal or greater signal strength on high frequency signals when compared to any other antenna that I tested.

Some down-to-earth antennas

There were two interesting antennas which I used there that surprised me somewhat. One was laid out on the ground: the other was buried a couple of inches underground...and they both worked! They had to be shortened for resonance from their free space dimensions due to interaction with the earth (velocity factor).

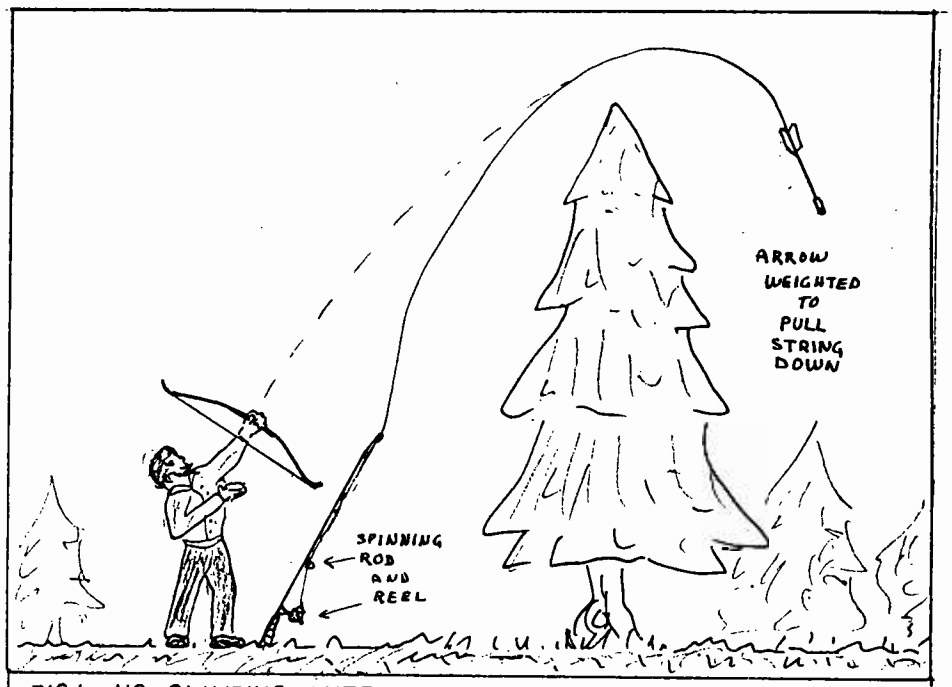


FIG.1. NO-CLIMBING ANTENNA ERECTION

The on-ground version, a 40-meter dipole, put out a good signal around town for local contacts. I never did finish all the digging and re-planting required to get the other one resonant, and it didn't function too well. Neither antenna was a "DX" antenna, but then they never came down in a windstorm either!

The old standbys:

I have found two antenna configurations that are very hard to beat for general purpose, high-frequency monitoring or hamming: the random-length longwire and the halfwave dipole. If there is one antenna which will give decent service across the HF bands with a minimum of time and expense to erect, it is the random-length longwire antenna. You must use an antenna tuner with this skywire, but it will get the job done for general purpose work.

When I got to Vermont, out came a coil of wire and up went a longwire across the trees around my house. It winds its way through about 175 feet of the countryside and produces good signals all the way from the low-frequency end of the spectrum to the top of the HF band.

Don't get me wrong; a random-length longwire is no match for a beam antenna or for an antenna designed specifically for a band of particular interest. A longwire aggravates broadcast band intermod and images on some receivers and should be used with a tuner or preselector. It is a good compromise when you want to listen to signals from many directions on a wide band of frequencies.

But there were times when I wanted better performance on twenty meters than my longwire would produce, so up went a twenty meter dipole. The improvement in signal strength was very worthwhile and I was able to work considerable more stations with the dipole than with the longwire.

A gift from Ma Bell!

In looking over the place where I now live, to my surprise and delight, I found an abandoned telephone line. This line runs on the same poles as my regular phone line, but it had been damaged in the past and was disconnected. The break is about 500 feet from the house, so naturally I thought of using the abandoned line as a long antenna.

Unfortunately, it didn't work out nearly as well as I expected it to. I could find no directional characteristic and this antenna was a disappointment. The project is about to be abandoned anyhow, because if I should forget and use this antenna for transmitting rather than receiving, its long run alongside the

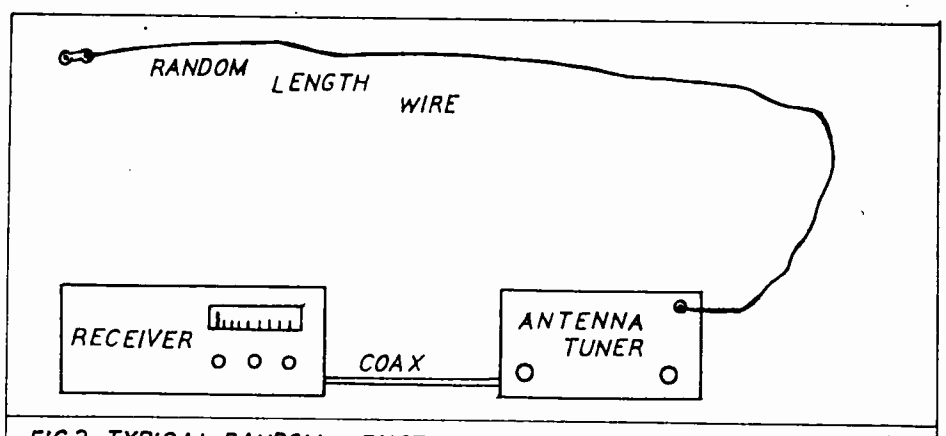


FIG.2. TYPICAL RANDOM-LENGTH ANTENNA HOOK-UP

regular phone line might produce some unwanted, even if interesting, results!

A "cable-ready" antenna:

This place where I now live is surrounded by farms and timberland. It's a great place to live, but we do get our share of cold and snow in the winter. The man who lived here before me had lived in Vermont for many years and weathered many of the long cold winters we have.

There is a long, sloping path from the house to the garage. The former owner found that one is likely to take a spill on the slick path at times. Being a practical man, he decided to do something about the problem and ran a 3/16-inch steel cable, at a height of about seven feet, from the house to the garage. Holding a rope looped to this cable, he and his wife could, without falling down, safely walk the path even in an ice storm!

Why am I telling you this? Well, the cable, low as it is, and perhaps 60 feet long, makes a very decent, random-length HF antenna! I attached a tuner where the cable enters the basement. Now that's what I call a "cable-ready" connection!

Growing things

This is farming country and, while my neighbors grow things like cows, milk and hay, I hope to grow some more antennas on my "antenna farm!" There are some trees near my house which give me the idea that I could swing up a four-element, cubical-quad beam, oriented toward Europe, without too much trouble.

And my scanner, at present, has only its case-mounted vertical whip to work with. I need something to improve on that for sure. So my farm will continue to grow, providing I get busy and put some work in on my "crops!"

IT'S STILL CONTEST TIME!

Don't forget to submit your entry. What antenna do you think is the largest, and which is the smallest ever constructed? To enter this "Largest and Smallest Antenna Contest," just drop me a card or letter with your candidate for either, or both, of these categories.

Try to give a reference of some kind as to the source of your information about the antenna. A picture would be great, too, but is definitely not necessary. Names of persons submitting the winning entries will be credited in this column, and they will receive a certificate of appreciation for their participation in the contest. So, get busy and send in your entry today!

RADIO RIDDLES

Last Month's Radio Riddle: Last month's riddle asked, "Who was determined, after a lengthy court battle, to have been the first person to develop and patent a communication system utilizing an antenna?" A hint was given that Heinrich Hertz, the discoverer of radio waves, was not the person!

Well, the man who is given credit by the court decision mentioned is the same person who invented the AC power system which is used the world over today: Nicola Tesla. Tesla was an electrical and radio pioneer of very great genius, and the court actually awarded him the patent on the first basic radio system. But it ruled that John Stone Stone had anticipated him on the design of the antenna itself![1]

Today, many scientists are rediscovering Tesla's work and realizing anew that his contributions have been vital in the growth of electrical engineering and radio communications. Among radio-communications engineers, there is also a great deal of respect for Stone, both as an engineer and as an individual.

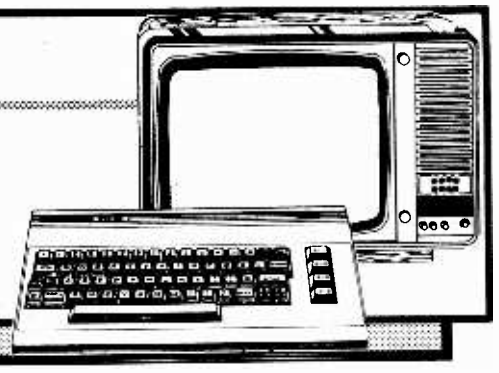
This Month's Radio Riddle: At various times, in this column, you've heard reference to the "half wave dipole." Well, just what is a "wave," and what is a "half wave?" And, if there is a wave, just what is it that is waving?

Next month I'll be discussing antennas for VHF and UHF scanners. In the meantime, drop me a line if you have any questions, comments, or suggestions concerning the column. Happy Valentines Day! ■

REFERENCE

Anderson, Leland I. "John Stone Stone on Nicola Tesla's priority in radio and continuous-wave radiofrequency apparatus," in The AWA Review, (1st ed.). Ed. Robert M. Morris. Holcomb, NY: 1986, p. 21.

MT Computer Corner



C.W. Ellis
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Ulster, PA 18850

Getting on the Bus

First on the scene this month is a short tutorial on how the digital bus works in a computer. If you recall, I promised to take you through this as a further explanation of the workings of the address match card presented in a previous column.

Figure 1 shows the logical levels associated with the various lines that comprise a typical address/data bus in a digital computer. The biggest difference between the bus structure of a small personal computer such as a Commodore 64 or VIC-20 and a large, fast (and expensive) PC is contained in the number of lines.

As an example, the IBM PC uses an 8 bit data bus and a 16 bit address bus, while the AT uses a 16 bit data bus and a 24 bit address bus. The principles of operation are the same.

Which Way Does it Go?

Back again to Figure 1, we see that the three lines labeled ADDO, 1, and 2 represent the logic state of the various address lines with respect to time. Notice that I have shown only three data and three address lines for clarity.

In actual operation, all address and data lines will assume the same timings as shown, varying only as to which state each line is in. The diagram assumes positive logic, meaning the "up" portion of each line represents a logic one, and a "down" level indicates a logic zero.

The time marked T0 on the diagram indicates the start of a bus operation, in this case, a write operation. If we determine the status of the address lines at T2 time, we see that a binary 101 is present, meaning address 5 is being used. Doing the same thing at T3 time for the data lines indicates a binary 110, or a data value of three.

At this point, it becomes clear that there must be a given sequence to use when reading the value of these lines. Standard convention says that bit 0 will be the low order bit, bit one the next higher, etc.

For example, the data bus is read as DATA0=1, DATA1=1 and DATA2=0. Arranged in an 8 bit pattern, they become 00000011, or a decimal 3. The address bus in handled the same way, resulting in a 00000101, indicating a decimal 5.

Now that we know what the address and data represent, look at the line labeled ADD EN--this is short for Address Enable. Note that all address lines have settled into the desired pattern *before* ADD EN becomes a logical one, or what is also referred to as the active level. This is true of the line labeled WRITE at T3 time.

All the data lines have assumed a steady state value before the write line is activated. It must also be noted that these lines in a specific machine may be active low, referred to as "negative logic." In this case, the WRITE label will be shown with a bar across the top of it, indicating the "NOT" state. For our discussion, we will stick with positive logic, active high.

Rules of the Road

The foregoing illustrates the basic and fundamental rule of bus operation--all address lines will be set to the desired state *prior* to ADD EN being activated, and maintained in ▶

(COMPUTER CORNER, cont'd)

that state until ADD EN is removed. There is no way around this rule, and the same rule applies to the DATA and WRITE line relationship.

This is the basis of bus operation and insures that correct bus operation takes place. It takes very little imagination to figure out what might result if any address or data line changed at the wrong time.

One last point on Figure 1--the READ line is shown at a logical 0 during the whole operation. If the operation of the READ and WRITE lines are interchanged, a read operation results.

The primary difference is that during a WRITE operation, the microprocessor is forcing the data lines to the correct level, and during the READ operation, it is the device being addressed that forces the data to the correct level.

This reinforces the rule: the ADD and ADD EN lines are all activated before the READ line to allow the device being addressed time to force the bus to the correct logical state. In a real machine, the time relationship between each step is specified at a maximum and minimum value.

In the instance just referred to, the timing specifications might well read "The ADD lines must be at the correct level *at least* 20 nanoseconds prior to asserting ADD EN, and READ must be asserted at least 55 nanosecond *after* ADD EN." This would allow the device being read a 55 nanosecond period to decode the address, and force the bus to the appropriate state.

In a real machine, these values must be guaranteed at the device being read or written; for example, it may take only two nanoseconds for the signal to arrive at a memory chip pin because the memory chip is close to the micro. Some other bus device may by physically a long way from the micro and the signal may take 12 to 15 nanoseconds to arrive.

A typical example would be memory chips mounted on the motherboard versus the same chips mounted in a plug-in memory expansion card. When things happen such as the DATA lines on a write operation being slower to arrive at the device being written than the WRITE line, the wrong data may be written. The bus timing specifications assure that such collisions don't happen.

If the foregoing has whetted your appetite for more, pick up one of the Motorola or Intel microprocessor manuals and start reading through the section on bus operations. While a little hard to understand at first, these manuals contain a wealth of information and are well worth the reading.

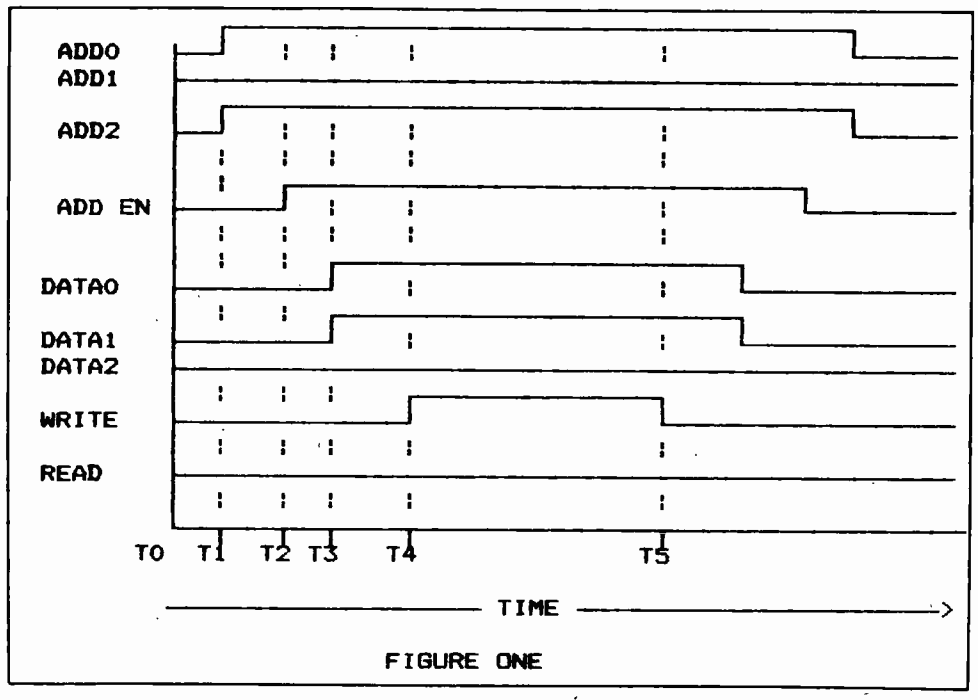


FIGURE ONE

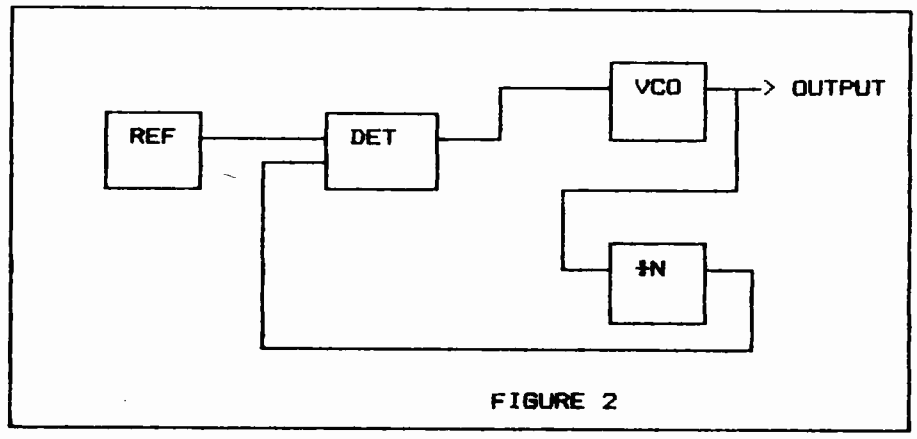


FIGURE 2

Frequency Synthesizers

Any radio enthusiast who has ever read a receiver spec sheet or advertisement for a typical receiver has seen the words "frequency synthesizer." In 500 words or less, I am going to attempt to cover the basics of frequency synthesis.

There are four primary blocks in a frequency synthesizer and only two are digital; the remaining two are analog (see Figure 2). I am going to assume that you are somewhat familiar with functions and terms like mixing, phase detection, VCO, etc., and just touch on the basics of these functions. We start by defining each block and its function:

REF: The reference oscillator is normally at a low frequency so that an accurate frequency can be more easily generated and maintained.

DET: The phase detector has two inputs, the reference oscillator and the feedback frequency. It has one output, the analog voltage that controls the VCO.

VCO: The voltage controlled oscillator generates the desired output frequency and consists of an oscillator whose frequency is varied by the applied control voltage. This oscillator is normally many times higher in frequency than the reference frequency and is not designed for stability. It depends on the controlling voltage to keep it on frequency.

÷N: This digital block divides the VCO output frequency by a fixed value and feeds the resulting lower frequency to the phase detector.

Operation: The reference oscillator generates a precise, usually crystal-controlled reference frequency which is fed to the phase detector circuit. The care with which the reference oscillator is designed determines the overall accuracy of the synthesizer, as any error here is magnified by the division factor of the ÷N stage.

For our discussion, assume a 100 kHz reference oscillator (I have chosen values which make the math easier; values would depend on the application).

Let's assume that the desired output frequency is 10 MHz. The VCO is set up to operate somewhere near 10 MHz in its "freewheeling" state; that is, in the absence of a correction voltage, the VCO is biased to operate somewhere near 10 MHz and will be pulled to precisely 10 MHz with the application of the control voltage, or correction signal, from the phase detector.

The output of the VCO goes to the next stage in the device for which the synthesizer is designed and also to the ÷N circuit. In our theoretical synthesizer, the division factor is set to 100; thus, the near-10 MHz output is divided by 100 to give a result near 100 kHz which is also fed to the phase detector.

In the phase detector the signal from the precise 100 kHz reference oscillator is compared with the "near 100 kHz" output of the ÷N stage and an error voltage is generated that is proportional to the difference between the two frequencies.

This error voltage is applied to the VCO in such a manner that its frequency shifts in the direction that brings it closer to the reference frequency. When the phase detector finds a voltage that causes the two frequencies to be equal, the VCO is said to be locked to the reference frequency.

Since the reference frequency is now identical to the feedback signal, the VCO output must be exactly 10 MHz.

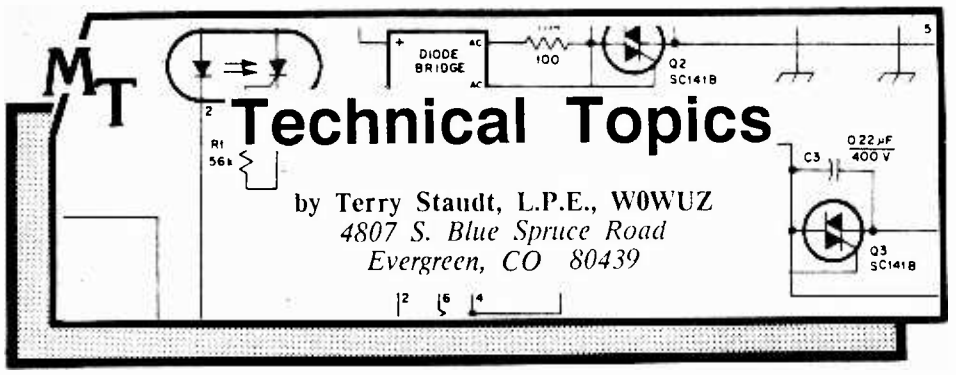
A number of factors affect the operation of our synthesizer--loop response time, lock time, capture range, etc.--and these factors are utilized by the designer to achieve various different types of synethesizers.

One manner of variation is adding a second crystal-controlled oscillator and mixer between the VCO output and the phase detector. If we set this oscillator to 9 MHz and mix the 9 and 10 MHz signals together, the results are 1 MHz, 19 MHz and the two original frequencies.

If we then filter out all but the 1 MHz difference frequency, we can set the ÷N stages to divide by 10 rather than 100 to achieve our feedback signal of 100 kHz. This has the advantage of reducing the loop time since less divide circuitry is needed. However, the new 9 MHz oscillator must also be highly stable, as the VCO output is dependent on it as it is on the reference oscillator.

Next month we'll continue our synthesizer discussion, and hopefully we can get into the real digital aspects.

In closing, I'd like to pass on one comment. All the Computer Corner columns written by myself exist on diskette, in the IBM 360 Kbyte format. If there is any interest in these diskettes being made available, drop a line to Bob Grove, and let him know. If enough demand is evident, Bob may just make them available. ■



by Terry Staudt, L.P.E., W0WUZ
4807 S. Blue Spruce Road
Evergreen, CO 80439

Let's "Drain the Swamp"

For years since I first heard it, one of my favorite sayings of all time has been, "When you're up to your rear in alligators, it's difficult to recall that your initial objective was to drain the swamp." This is going to be a rather short piece on "swamping," a phenomenon we've all experienced in radio reception--especially since solid state circuits have been the 'norm' for the last 15 years or so.

In the late 1970's, I was Service Manager of several CB outlets in the Ft. Worth, Texas, area (I'll *never* live that down!). I heard repeated, vague complaints from truckers running in a convoy configuration (many using illegal power) about not being able to hear each other when they were too close.

This struck me as rather odd, as I had experience with military "walkie-talkies" and knew they squealed when they were just a few feet away from each other, but you could always communicate--no problem.

What I didn't realize was that the old walkie talkies used "peanut" tubes--extremely high impedance--whereas the CB's used either low impedance, bi-polar transistors or dual-gate MOSFETS which were high impedance, but with an important difference!

A Short Technical Treatise

When gate 2 of a dual-gate MOSFET goes positive in respect to the source, it avalanches--breaks like a flood-swollen dam--and causes intermod, cross-mod, "birdies" and other by-products which are amplified and swept through the receiver like a flood, covering up all primary information.

The bad news to the SWL and ham is that just about all modern gear uses a dual-gate MOSFET as the first RF (radio frequency) amplifier. The good news is that you can correct the problem for less than a buck and realize cleaner reception that you ever thought possible!

An Idea Evolves

After many conversations with CB people and component manufacturers an initial idea was born--controlled, rather than resistive biasing. This entailed running a resistor (usually 10 K) from the B+ to the source resistor. You very probably have this in your receiver (Fig. 1).

The maneuver worked so well the problem was thought to be solved; it wasn't. In cases beyond laboratory conditions, it was still getting swamped. The next solution? Replace the source resistor with two silicon diodes (a constant 1.2 volt drop). This worked *very* well (Fig. 2); that was, until you have two or three hams running 1000 watts on the same block!

The Final Fix

What finally evolved and is being used in most equipment made in the last several years, is the use of an LED to give a dynamic response, making the scenario of the original cause impossible (Fig. 3).

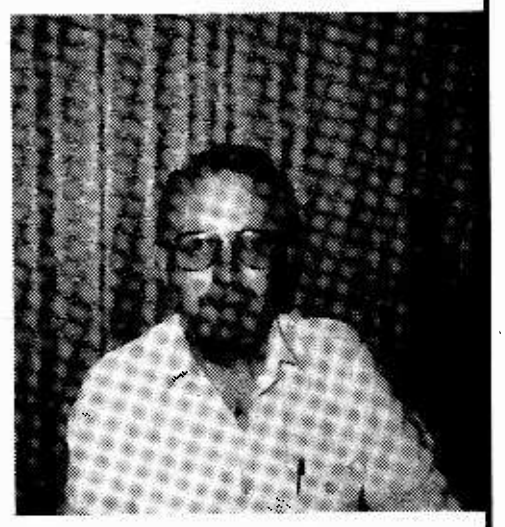
If you have a "bargain bag" of LED's, use a 12 volt bench supply, a 1K resistor and a VOM to find one around 1.2 volts (See Fig. 4).

You now know the theory which will give you the easiest, cheapest modification you can do to take your receiver into the 1990's. You simply don't realize how many "borderline" cases of this problem have plagued you, made you scratch your head and put up with it--NO MORE! If you doubt the Sage, tune in an enormous signal and, with the room lights off, watch the LED flicker.

Enjoy. Any questions will be answered if received with an SASE.

MT's Family of Writers

Terry Staudt



Terry Staudt was born in Canton, Ohio, Feb 4, 1940. He had the good fortune to have both an Amish maid and the very best Zenith radio/phonograph console available. When his parent were away, the maid would tune to Radio Berlin to hear Hitler's speeches and translate.

Finding that interesting, after the speech and the maid went elsewhere, he "tuned around," listening to the BBC and the Armed Forces Radio Network. An SWL at four!

The radio bug had bitten and at 14 he passed his novice "ham" exam, elevating to General Class a year later.

In 1957 Terry joined the U.S. Navy and was assigned to E.T. school at Treasure Island, California ("in the middle of San Francisco Bay, with a lovely view of Alcatraz," says Terry!).

Through extensive testing he became an Electronic Warfare Specialist at the Top Secret school at Point Loma, California, just north of San Diego. After that he was assigned to the U.S.S. Helena, Flagship of the 7th Fleet. He saw considerable action in Quemoy and Matsu and was awarded several medals and four "E"s.

After discharge he entered the University of Northern Colorado where he majored in Electrical Engineering and minored in Anthropology. In 1965 he married and had also written his first article for *73* magazine.

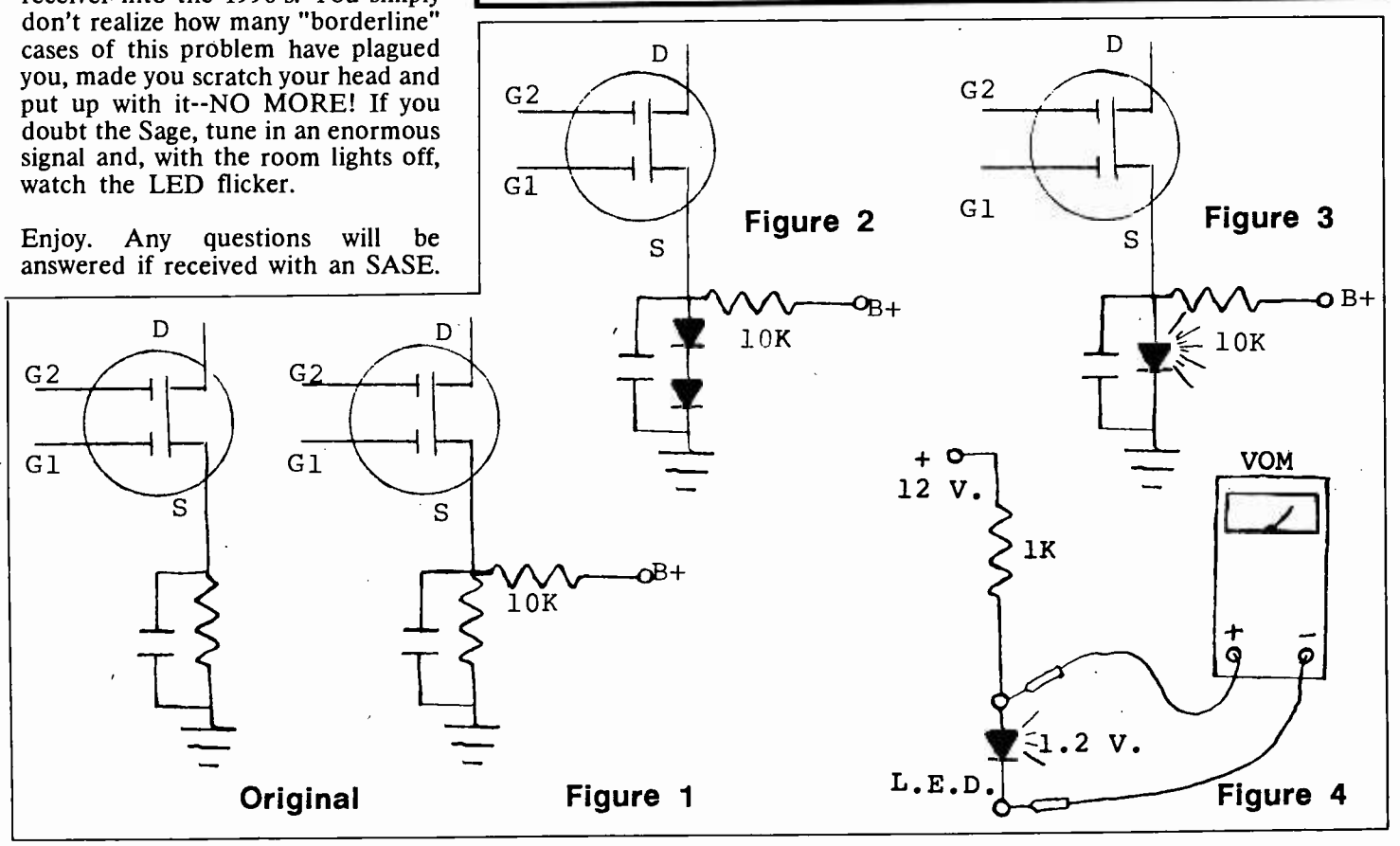
As time passed, he received his Advanced ham ticket, First Class Radiotelephone FCC license with Radar Endorsement, and Radio Telegraph endorsement.

In 1968 Terry joined the Colorado State Police, becoming Senior Communications Officer for Division 3 (all of northeastern Colorado).

As an active ham, his love is *talking* to DX station, helping newcomers and writing. He says, "Although I'm not particularly religious, I feel we're all here to help each other."

He's presently a Licensed Professional Engineer (and had worked for Hallicrafters in Arlington, Texas, as Senior Engineering Associate) and never ceases to experiment with new ideas, technology and technical writing. He holds many of the prestigious amateur radio awards but deprecates himself by saying, "If you hang in there long enough, anyone can do it."

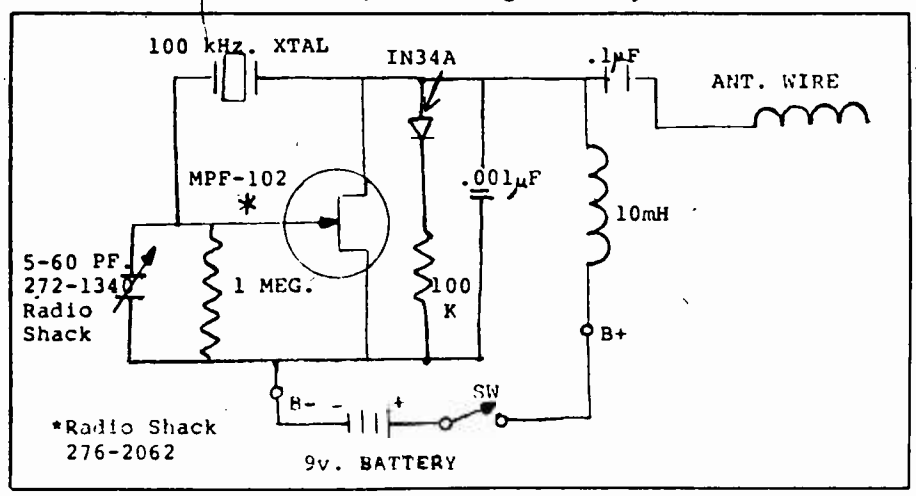
We're pleased to have Terry aboard from our acquisition of *International Radio* magazine, where he was Technical Editor.



TECHNICAL TOPICS CORRECTION

In our January column, the schematic diagram which accompanied the article on the crystal calibrator was indistinct. We have reproduced the illustration here with bolder lines.

Additional Note: The coupling to the receiver is done by wrapping the insulated lead from the output capacitor (0.1 microfarad) around the receiver's antenna wire, not by connecting it directly to the antenna screw.



EXPERIMENTER'S WORKSHOP

BUILD THIS
Wideband Preamplifier

by Mark Simari

Circuit 1 shows a matched impedance (50 or 75 ohm) preamplifier which works from about 100 kC to 150 MHz. Layout is not critical, however a good ground plane, metal box and short leads are important. All resistors are 1/4 watt. All diodes are IN914.

Circuit 2 starts with a unity gain preamp connected to the base of Q1 to transform a high impedance to 50 ohms out. Diodes D2-D5 are limiters to keep high signal levels from burning the gate of Q2 out.

Short leads and *a very good ground plane* are required.

The second circuit would make an excellent active antenna with a short whip attached to the input.

Both circuits can run at 9 to 12 volts DC. R7 is a gain limiter--if it is installed you cut the gain in half.

" ASK BOB "

Bob Grove, WA4PYQ, answers questions of general interest

Q. *Exactly what is a "panoramic display?" (Norm Gregory, Seattle, WA)*

A. As with a spectrum analyzer, a horizontal line representing several megahertz of spectrum appears on a screen. Every signal which is being received within that band shows up as a "pip" (bump) on that line.

Panoramic displays are known variously as panadaptors, spectrum display units (SDUs), scanalyzers, and probably a few other names as well. They are added on to an existing receiver so that the user will see a signal immediately when it comes on the air and tune to it, rather than wait for the trial-and-error method of a slow search coincidentally arriving on a frequency that might be in use at that instant.

Grove Enterprises is actively developing a spectrum display system for the ICOM R7000 and other receivers as well and would like to hear from readers concerning their interest and their recommendations.

□ □ □ □ □

Q. *Does anyone make a handheld scanner that covers the 800 MHz band besides the Regency HX2000/2200? (Wayne Platt, Lantana, FL)*

A. No.

□ □ □ □ □

Q. *In your magazine and some others I have seen references made to using portable or handheld frequency counters in searching out new frequencies. This idea sounded intriguing to me and I thought I would try a Heathkit handheld counter with the telescopic antenna.*

For my first field test I decided to try my car CB radio. I had a buddy key the mike while I checked the frequency. It worked perfectly. But at a range of approximately 3-1/2 to 4-1/2 car lengths away (about 35 to 45 feet) the frequency counter would no longer read accurately. It was at this point that I started to sense that all was not going to be as easy as I believed!

Since I was in Omaha, Nebraska, visiting my friend and we knew the frequencies for the Omaha Police Department, we decided to use them for our second field test. We proceeded to walk around the block containing the Omaha Police Department, I carried the frequency counter and my buddy carried the scanner. Even though we could hear the police on the scanner, we could not get any readings on the frequency counter.

Thinking that something might be wrong with the frequency counter I took it to Heath and they checked it. They stated that it was sensitive to 10 mV, that the frequency range was 50 Hz to 512 MHz, and that it was working perfectly.

The antennas on top of the police department are approximately 100 feet above the ground. How much power is used is unknown.

Do you think that by adding a wideband preamplifier such as those available for scanners would work? (David Epp, Lincoln, Nebraska)

A. Signal strengths drop off rapidly as you leave a transmitting antenna. The police antenna, at 100 feet elevation, is radiating into the horizon, not down toward you. A preamplifier will help somewhat, but will increase false responses to electrical signals all around you. Try the unit near a commercial AM, TV or FM tower and see what happens.

□ □ □ □ □

Q. *Is there a scanner frequency directory for the Cincinnati area? (Don McMillan, Cincinnati, OH)*

A. As a matter of fact, there are three. Check your local Radio Shack for the Police Call Directory, volume 3 (Michigan and Ohio); call Fox Marketing (1-800-543-7892) for the location of one of their dealers and ask for the Cincinnati directory RL 006-2; contact the All Ohio Scanner Club (PO Box 2496, Springfield, OH 45501-2496) and enclose an SASE along with your request for Cincinnati information.

□ □ □ □ □

Q. *Can the Regency HX1000 and 1200 be kept in the Polaris charger for long periods of time without degrading the battery life? (William Freiler, Hatfield, PA).*

A. According to the manufacturer, yes. The Polaris drop-in charger (Grove accessory ACC18) senses current drain (thus exhausted state) of the batteries and automatically switches between high and low charge.

Even the HX1500 may be charged with the Polaris charger, provided a few precautions are taken so as not to overcharge the lower capacity AA cells. Repeatedly insert and remove the scanner from the recharger until the charge light glows dimly, indicating the lower rate. Regency may announce a special charger for the HX1500 eventually.

Q. *Where can I find a good quality GaAs FET preamplifier for VHF/UHF monitoring? (Hank Rose, Lawrenceville, NJ)*

A. An excellent line of high quality GaAs FEt preamps is available from Lunar Industries, 7930 Arjons Dr., San Diego, CA 92126. Other sources as well are listed in the prominent amateur radio publications like *QST*, *73*, *Ham Radio*, and *CQ*.

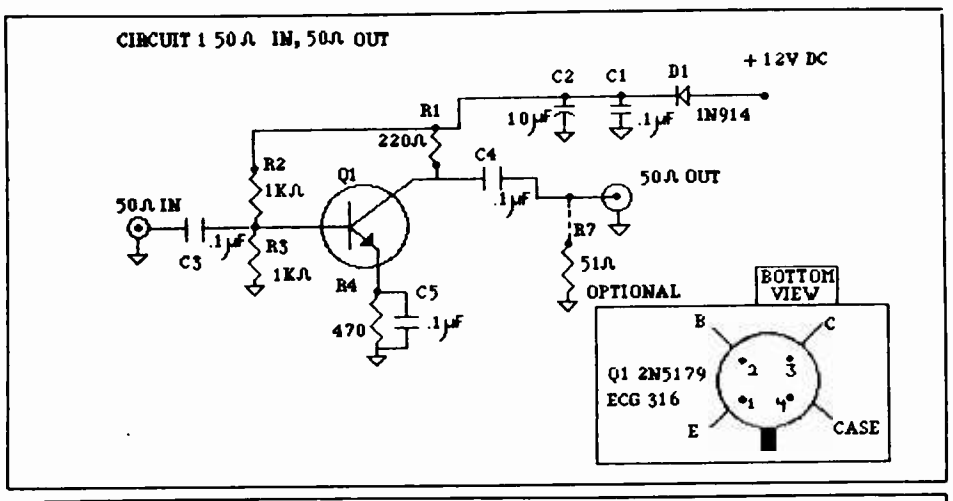
□ □ □ □ ■

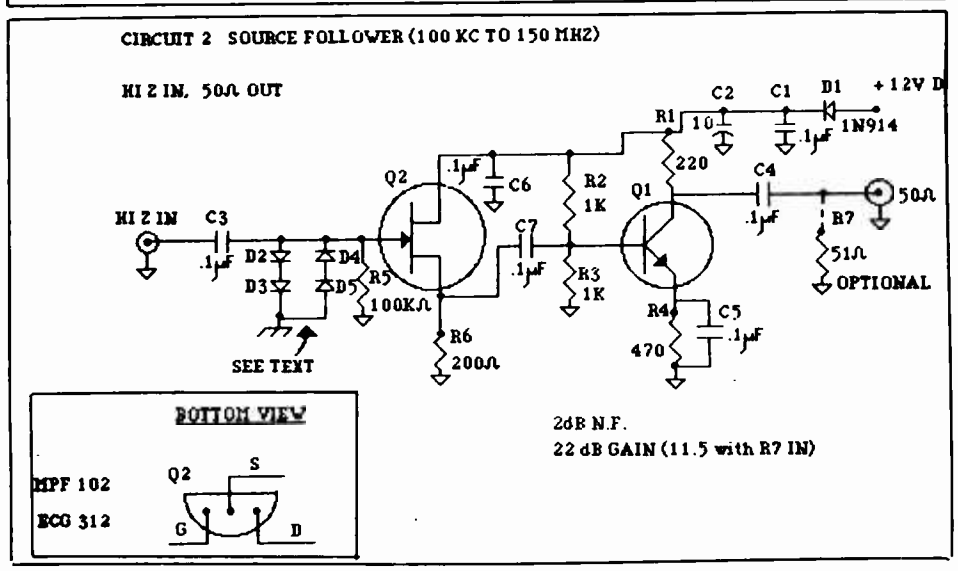
ERRATA:

In our December column I responded incorrectly to the question, "*If you feed the end of a long wire antenna (high impedance) with coax (low impedance), does a tuner at the receiver (or transmitter) correct the mismatch?*" The answer should have been, "Yes, through a law called 'conjugate matching.'"

Greatly simplified, the theorem states that in a complex circuit of mismatched components, if you are able to resonate (match impedance to frequency) one branch of the circuit, all other reactances (unmatched branches) will also be brought to resonance. Thus, any mismatched feedline/antenna system may be tuned to resonance at the operating position, not at the antenna.

I would like to thank a friend in Georgia who prefers to remain anonymous for bringing this oversight to my attention.





How to hook an SWL –

A Simple, Inexpensive 6 MHz to AM Broadcast Band Converter

by Chris Williams

I recently found myself in need of a quick, convenient way to expose a friend to the world of shortwave listening. This was by no means a first. I'd say someone gets curious and asks me questions about the hobby about once a month.

Now obviously, I could have invited him over for a demo, or I could have lent him a spare receiver. But I've found neither of these approaches is particularly effective in recruiting newcomers to the hobby.

The problem is time. It takes time to get hooked. You can't have someone live in your shack and you aren't likely to be comfortable having expensive equipment scattered about the neighborhood for long periods.

That is why I came up with the circuit I'm presenting in this article. This little gem is simple to use, fascinating to shortwave newcomers, very inexpensive, and easy to build. Because the "from scratch" cost of this device is on the order of ten dollars, you can lend it for weeks and worry about it not at all.

Incidentally, it seems that weeks is the right duration. After having this toy and playing with it for weeks, people usually ask for receiver catalogs when they finally return it!

The Circuit

The circuit, a straightforward HF heterodyne converter, is shown in Figure 1. It receives 6 MHz signals (plus or minus about 200 kHz) and heterodynes them to 1 MHz. Since 1 MHz is right in the middle of the AM broadcast band, a simple AM broadcast receiver functions nicely as the intermediate amplifier, detector and audio amplifier stages.

The mixer consists of an input tank, a 40673 dual gate MOSFET (Q1) and an output tank. For those of you new to this sort of thing, a tank is a coil-capacitor combination. In this case, the input tank is T1/C1 and the output tank is L1/C5.

Both tanks are loaded with ▶

(EX. WORKSHOP, cont'd)

resistors (R1 and R5) so as to be broadband, thus permitting one knob tuning--the air variable capacitor in the local oscillator (L.O.) stage (C6). C7 is a 10 pF padding trimmer capacitor mounted on the air variable and is used for calibration.

The L.O. is a simple Colpitts designed to tune from about 6.8 to 7.3 MHz, mixing with stations in and around the 6 MHz shortwave broadcast band to produce a heterodyne output at about 1 MHz.

If the 1 MHz frequency has a strong AM broadcast station occupying it, simply tune the AM broadcast receiver to a nearby unused frequency. The broad output tank of the mixer will be able to accommodate an intermediate frequency slightly off of 1 MHz.

The project is best built in a small aluminum box with the air variable capacitor mounted inside. L1, a ferrite rod loopstick, should be mounted on a spacer a few inches above the box (see illustration).

The circuit is easy to get working and no extraordinary techniques or skills are required. Please ensure the capacitors you use in the L0 are polystyrene when that type is called for in the parts list.

Special Attractions

The advantage of this gadget is its ability to operate through AM broadcast receivers without any internal connections; the signal is strong enough from the mixer to radiate several inches. Even so, you can improve your results by turning the receiver to provide different antenna angles or simply by moving it closer.

The device operates off a 9 V battery and, because the current draw is low, the battery should have excellent life. Connect the battery positive side to Vcc, negative side to ground.

Calibration

First, use your own shortwave receiver tuned to about 7 MHz to ensure the L.O. is oscillating. Once you're certain of this, adjust the coil spacing of L2 and the setting of the C7 padder to provide the desired tuning range of C6, which should be 6.8 to 7.25 MHz. After you've done this, and before going any further, glue the coils of L2 into place.

To complete calibration, peak T1/C1 at 6 MHz with a grid dip meter by adjusting the coil spacing of T1's secondary. Do the same with L1 only arrange the peak at 1 MHz. If you don't have a dipper, set up the converter with an AM radio tuned near 1 MHz and peak the two adjustments for maximum signal. When finished, glue the coils of both inductors into place.

Operation

Operation is so simple that all you need tell a prospective shortwave enthusiast is to connect a long piece of wire, preferably strung as high as possible outside, to the antenna input. He is then to turn on the converter and the broadcast receiver, set the receiver to about 1 MHz, and begin to explore the 6 MHz shortwave broadcast band with the tuning control.

Recruiting the Prospective SWL

by Chris Williams

There are a couple of techniques I've found useful in generating enthusiasm among users of this converter project and I'd like to pass them along.

First and foremost, encourage logging! Ask the user to write down what he hears and what frequency the announcers quoted for the stations he was listening to. Ask him to use that information to pencil-mark a calibration of the tuning knob. He'll also need to record as accurately as he can the setting of the AM broadcast receiver's frequency.

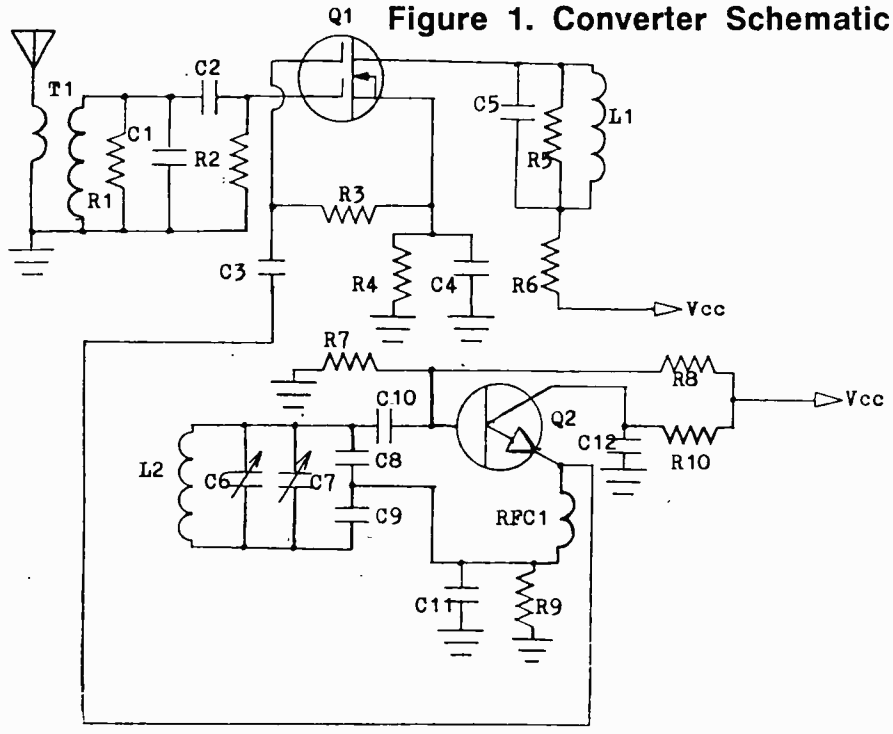
All this gets him to think terms of goals rather than passive armchair listening. From this, it is a small step to some of the other sub-pursuits of our hobby like DXing and QSL hunting.

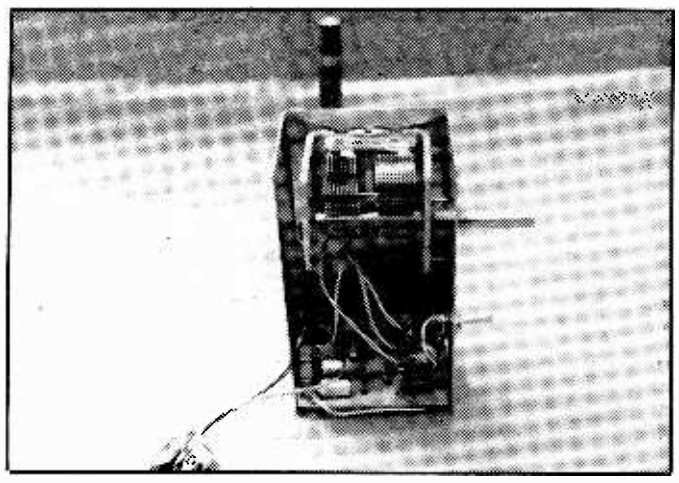
Next, ask him to experiment with antennas and to record his results. Different antennas can greatly change what he can hear, and most people find that fascinating.

Lastly, ask him to listen at different hours of the day, even if only for a few minutes. This will increase the number of stations he can log and add to his enjoyment.

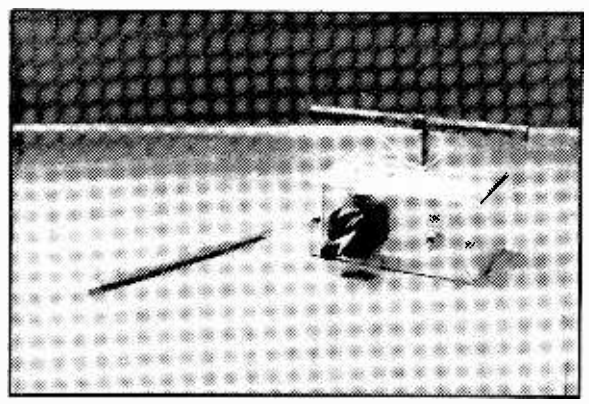
I hope you build this project and find many others to enjoy it. Good luck!

Figure 1. Converter Schematic





An inside view of the converter. Only one section of the variable capacitor is used.



The completed converter. Radiating loopstick is mounted outside the box.

PARTS LIST:

C1 - 6580 pF disc ceramic
R1,R3,R5,R7 - 10K ohms
C2 - 270 pF polystyrene
R2 - 100K ohms
R4,R6,R10 - 100 ohms
R8 - 22K ohms
C4,C11 - .005 uF
C5 - 150 pF
C12 - .01 uF
R9 - 1K ohms
Q1 - 40673 dual gate MOSFET
Q2 - 2N2222A NPN transistor
C8,C9 - 1300 pF polystyrene
C6 - 10-160 pF air variable
C7 - 10 pF padding trimmer capacitor
T1 - Primary: 4 turns no. 22 enameled wire on T-50-6 toroid core. Secondary: 16 turns of no. 22 wire on same core.
L1 - 42 turns of no. 28 wire on ferrite rod. This is a BC band loopstick with turns removed to achieve resonance with C5 at 1 MHz.
L2 - 12 turns of no. 22 enameled wire on T-50-6 toroid core.
RFC1 - 10 MHz radio frequency choke (or adequate ferrite bead)

These parts are available from:

Dick Smith Electronics
1-800-332-5373

Circuit Specialists
1-800-528-1417

State Street Sales
P.O. Box 249
Luther, MI 49656

REFLECTIONS on radio

As you might expect, radiocommunication and the customs that have grown up around it are just as illogical as language itself; maybe this article will start you wondering about other traditions and how they came about. Therein may lie a story!

Customs, Quirks, and Confusion!

by D.K. de Neuf, WA1SPM

Setting the Date

If you wrote a friend in Europe on December 5, 1984, you'd probably date your letter 12/5/84. But if he was writing to you on the same date he'd most surely date his letter 5/12/84; we could avoid the confusion by writing the date as 05 Dec 84, or 05 XII 84.

Fading Signal Report

On amateur radio CW code you'll hear signal reports from all quarters of the globe using the "RST" reporting system (Readability, Strength, Tone). "Tone" is an anachronism dating back to the earlier days when heavily modulated carriers were common due to lack of filtering of the power supply, etc. Today virtually all CW signals are clean and pure, yet practically everyone continues to use "9" as the last figure of a signal report. The "9" is really of no value whatsoever, and its transmission wastes time, power and frequency space.

Some years ago the commercial point-to-point stations used a very effective reporting system called the SINPO code, which consisted of five figures. "S" stood for signal strength, "I" for interference (QRM), "N" for noise (QRN), "P" for propagation disturbance (QSB), and "O" for overall readability.

Each of these was graded, one to five, based on intensity or degree. "43534" for example, would mean the equivalent of "Good signal, moderate QRM, no QRN, moderate fading, and reading you quite well." But today for a report on the same signal you'll probably hear a fellow spell out, "*RST 459 but there's some QRM and some QSB but manage to copy you OK.*"

What a time saver was the old SINPO as well as providing considerably more useful information!

Being diacritical

A good friend of mine, whose first language is Spanish, asks me why the pronoun "I" is always capitalized in English, rather than using a small letter. He says it's not done in any other language to the best of his knowledge. I'll be darned if i know, do you?

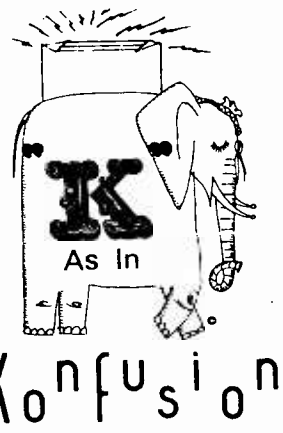
And speaking of Spanish, in the written form some letters carry diacritical marks as do some other languages. For example, in Spanish the letter "ñ" is pronounced "en-yeh" rather than "ehn." It is interesting that teleprinters have always used "all-caps" so that lower case (small letters) and letters with diacritical marks are not provided on keyboards. As a result, Spanish language news services have had to transmit "ñ" as simply "n" on teleprinters. Hence the word "años" ("years" in Spanish) is always transmitted as "anos" - which is Spanish for anus! (Editors don't dare let their minds wander.)

Even though seldom used today, the original International Morse code actually provided code symbols for letters carrying diacritical marks as a guide to pronunciation (see illustration). Its use had been pretty much abandoned except for handwriting because of the conventional typewriter and teleprinter restrictions.

I suspect that people learning English would welcome the use of some diacritical marks on certain letters--the letter "C" for example. When it's sounded like "see" how about showing it as ć and when sounded like "kay" showing it as c̄? Then "circus" would be much easier for a student of English--it would appear as "ćirc̄us"! Much more practical then trying the change the language so that we'd spell it as "sirkus"!

No doubt you have noticed that many Europeans when handwriting the number "1" use a rather long serif (1). To avoid any confusion, a "7" is written as 7̸ with a crossbar.

This world of alpha-numerical computers and printers using only "all-caps" has forced me to write my name on hotel and airline reservations, for example, a little differently than it is supposed to be. If I put a space between the "de" and "Neuf" it shows up under "N" as "NEUF D E" - the computer figuring that somebody didn't know what they were doing because of the space, and that the "DE" must be initials. So, to prevent this, and to bow to the times I now run it all together--"DENEUF".



The use of common names to assist in the voice transmission and reception spelling of words has been standard practice for many years. But the "phonetic experts" in world meetings like that of ICAO (International Civil Aviation Organization) have caused the nomenclature to be changed several times.

A, B and C for many years was ABLE, BAKER, and CHARLIE. Now it's ALFA, BRAVO and CHARLIE. DOG became DELTA, LOVE turned into LIMA, IDA is now INDIA and QUEEN was renamed QUEBEC. But one wonders about the wisdom of choosing geographical names under circuit conditions of poor audio quality, static and interference, especially in these days of really wierd call signs.

How about a message, under poor intelligibility: "*This is LIMA 2 QUEBEC INDIA enroute to India via Lima and Quebec.*" Confusing? It used to be simple: "*This is LOVE 2 QUEEN IDA enroute to India via Lima and Quebec.*"

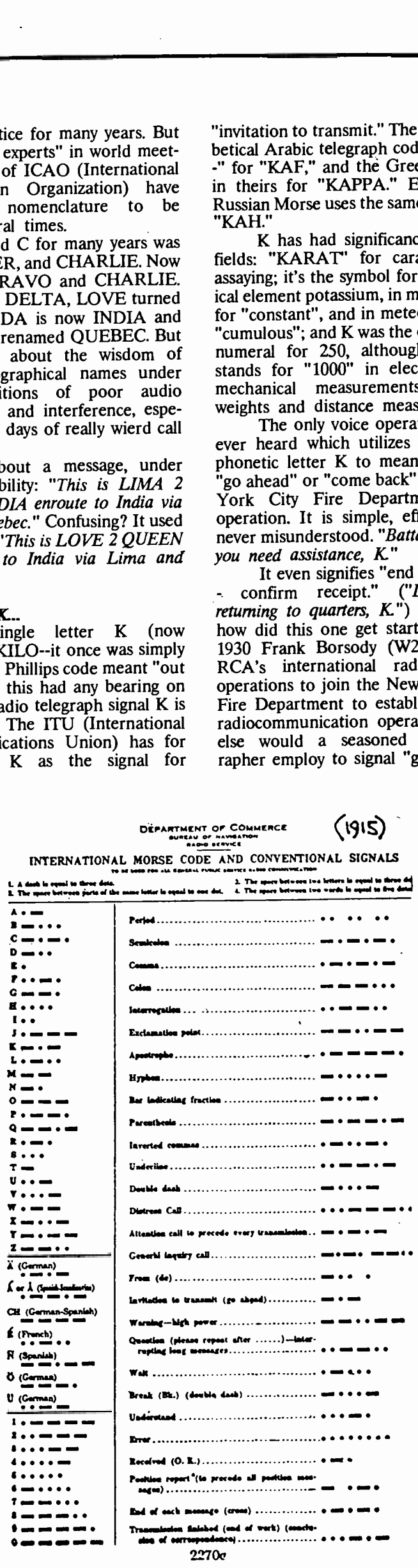
Speaking of K...

The single letter K (now phonetically KILO--it once was simply KING) in the Phillips code meant "out of." Whether this had any bearing on the age-old radio telegraph signal K is questionable. The ITU (International Telecommunications Union) has for years listed K as the signal for "invitation to transmit." The old alphabetical Arabic telegraph code used "- . -" for "KAF," and the Greeks used it in theirs for "KAPPA." Even today Russian Morse uses the same signal for "KAH."

K has had significance in many fields: "KARAT" for carat in gold assaying; it's the symbol for the chemical element potassium, in mathematics for "constant", and in meteorology for "cumulous"; and K was the old Roman numeral for 250, although today it stands for "1000" in electronic and mechanical measurements and in weights and distance measurements.

The only voice operation I have ever heard which utilizes the simple phonetic letter K to mean "over" or "go ahead" or "come back" is the New York City Fire Department radio operation. It is simple, effective and never misunderstood. "*Battalion 51, do you need assistance, K.*"

It even signifies "end of message - confirm receipt." ("*Ladder 74 returning to quarters, K.*") When and how did this one get started? About 1930 Frank Borsody (W2AYN) left RCA's international radiotelegraph operations to join the New York City Fire Department to establish its first radiocommunication operation. What else would a seasoned radiotelegrapher employ to signal "go ahead"?! ■



DEPARTMENT OF COMMERCE (1915)
BUREAU OF NAVIGATION
RADIO SERVICE

INTERNATIONAL MORSE CODE AND CONVENTIONAL SIGNALS

1. A dash is equal to three dots. 2. The space between parts of the same letter is equal to one dot. 3. The space between two letters is equal to three dots. 4. The space between two words is equal to five dots.

A • —		Period	• • • • • •
B — • • •		Semicolon	— • — • — •
C — • — •		Comma	• — • — • —
D — • •		Colon	— — — • • •
E •		Interrogation	• • — — • •
F • • — •		Exclamation point	— — • • — —
G — — •		Apostrophe	• — — — — •
H • • • •		Hyphen	— • • • • —
I • •		Bar indicating fraction	— • • — •
J • — — —		Parenthesis	— • — — • —
K — • —		Inverted commas	• — • • — •
L • — • •		Underline	• • — — • —
M — —		Double dash	— • • • —
N — •		Distress Call	• • • — — — • •
O — — —		Attention call to precede every transmission	— • — • —
P • — — •		General inquiry call	— • — • — — • •
Q — — • —		From (de)	— • • •
R • — •		Invitation to transmit (go ahead)	— • —
S • • •		Warning—high power	— — • • — —
T —		Question (please repeat after .....)—interrupting long messages	• • — — • •
U • • —		Wait	• — • • •
V • • • —		Break (Bk.) (double dash)	— • • • —
W • — —		Understand	• • • — •
X — • • —		Error	• • • • • • • •
Y — • — —		Received (O. K.)	• — •
Z — — • •		Position report (to precede all position messages)	— — • — •
Ä (German) • — • —		End of each message (cross)	• — • — •
Ñ or Å (Spanish-Scandinavia) • — — • —		Transmission finished (end of work) (cessation of correspondence)	• • • — • —
CH (German-Spanish) — — — —			
É (French) • • — • •			
Ñ (Spanish) — — • — —			
Ö (German) — — — •			
Ü (German) • • — —			
1 • — — — —			
2 • • — — —			
3 • • • — —			
4 • • • • —			
5 • • • • •			
6 — • • • •			
7 — — • • •			
8 — — — • •			
9 — — — — •			
0 — — — — —			

2270e

Mailbag

Broadcasting

Larry Miller, MT Broadcast Editor, P.O. Box 691, Thorndale, PA 19372

We've got a full mailbag this month -- complete with some very thought provoking comments. So let's dig right in.

Laying Some Rumors to Rest

I have a note from someone -- name undecipherable (maybe I should send some of my mail to Utility Intrigue columnist Don Schimmel for descrambling) -- who asks, "Who actually publishes *World Radio Report*? Does Bob Grove approve?" Although I already addressed this in the last Mailbag, let's clarify. *World Radio Report* is published by the Foundation for International Broadcasting, Inc. (FIBI), a registered non-profit corporation. FIBI is governed by a Board of Directors, which includes the Rev. Ken MacHarg of HCJB and Dr. John Santosuosso of *Monitoring Times*. I am also a board member and run the day-to-day operation of the Foundation. I discussed the publication with them in advance and Bob and Judy Grove do approve of it.

Radio Japan Has Its Head in the Sand

Larry Nebron of Daly City, California writes a letter that, since my blood pressure is rising a bit anyway, I don't mind tackling. Says Larry, "Tell me if I'm wrong but in the last six months I have seen exactly zero column inches of advertising from international shortwave stations in *Monitoring Times*.

"When *International Radio* magazine [now merged with MT] came on the scene with its fresh approach and day-to-day schedules, how much support did it receive from international stations? It's a real disgrace.

"Stations are spending a fortune on equipment yet cutting the public relations budget. Look at Japan which obviously found the money to buy time on Radio Canada International but then cut the Radio Japan Times [a 4 to 6 page flyer sent to listeners]. In the end, I think most international stations care more about pleasing the Minister than pleasing the listener."

If there's one thing that sets me on fire it's the way stations treat us -- listeners and publications alike. Now there are certainly some very worthy exceptions. But for the most part, to say that stations take all of us for granted would be a gross understatment. Hell, what do they care? They get their appropriations from the government each year whether anyone listens or not.

I mean, take Radio Tirana for example. Night after night, they broadcast some of the most uninteresting, flat-out boring material that has ever ridden a radio wave. But does it bother them that maybe ten people in the whole world are listening? Hell, no. In fact, I really believe that if the only living creatures in all of North America was a pack of wild dogs, most international radio stations would still broadcast to them each night in English. And then try to send them pennants.

I take the Japanese as a good example. God bless 'em, they did take out an ad in *Time* magazine announcing their new relay over Radio Canada International. But I'll be dipped and deep fried before I can figure out why they wrote that idiotic copy. Instead of trying to take advantage of the fact that they were reaching a general audience by going in *Time* and explain to 5,000,000+ readers what shortwave is and get them interested, they write some bonehead piece that says "Radio Japan listeners in North America can look forward to improved transmission quality" and "We shall be sending you our programs via the RCI facilities in Sackville..." and "We can promise you a warm, and clear, reception." Just look at that copy!

First, how many times have you been watching the TV, turned to the wife and said, "My, isn't the transmission quality on channel 6 providing us with a warm, and clear, reception tonight?" No one talks like that. I don't think I've ever used the word "shall" in my life. Call me ignorant.

But worst of all, the ad copy seems to indicate to me that the people at Radio Japan actually think that the average American already knows what Radio Japan is, is familiar enough with Radio Canada International that they'd know it by its initials, and can figure out that the frequency of 6120 kHz must be on the shortwave bands. Phew!! And people wonder why collecting pocket lint is more popular with the general public in North America than shortwave. If the people at Radio Japan had used their heads, they could have done a greater service for themselves *and at the same time promoted the medium of shortwave* by telling people about shortwave and how to listen. But nooooo. The only people who understood that ad were people who already listen to shortwave. It was a tremendous waste of money.

In short, do you really expect people with that kind of mentality to think about buying an ad in a shortwave publication? No way. And you're right Mr. Nebron, it is a disgrace.

Kudos on China

"I wanted to tell you how much I enjoyed your trilogy on China," says Mrs. Rene LaBrecht in Fort Pierce, Florida. "It was an excellent piece of work that really conveyed a sense of the excitement that you obviously experienced. While I don't suggest you write something on China every month, it would be a nice if you could report from other foreign countries every once in a a while."

I did enjoy the trip immensely. And I would like to do that sort of reporting from time to time. But the truth is that the only way I was able to do the China report was because Radio Beijing paid for the trip -- although I have been trying to get *Monitoring Times* to send me to the Bahamas for a few weeks this winter to report on shortwave stations on that island. And I thought I might pull that one off until Bob Grove looked in *Radio Database International* and found that there are no shortwave stations in the Bahamas!

More seriously, if you have the opportunity to travel abroad, drop us a line and I'll try to set up a visit with the shortwave station in your country of destination. And then we'll pay you to write up an article on it. But you will have to give us a couple of month's advance warning to make the necessary arrangements.

Crosley--a slice of history

"You folks really hit the nail on the head with the article on Powell Crosley," says Steve Forest of Cincinnati, Ohio [November *MT*. p.16]. "Indeed, WLW radio did transmit at 500,000 watts, for a short period of time on 700 kcs. In fact, the stories still go around how people living near the tower could receive 'The Nation's Station' through the fillings in their teeth! Suffice it to say that WLW is now down to 50,000 watts, on a clear channel.

"While making no pretense about being a Crosley expert, I can tell you several things about the man. He was an inventor of such things as the Crosley automobile. He also marketed the Crosley Shelvador refrigerator (I have a copy of the March 30, 1936 *Time* magazine which featured a two-page advertisement for the Shelvador. It was modestly billed as 'The World's Most Beautiful Refrigerator.')

"Crosley, of course, was most famous for his radios. I have an old table model -- which works -- and pull in shortwave as well as AM broadcasts. A number of radio stations on the air in the mid-30s are listed on the glass panel above the dial. The only station listed *on* the dial, however, is Crosley's own WLW.

"The only inland VOA relay station is located at Bethany, Ohio -- just north of Cincinnati -- because Crosley built it there. The equipment today is largely antiquated but the station continues on the air, putting out a strong signal as you well know. I had one friend describe it to me as a working broadcast museum.

"Finally, a hospital now owns what used to be Crosley's mansion. The rooms have been converted into offices, but at the bottom of the staircase sits a hand-carved monkey, perched on the end of the banister, *listening on a pair of headphones!*"

"Enough for the history lesson. There will be a test later."

Thanks for that excellent letter, Steve. Keep in touch. And I'll give you $100.00 if you'll go out some night and steal me that monkey!

Greener Grass

"What kind of receiver do you use at at *Monitoring Times*-Thorndale?" asks Peter Smythe of New York City. "I wonder, because you seem to hear more stations than I do." Beside being a big fan of the ICOM R-71A for serious DXing, I am currently awaiting delivery of a Yaesu FRG-8800 and a Grove Minituner. We also use a Sony ICF-2010 for general monitoring. However, virtually every model of receiver has passed through here at

Mailbag

Utilities

Bob Grove, Utilities Editor, P.O. Box 98, Brasstown, NC 28902

SOUNDING OFF

...about easy money and low quality

I don't write very often; once to wish you luck in 1982, again in 1984 (I think) when you went monthly, and now about the new format. I have enjoyed each and every issue (still have old #1, with your smiling face and the Space Shuttle patch on page one).

Both the Shuttle and our right to listen to our radios have taken quite a few lumps since then, but we are still proud of both of them. The space program was injured by accident, the monitoring program was injured on purpose, but nonetheless they were taken as personal tragedies by me, and lessons were learned.

The internal lack of communication within NASA and the internal corruption within our political system may have its roots in a common weakness. The weakness being: "get in, sell to the highest bidder, get out, and live comfortably for the rest of your life." Whether it be rocket parts, spectrum space, secret documents, oil, drugs, arms or whatever the commodity, the strategy behind the "deal" is the common denominator.

I don't buy the idea that because "everything and everyone has a price," and the other popular saying "you can't legislate morality," that we should ignore it and wait for it to go away. Self-respect is not bought nor sold by the pound; it has been, and always will be earned by people who feel it is important.

I know this is not a political forum, and I'm sure you would choose a better speaker than I to express our views (as monitors). But judging from the last five years we should do something now to prevent the reading of *Monitoring Times* in 1992 with holes cut in its fact-filled pages (read that, censorship). We have now been exposed to what "they" can do. Remember, no one thought you could buy radio frequencies either!!!

The new format is great! and I like the color on the cover, but I also crave the "meat and potatoes" inside the cover each month. Keep the news pure, Bob, and watch for those who would want to use your (our?) paper for their own means. Pardon me while I over-react!

Vernon Stilwell
Cecilia, KY

...about MT content:

As a hardcore DX, Ute, SWL, Ham listener with a ham license, I have noticed a trend to reduce utility loggings and articles in favor of a couple of pages devoted to the history of ham radio.

Although Mike Mitchell is an excellent writer, his articles would be more appropriate in *Boy's Life*. Not as a page or column filler to entice advertising from *QST* or the ARRL. If I wanted the history of ham radio there are three shelves of donated hardback books at my public library, not to mention the ton of back issues of *QST, Ham Radio*, and *Radio Technology* in storage. History may be interesting, but it's been done. Why is it necessary to bore the reader? Ham is exciting!

Mike, if you have to do these articles, please do some research into the *MT* look-alikes on the west coast. There are several ham radio papers that are always full of up-to-date articles on hams helping others in a disaster, or ship operators intercepting a distress call.

As hams, we recently devoted our time and equipment to the local Navy in an exercise in traffic handling as simulated wounded were flown in from a disaster drill to local hospitals. How about hams describing first-hand what led up to a disaster?

My most memorable intercept was an Extra-class ham and NASA tech describing for two hours what caused the Shuttle disaster on the very night of the incident. The information was so detailed that I had the story long before any official report was made.

Obviously, to the average SWL, one look at the incredibly detailed and column-crunched *QST* is enough to scare anyone from ham radio. I can still appreciate the need for simple articles from magazines like *Ham Radio Horizons*.

MT is no exception. There is still a need for simple articles on SWL and Utilities for the beginner and complex articles on FAX, Subcarrier and RTTY for us polar bears.

Think of all those "beginners" sending hate mail to Larry Miller because they can't hear Norway on their tin cans and string. Is Norway low power? NO. Is our antenna too short? NO. It's Radio Norway's fault for changing the frequencies after *MT* gets to print. I applaud any shortwave list that can be as accurate and up-to-date as *MT*. Nothing could be more difficult.

Finally, if *MT* is limited to the number of columns or pages due to cost versus advertising let's retire "On the Ham Bands" to the same dusty shelf as the CB articles we trashed last year. Let's get back to what *MT* should be, **shortwave or utilities listening**.

With respect to M/Sgt. David Freed's letter in the December issue, it's about time we put together a promotional awards program for those turned-in loggings.

Mark Swarbrick KA3NYN
Thorndale, PA

ON THE WANTED LIST:

As a subscriber to *MT*, I think it is a welcome addition to hobby field activities, but you could add a bit to its worth by covering some news of the broadcast band. Lately, I understand, there has been an OK by the FCC of 154 changes of ownership of radio stations as well as deletions (at Lapier, Michigan, for example--two stations in Sarnia, Ontario)--some daytime stations going full time--and more interference at night. Could we have a bit of info on such activities in *MT* on an occasional basis?

Harold Sibilla
St. Clair, MI

The new format of *MT* is excellent except for one thing--whatever happened to Jean Baker's column? Her column has been a mainstay of *MT*.

Herb Gardiner
Honolulu, HI

(Jean "Plane Talk" Baker and Jim "High Seas" Hay presently alternate their columns on a bimonthly basis.)

EQUIPMENT EXPERIENCES

Just a note to say that I took advantage of your HX1200 "Birdie" advice found in my October '86 issue of *MT*. I sent my HX1200 to Regency on 9/26 and had it back - birdie free - on 10/6. This was accomplished at no charge to me, as you stated. Thanks for the info Bob and 'way to go Regency!!

Christopher Linck
E. Greenbush, NY

I have a Sony ICF-2001, and I noticed the incidental remark about that model in your November equipment review. Evidently I am not the only person dissatisfied with the Sony's performance.

Within a week after bringing home that receiver, Radio Finland at 15400 kHz was fast disappearing. After a couple of years, when trying to record Radio Nederland language lessons from speaker to mike, I recorded mostly squawk and garble. A year ago I brought the set to Nantucket on vacation, and on batteries and current alike the AM band was completely dead when I should have been able to receive Cape Cod, Boston, and New York with ease.

When the ICF-2001 was premiered in a Boston department store, it was with demonstrations of recorded shortwave broadcasts. Perhaps it is no wonder that the production receiver never lived up to the engineering samples. I am surely committed to reading your future equipment reviews.

David Ames
Weymouth, MA

While reading the book, *Apple's Europe*, by R.W. Apple, Jr., (1986), the author wrote that he carries "a Sony ICF-7600D radio, the foreign correspondent's best friend. The size of a paperback book, it will pull in long, short- and medium-wave broadcasts, plus FM, in the most unlikely spots, enabling on to listen to the trusty, crusty BBC World Service rather than relying for a summary of the day's news on newspapers controlled by dubious governments and written in languages that one understands badly, if at all. I would rather be without a typewriter than without it."

So there are other afficionados of SWLing besides we hobbyists and citizens of foreign countries.

Ruth Hesch
White Plains, NY

RTTY READING

Thanks for the wonderful job done by you and your crew there in cranking out informative R.F. news.

I saw in the September issue a request for RTTY/FAX information. The articles I've included, I believe, would bring all of your readers to the top of RTTY knowledge.

Mark Rice
Greenville, TX

(Mark suggests the following back issues of CQ magazine: November, 1984, pp. 20, 34, 40, 47, 54; December 1984, p. 28. Thanks, Mark)

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one time or another. Some I buy out of pocket, some are loaners from manufacturers. With the exception of the '2010, I try not to keep any radio for more than six months so that I can get a feel for what's on the market. My antenna is an Eavesdropper oriented north-south.

As for the fact that I hear more stations than you, I don't know. Check part 2 of the "DXing with the Eck-spurts" article in this edition of *Monitoring Times* and you can compare my bandscan with yours.

That's it for this month. As always, I welcome your letters, newspaper clippings, loggings and so forth at P.O. Box 691, Thorndale, PA 19372. Until next time, good listening! ■

STOCK EXCHANGE

NOTE: Monitoring Times assumes no responsibility for misrepresented merchandise.

PERSONAL SUBSCRIBER RATES: $.10 per word; NON-SUBSCRIBER RATE: $.25 per word. All ads must be paid in advance to Monitoring Times. All merchandise must be non-commercial and radio-related. Ads for Stock Exchange must be received 45 days prior to the publication date.

COMMERCIAL RATES: $30 payment must accompany ad, payable to Monitoring Times. Send 2-1/4" x 2" camera-ready copy or send text.

For Sale: ICOM R-71A receiver, "HP" model, as modified by EEB. Includes 2.4 kHz filter, 4 kHz filter, front end upgrade, etc. Also includes remote control. Excellent condition, $700.00 O.B.O. John Davis, P.O. Box 2226, Longmont, CO 80502.

Wanted: ZENITH Transoceanic Model R 7000 Circa early 1980's. Must be mint. Larry Rosenberg, 127 Carliss Drive, Moraga, California 94556, please call (415) 376-1272 evenings.

JOIN a radio listening club. Complete information on major North American clubs and sample newsletter $1.00. Association of North American Radio Clubs, P.O. Box 462, Northfield, MN 55057.

ATARI P/D software for ham, SWL, and etc. For sale or trade. SASE for details. Jerry Callam, 10 Avalon Rd., Mount Vernon, OH 43050

For Sale: INFOTECH M-200F. Like new, little used with original box and manual $225. Riley Kinney, 1325 Woodgate Way, Tallahassee, FL 32312.

Wanted: COLLINS 62S-1, 6 and 2 meter transverter - Must be in A-1 condition.
Wanted: T/R switch for JOHNSON VIKING RANGER transmitter. Stephen Canney, VE3FAK, 2952 Bayview Ave., Willowdale, Ontario, M2N 5K6 Canada 1-416-222-9658.

TUBES: rare, old and current, reasonable. Send list for quote. Ted Youngman, 2225 Vigo, Lake Station, IN 46405.

Wanted: ICOM 551 6-meter transceiver. WB8HWF, 1575 Ditmore-Stroll, Newark, OH 43055.

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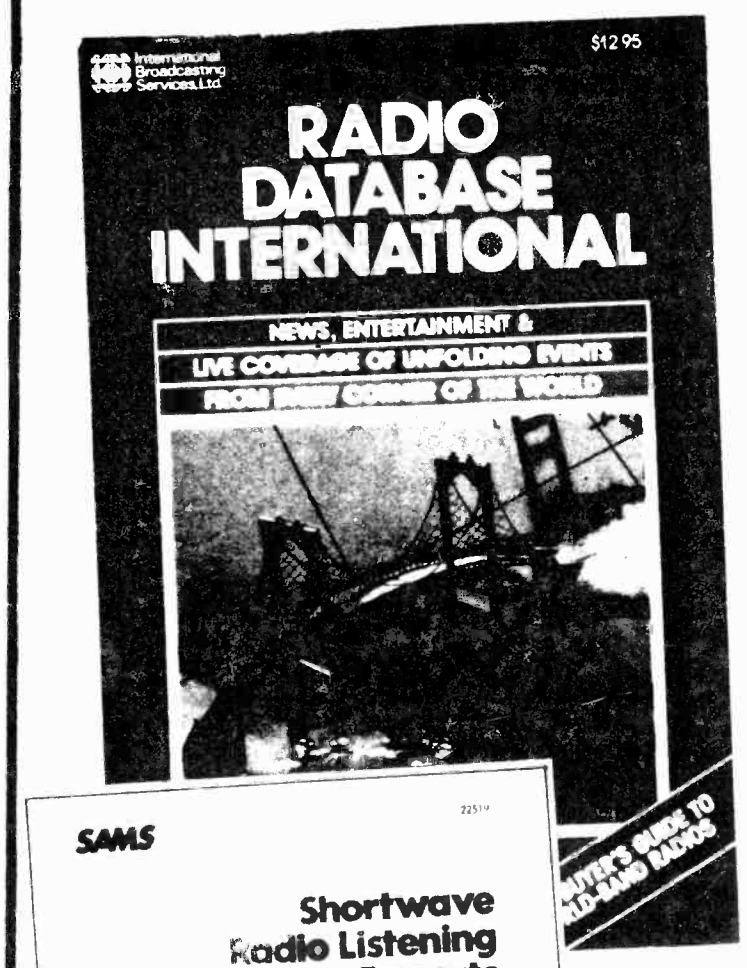

New!

International Radio: Limits of the Limitless Medium by Dr. Donald Browne

Browne is one of the leading scholars in the field of international radio and this is one of the most serious, thorough and comprehensive studies of international radio written in recent years. And despite its frankly intimidating price, we cannot recommend this book strongly enough. If you really want to learn about international radio -- it's background, history, politics, programming and more -- treat yourself to this book. It's almost like becoming an instant expert. Hardback only. [#IRLLM] $36.90

1987 World Radio TV Handbook

It's here and in stock! And it's not getting older, it's getting better! The 41st annual edition of this authoritative directory of world radio and TV continues the proud tradition of previous years. Over 600 pages of station names, addresses, broadcast schedules, languages, and other information -- even down to phone nmbers! No wonder it's called the "bible" of international radio. Their price: $19.95 plus shipping and handling. Our price: $17.95 -- and shipping is free! [#WRTVH]

Shortwave Radio Listening with the Experts Various Authors

A shortwave book that takes you from A to Z. A massive, 500+ page book filled with 25 chapters of information on virtually all aspects of radio monitoring -- from "How to Get Started" to antennas, DXing and much, much more by some of the biggest names in the business: Magne, Jensen, Helms, Berg, and others. It's the definitive book on the radio hobby. No SWL should be without this valuable, informative, new shortwave book. Their price: $21.95 plus shipping and handling. Our price: $19.95 and shipping is free! One of our best-sellers! [#SWEXP]

1987 Radio Database International Magne & Jones, Editors

If you enjoy scanning the shortwave broadcast bands and you buy only one book this year, get RDI. RDI will undoubtedly be the most used book in your library. It's the ultimate frequency guide to the shortwave bands. Arranged by frequency, Radio Database International's computer-generated graphics take you through the broadcast bands from Radio Republik Indonesia on 2260 kHz on up through Belgian Radio on 21810 kHz. It's high accuracy and reliability made it the smash hit of 1986. And RDI now includes reviews of the latest shortwave receivers by award-winning author Larry Magne plus other articles of interest. Thousands sold already in 1987 and it's only been out a few months! Our best selling book. 352 pp. [#RADAI] $12.95

Havana Moon Is Back!

Unos Dos Quatros: The Story of the Number's Stations by Havana Moon

Popular former MT columnist Havana Moon is back with a full length book on those mysterious numbers stations! Numbers stations-- some have said that they're transmission used by spies. Others have associated them with everything from the military to UFOs! They've been around for years and still no one knows exactly what they're on the air for. But if there's one man who can shed some light on the topic, it's the equally mysterious Havana Moon. [#UNDOQ] $13.95

The Shortwave Listener's Antenna Handbook by Robert Traister

Even the most sophisticated receiver can pick up only hum-drum signals if the antenna isn't up to par. And a relatively inexpensive receiver can bring in some pretty impressive signals when the right antenna is in place. A complete, authoritative guide to shortwave listening antennas including how to design, build and install them. [#SWANH] $9.95.

The Shortwave Listener's Handbook by Harry Helms

Harry Helms is a name known to readers of Popular Communications and dozens of other radio magazines down through the years. And now he has a major new book covering the entire field of shortwave listening. Covers the subject from A-Z. $14.95

New!

Clandestine Radio Broadcasting by Larry Soley and John Nichols

Years in the making, it's finally here. An incredibly thorough, comprehensive look at clandestine radio broadcasting by renowned experts Larry Soley and John Nichols. If you enjoy clandestine radio -- and belive me, if you spend $47.95 for a book on the subject you better damn well enjoy it -- this is truly an excellent, hardcover book. This is it. [#CLRAB]

The Basic Electronics Course by Norman Crowhurst

Whether you've simply got a mild interest in electronics or would really like to become better versed in the technical aspects of radio, the "Basic Electronic Course" is for you. Written in an easy-to-follow fashion, author Crohurt presents the basic elements of electronics in the most logical sequence possible, bringing you a clearer understanding of the subject. A complete and thoroughly accuate self-study text for everyone. [#BAELC] $13.95

Other books:
New!

Language Lab Available for French or Spanish. French. An ingenious book that gives you hundreds of key phrases needed for filling out attention-getting reception report forms -- and their French equivalent. Now you can increase your chances for that sought-after QSL with a first-class report in the station's own language. French [#FRLAL] $12.95 or Spanish [#SPLAL] $12.95.

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