November, 1986 Volume 5, Number 11 $2.00

With *International Radio*

MONITORING TIMES

Second Class Postage Paid

Inside this Issue:

Radio Earth 1987

by Larry Miller
p. 6

Olde Tyme Radio (AWA Convention)

by F.W. Chesson. See page 10

KENWOOD

...pacesetter in Amateur radio

NEW

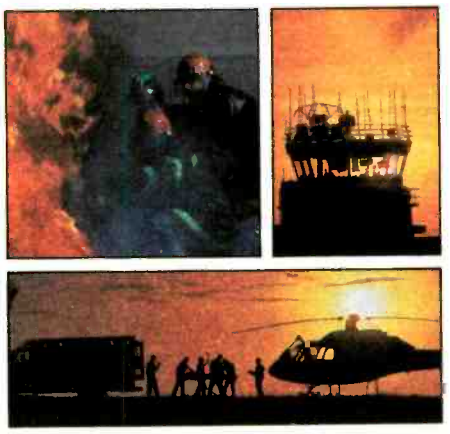
Hear it All!

R-5000

High performance receiver

***THE* high performance receiver is here from the leader in communications technology—the Kenwood R-5000. This all-band, all mode receiver has superior interference reduction circuits, and has been designed with the highest performance standards in mind. Listen to foreign music, news, and commentary. Tune in local police, fire, aircraft, weather, and other public service channels with the VC-20 VHF converter. All this excitement and more is yours with a Kenwood R-5000 receiver!**

- **Covers 100 kHz-30 MHz in 30 bands, with additional coverage from 108-174 MHz (with VC-20 converter installed).**
- **Superior dynamic range.** Exclusive Kenwood DynaMix™ system ensures an honest 102 dB dynamic range. (14 MHz, 500 Hz bandwidth, 50 kHz spacing.)



- **100 memory channels.** Store mode, frequency, antenna selection.
- **Voice synthesizer option.**
- **Computer control option.**
- **Extremely stable, dual digital VFOs.** Accurate to ±10 ppm over a wide temperature range.
- **Kenwood's superb interference reduction.** Optional filters further enhance selectivity. Dual noise blankers built-in.
- **Direct keyboard frequency entry.**

- **Versatile programmable scanning, with center-stop tuning.**
- **Choice of either high or low impedance antenna connections.**
- **Kenwood non-volatile operating system.** Lithium battery backs up memories; all functions remain intact even after lithium cell expires.
- **Power supply built-in.** Optional DCK-2 allows DC operation.
- **Selectable AGC, RF attenuator, record and headphone jacks, dual 24-hour clocks with timer, muting terminals, 120/220/240 VAC operation.**

Optional Accessories:

• VC-20 VHF converter for 108-174 MHz operation • YK-88A-1 6 kHz AM filter • YK-88S 2.4 kHz SSB filter • YK-88SN 1.8 kHz narrow SSB filter • YK-88C 500 Hz CW filter • YK-88CN 270 Hz narrow filter • DCK-2 DC power cable • HS-5, HS-6, HS-7 headphones • MB-430 mobile bracket • SP-430 external speaker • VS-1 voice synthesizer • IF-232C/IC-10 computer interface.

R-2000 150 kHz-30 MHz in 30 bands • All modes • Digital VFOs tune in 50 Hz, 500 Hz, or 5 kHz steps • 10 memory channels • Programmable scanning • Dual 24-hour digital clocks, with timer • 3 built-in IF filters (CW filter optional) • All mode squelch, noise blanker, RF attenuator, AGC switch, S meter • 100/120/220/240 VAC operation • Record, phone jacks • Muting terminals • VC-10 optional VHF converter (118-174 MHz)

More information on the R-5000 and R-2000 is available from Authorized Kenwood Dealers.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

Specifications and prices are subject to change without notice or obligation.

Senate Passes Electronic Privacy Act

A Guest Editorial by Robert Horvitz

Washington, DC--The Senate Judiciary Committee on 19 September 19, 1986, gave unanimous approval to S.2575, the Electronic Communications Privacy Act. Consideration of the bill took exactly 25 seconds.

On Tuesday, September 30, 1986, the U.S. Senate passed the amended version of the Act, now attached as an amendment to the anti-drug-abuse bill. Differences in wording between the House and Senate versions must be reconciled, and an enormous amount of significance rides on the interpretation of the accompanying report as well.

Senator Paul Simon (D-IL) introduced two amendments to the bill on behalf of the Association of North American Radio Clubs (ANARC). One reduces the penalty for a first interception with no bad purpose of public land mobile radio services (including cellular, older carphones and paging) to a fine of $500, eliminating the 6-month jail term. The other eliminates criminal penalties for interception with no bad purpose of broadcast remote pick-up stations, but permits the federal government to seek court injunctions against interceptors, accompanied by a $500 civil fine. The Simon amendments, offered as compromises with those wanting stiffer penalties, were accepted and incorporated in the bill.

In its present form, S.2575 would make it *legal* to monitor: the radio portion of a cordless telephone call or a tone-pager; any marine and aeronautical radio communications; any communication transmitted "for the use of the general public"; any amateur, CB or general mobile radio transmission; any governmental, law enforcement, civil defense, private land mobile, or public safety communications, including police and fire, which are "readily accessible to the general public."

ANARC continues to oppose the bill's definition of "readily accessible" as contrary to physical reality in many cases. The definition also limits First Amendment rights in electronic media by making it a crime to receive certain communications on the pretext that they are inaccessible, when they actually are accessible. But given the passage, we prefer the Senate version as the lesser of two evils, and regard the adoption of Sen. Simon's amendments as an important victory.

Confessions of an ANARC Basher

I am an ANARC basher. For that I make no apologies. It's my job as a journalist to report what I see. But, just as I admit to taking some strange pleasure in pulling the wings off this shortwave fly, so do I recognize its successes.

Case in point is the recent work of Robert Horvitz (ANARC "Woodpecker Project" Coordinator) and Richard "Terry" Colgan (out-going ANARC Executive Secretary) in fighting the Electronic Communications Privacy Act (S.2575).

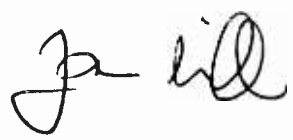
That bill, had it passed in its worst-worded form, would have made it illegal for you to listen to certain parts of the radio spectrum, even if you innocently did so as part of nothing more than a hobby. There was even a clause about prison. Imagine: prison for listening to your radio.

In an effort to ensure your ability to tune about the bands, Terry and Bob took it upon themselves to inform listeners, buttonhole legislators, and even make a Washington, D.C. appearance in order to testify first-hand about the potential effect of the bill on the radio hobbyist. The work done by these two gentlemen goes beyond a mere hobby interest in communications. For a period of time, they worked on behalf of all of us, giving freely of both their time and money to make legislators aware that some of us would like the opportunity to listen to the radio without restriction and fear.

The fact is that, because of their hard work, significant portions of ANARC-inspired wording were included in the bill and once again it is safe for you to turn on your scanner.

I was thinking about Mssrs. Colgan and Horvitz the other day when my eyes fell on the membership certificate of one of the ANARC member clubs. The little yellow sheet has a typewritten quote on it by Aristotle. It reads, "There are people who make things happen, people who watch things happen, and people who don't know anything happened." Clearly, Horvitz and Colgan are people who make things happen.

I feel that both Horvitz and Colgan deserve your applause. And coming from an admitted ANARC basher, that's quite a compliment. Gentlemen, take your well deserved bows. If there was a "Hero of the Hobby" medal, you guys would get it.



Larry Miller
Broadcast Editor

Jack Anderson Hits Privacy Bill

As forecast in our October issue, syndicated Washington columnist Jack Anderson released a scathing critique of the Electronic Communications Privacy Act of 1986 in his September 23, 1986, column.

Anderson quoted ANARC representative Robert Horvitz's charge that cellular telephone advocates are "misleading the public" and "misleading the Congress."

One of Anderson's reporters related several anecdotes of misinformation being provided by the cellular industry intended to lull prospective users into a false sense of privacy.

Anderson went on to point out the inherent fallacies of the bill which appears, at this point, to be quite lackluster. It would appear that in spite of the money donated to legislators to foist the bill on their colleagues, the Political Action Committees did not "PAC" a wallop! (Washington Post clipping submitted by Bill Black, Washington, DC)

Cover art by Owassa Graphics, Murphy, NC. Cover photos: Michael and Suzanne Poulos tell about snorkeling on the upcoming Curacao Group Tour. Antique radio photos: "His Master's Voice"; a visitor examines an early scanning disk television receiver; 1985 antique radio contest winner, a French Ducretet radio restored by Mike Katz; Photos by F.W. Chesson.

MONITORING TIMES (ISSN 0889-5341) is published monthly for $14 per year by Grove Enterprises, Inc., P.O. Box 98, Brasstown, NC 28902 (ph.1-704-837-9200). Second class postage paid at Brasstown, NC, and additional mailing offices. POSTMASTER: Send address changes to MONITORING TIMES, P.O. BOX 98, BRASSTOWN, NC 28902.

MONITORING TIMES

Published by:
Grove Enterprises, Inc.
Publisher and Utilities Editor:
Bob Grove
Broadcast Editor:
Larry Miller
Production Manager:
Rachel Baughn
Subscriptions:
Mitzi McCoy
Advertising and Dealerships
Judy Grove

Inside this Issue

WORLD RADIO NEWS WORLD R

Belgium

Belgium, as a shortwave broadcaster, is unusual in the fact that it has two international services. One, commonly known as the BRT, is the external service of the **Belgische Radio en Televisie**, the radio network of the Dutch or "Flemish" community in Belgium. The other is **RTBF Internationale**, or La Voix de l'Amitie. The latter broadcasts in French and German; the former in Dutch, German, English and Spanish. The BRT is the most commonly heard in North America. But now, reports Radio Netherlands' *Media Network*, the BRT is stepping into the RTBF's territory by starting a French service. The French broadcasts will be heard on the following schedule:

1400-1430 on 15580, 15590
1730-1755 on 9905, 15515
2030-2055 on 5910
1030-1055 on (not announced)

There is, however, a nasty side-effect for the English-speaking listener. The BRT's English programs to North America are being shortened from 55 minutes to 28 minutes. Says the head of the service, "The English programs had to be shortened. Twenty four hours is twenty four hours. We only have two transmitters. If we put up a program in French, we had to cut in half, actually, our English program...which need not be a loss in fact. Because we will try as much as we can not to change the contents nor the quality nor the style of program." The German service, which was relayed from the BRF in the eastern part of Belgium, will be doubled from 15 minutes to 28 minutes and heard at 0900 to 0928 UTC. The new French programs, will be broadcast daily except Sunday for 25 minutes. (various)

A partial schedule of English broadcasts is as follows:

1500-1528 on 9880, 21810
0800-0828 on 9880, 17595
1330-1328 on 15580, 15590
1630-1628 on 9905, 15515
1830-1828 on 5910, 9905
2200-2228 on 5910, 9905
(with SCDX)

Burkina Faso

Radio Burkina has registered a number of test frequencies for new transmitters in Ouagadougou. A 50 kW transmitter will be testing on 6045, 7230, 9515 and 11815 kHz. A 100 kW transmitter will be using 17700, 17830 and 21605 kHz. Another 100 kW transmitter is also expected to be put into service. SCDX

Clandestine

The Voice of the Libyan People, a clandestine station hostile to the government of Libya, operated by the National Front for the Salvation of Libya, broadcasts in Arabic between 1600 and 1800 on 11975 kHz and again from 1900 to 2100 on 15195 kHz. The station is believed to be in Iraq.

Radio Farabundo Marti, which says that it's broadcasting from Chalatenango Province in El Salvador, now only broadcasts at 1830 and 2300. Transmissions at 0100 and 1230 are no longer announced or heard on 6735 kHz.

Costa Rica

The new Adventist World Radio station in Costa Rica has been testing on 15460 kHz recently. When the station does begin regular programming, however, it's expected that English broadcasts will be heard between 1600 and 1800, Spanish from 1800 to 2200 and then a combination of French, Dutch, Papiemento and Portuguese. The alternate frequency, 11870 kHz, is expected to go on the air upon completion of a second transmitter. RNMN

World Peace University, which, in cooperation with the United Nations University in Costa Rica, says that its shortwave station, called Radio for Peace, will be on the air by the end of the year. Already, says Dr. Richard Schneider of World Peace University, the antenna tower is up and fundraising -- the station will be funded, in part, by listeners -- under way. Initial broadcasts over the 10 kW facility are expected to be in English and Spanish.

Dominican Republic

The popular Caribbean music and talk program, *This is the Caribbean*, hosted by Rudy Espinal, will return to the air weekdays on Radio Clarin International. Because of a dispute with Radio Earth, which once carried the program, however, the name will be changed to *This is Santo Domingo*. Reports of the actual broadcast time of the program have varied widely; try 11700 kHz between 2300 and 0200. Meanwhile, work on Radio Clarin's new antenna should shortly improve reception of the station in North America. (Jeff White)

England

The regular weekly program *Assignment* is back on the air at the BBC. *Assignment* focuses on topical issues. *Assignment* can be heard on Wednesdays at 0230, Thursdays at 1130 and again at 1615.

Falkland Islands

The Falkland Islands Broadcasting Service usually changes frequencies from 2380 kHz to 3958 kHz at this time of the year.

France

France has added a frequency for its 1600 to 1700 broadcast of *Paris Calling Africa*. In addition to 11705, 17620 and 17795 kHz, try now also 9860 kHz. The 11705 frequency often provides best reception as it is relayed by a station in Gabon, Africa.

Germany, East

Radio Berlin International has been testing new frequencies in English to the Pacific at 0545, 1115, 1230 and 1415 on 11960 and 17705 kHz. At 0715 and 0845, the station has been heard on 11960 and 21465 kHz. SCDX

Guatemala

The Adventist World Radio station in Guatemala has announced that it has extended its transmissions to include broadcasts between 1100 and 1300 on 5980 kHz. RNMN

Indonesia

Radio Australia reports that there is a new government station on the air from Indonesia calling itself **RPKDT-2** on 3143 kHz heard from 8:00 am (1200) to 11:00 am (1500). (Tentative)

Ireland

Radio Dublin International now seems to have a 24-hour a day service on 6910 kHz. SCDX

Israel

U.S. Vice President George Bush attended a ceremony in Jerusalem at which U.S. and Israeli officials signed an agreement allowing for the construction of sixteen 500 kW Voice of America transmitters and an antenna system in the Negev desert. Ecologists have protested the arrangement saying that the 200 million dollar project may harm bird migration between Europe and Africa.

Japan

Radio Japan will now be heard loud and clear on the east coast of North America starting this month. October 1 marked the beginning of a transmitter swap whereby Japan will broadcast over the facilities of Radio Canada International in Sackville, New Brunswick. The schedule for the daily broadcasts is from 1430 to 1530 with Japanese language programs at 1430 and English at 1500 on 6120 kHz.

Mali

Radio Bamako in Mali reports its schedule:

0600-0800 on 4783, 4835, 5995
0800-1000 on 7285, 9635, 11960
1200-1800 on 7285, 9635, 11960
1800-0000 on 4783, 4835, 5995

Mexico

XERMX, the international station of the Mexican Radio Institute, broadcasts daily in Spanish. During the mornings, the station uses 5985 and 11770 kHz; evenings on 9705, 15430 and 17765 kHz.

Morocco

Morocco's commercial shortwave station, Radio Mediterranean International (Med-1) broadcasts in French and Arabic between 0600 and 2300 on 9575 kHz.

Netherland

Radio Netherland's complete English schedule is as follows:

0400-0425 on 7175, 9895
(Middle East and East Africa)
0530-0625 on 6165, 9715
(Western North America)
0630-0655 on 9895, 11930
(to West Africa)
0730-0825 on 9630, 9715
(to Australia/New Zealand)
0830-0855 on 9630 (to Australia)
0830-0925 on 17575, 21480 (to Asia)
1030-1125 on 6020, 9650
1130-1225 on 5955, 9715, 17605
(to Middle East/Europe)
1130-1225 on 15560, 17575, 21480
(to East and Southeast Asia)
1430-1525 on 5955 (to Europe)
1630-1725 on 6020, 15570
(South and East Asia)
1830-1925 on 17605, 21685
(North and Northwest Africa)

1830-1925 on 6020, 9540 (South and East Africa)
1830-1925 on 6020 (Europe)
2030-2125 on 9540, 9715, 9895, 11740 (West Africa)
0230-0325 on 6020, 9895 (Eastern North America)
0230-0325 on 6165, 9590 (Eastern NA and Caribbean)
(Direct-Radio Netherlands)

Netherland Antilles

You can hear English programming from Trans World Radio, Bonaire on the following schedule: weekdays from 1110 to 1255 on 11815 kHz. On Sundays the broadcasts are extended until 1332; Saturdays until 1405. The station can also be heard at night from 0300 to 0400 Tuesdays through Saturdays. On Sunday and Monday the broadcasts are extended to 0530. Try also for TWR Bonaire on your AM radio at 800 kHz.

Norway

As reported in Monitoring Times, Radio Norway has begun testing their powerful new transmitters from Sveio. Frequencies were 9610, 11840 and 15435 kHz. Times for the tests, which included music and announcements asking for reception reports, ran variously between 1600 and 0600.

Peru

A new station, Radio Sensacion in Huancabamba, Guayabamba Province, Peru has been heard on 6791.2 kHz until its 0348 sign off with the Peruvian national anthem.

Philippines

Radio Veritas says that two 50 kW transmitter, used to replace ones wrecked by Marcos loyalists in the February revolution, have been replaced and are now on the air. Two other transmitters, powerful 250 kW units -- one donated by the archdioces of Cologne, West Germany and the other by the West German government -- will be on the air by the end of 1987. The first 250 kilowatt unit was donated in 1983 but only allowed into the country a week before Marcos was overthrown.

Seychelles

FEBA in the Seychelles has begun a new DX program for radio hobbyists. The 15 minute program, called *DX Postbag*, will be aired at 0715 on 15120 and 17795 kHz.

South Africa

Radio Oranje from South Africa's Oranje Free State can now be heard on shortwave. Pronounced "Or-on-ya" by the South Africans, the station has been heard in English on 6105 kHz after 0400. Radio Oranje is a commercial radio station. (Wood, NASWA Update)

A partial list of Radio RSA's official frequencies for fall includes:

0200-0256 on 5980, 6015, 9615
2100-2156 on 4810, 7270, 11775

Tonga

The Kingdom of Tonga in the Pacific can now be heard for the first time on shortwave. Identifying itself as "This is the call of the Friendly Islands, from station A3Zed [Z], Nuku'alofa, of the Tonga Broadcasting Commission." The station, which normally broadcasts on 1017 kHz on the AM band, is now using shortwave as a means of linking the station, located in the capitol of Nuku'alofa to low powered transmitter on its northernmost islands, some 500 miles away. The new link is powered by a 200 watt transmitter operating on 5030 kHz with standby frequency of 6012 kHz. Best time to try for A3Z relay is between 1800 and 1000 UTC. (RNMN)

Turkey

Following the news, The Voice of Turkey offers the following programs, including the return of the excellent *Turkish Panorama* on Sundays:

Sundays: Culture and Art, *Turkish Panorama*
Mondays: *Attaturk*
Tuesdays: *Cyprus in the Past*; Music
Wednesdays: *Letterbox*
Thursdays: *Turkish Economy* and *The Yesterday and Today of Turkey*
Fridays: *The Turks in History and Turkish-Islamic Architecture*
Saturdays: *Outlook, DX Corner* and *Turkish Album*

The Voice of Turkey can be heard at 2300 and 0300 on 9560 kHz.

Union of Soviet Socialist Republics

Some 2,800 people work within the framework of the Soviet Armenian State Committee for Radio and Television broadcasts. Yerevan Radio transmits over eight hours of programs to the Middle and Near East, Europe, America and to Latin America in Armenian, Arabic, English, French, Spanish, Persian, and Turkish. It broadcasts a total of two hours and eight minutes a day to Armenians living in Europe, America and Latin America. (BBCMS)

United States

Radio Connection, the long-suffering radio hobby program on KCBI, Dallas, Texas may have disappeared from the airwaves. Rumors have it that *Radio Connection* may yet return, perhaps in a different format.

Most of the United States returned to Eastern Standard Time on October 26. The result will be a one-hour difference in UTC at that time. For example, 0000 UTC is currently equal to 8:00 PM EST and 5:00 PM PST. Once Daylight Saving Time is over, 0000 UTC will equal 7:00 PM EST and 4:00 PM PST. Other countries change from DST at various times during September, October and November. These may or may not affect transmission times of various broadcasts listed in this magazine.

Callsign Confusion

In a previous article we accidentally identified the callsign of HBO pirate "Captain Midnight" as K4COP; it is actually KA4WJA.

True to form, if you're going to goof, you should do it well--and we did. K4COP is the callsign of Richard B. Engelman, the FCC's chief inspector on the case! Sorry about that, chief!

RADIO EARTH 1987:

Smoooooth Sailing Ahead

by Larry Miller

Radio Earth staff and friends at the 1985 ANARC Convention.

SETTING THE STAGE

There was a time when Radio Earth was the hottest thing on shortwave. Their daily program, called *The World*, was being heard proud, loud and clear over much of the United States, the Caribbean and South America, thanks to the transmitter of WRNO Worldwide. Radio Earth's host, Jeff White, nearly sparkled on the air, a charismatic broadcaster in the mold of the legendary Rudy Espinal of Radio Clarin, David Monson of Belgian Radio and Tom Meyer of Radio Netherlands' Happy Station. Their programs contained an interesting mix of features from correspondents around the world. A listener was as likely to hear a program about the oldest synagogue in the western hemisphere as he was a telephone conversation between White and a well-known DXer, all presented in a relaxed, old friends, "we're just sitting around in the livingroom" style.

Radio Earth was the first attempt by a group of non-station owning independents in recent memory to attempt to crack the commercial shortwave market. And for a time it looked like they might have a chance.

Not that the going was ever easy. Radio Earth first came on the air from a transmitter in the Dominican Republic, a place not known for either its technical competence or effectiveness. Local power outages caused the facility to leave the air abruptly and even the local insect population seemed set against the broadcast, clogging the transmitter and forcing it off. Even when it was on the air, the station was not easily heard and was more of a DX target than a station for listeners, as the founders had hoped.

By the time Radio Earth received an offer to broadcast its programs on WRNO Worldwide though, the on-air staff had honed its skills to a reasonable degree. That, in combination with "The Rock of the World's" powerhouse signal, put near local quality reception into the homes of shortwave listeners in most of the U.S. But then the drama began.

Financial difficulties plagued the operation, and before long, co-host Matthew Bell resigned to join WRNO. The broadcasts continued, with enough money coming in from two sponsors on the island of Curacao and some per-inquiry advertisements for radio magazines and the like to keep afloat. At one point, host Jeff White even organized what he called on-air "beg-a-thons," selling Radio Earth bumper stickers and asking for outright donations. The listening public was generous. But the fight was tough and the waters uncharted.

Before long, Radio Earth left WRNO in a highly publicized dispute and once again the station was without a real home. Try as it could, it did not find a broadcaster willing to air its programs for some time -- until KCBI in Dallas, Texas came on the air. But KCBI's signal was less than desirable and with the new station came a new time -- Sunday afternoons, predicted as optimal by some shortwave theoreticians, but less than satisfactory in terms of actual results. The relationship was tenuous. KCBI was founded by a very conservative religious organization and Radio Earth was given to a liberal, kind of 1960s-inspired free-form of broadcasting -- something that they were proud of announcing at the beginning of every broadcast -- "We're not affiliated with any political or religious organization," they would say. And although that was not the reason for the tenuous relationship, it did dissolve until the point when host Jeff White abruptly cancelled the deal and moved the station to its present home, WHRI in Nobelsville, Indiana. This time, Radio Earth would survive and prosper.

But White, the driving force -- or at least the most visible member -- of the Radio Earth team, had other ideas. Unsatisfied with the growth or direction of the station, he left to pursue plans for his own shortwave facility -- something Radio Earth had on the drawing board for some time. Either because of the lack of progress of the planned Radio Earth facility on Curacao or for financial or personal reasons, White left Radio Earth to start World Radio Network, S.A., a Dominican company based in St. Petersburg Beach, Florida. Today, WRN operates a tiny ham rig-powered station in Santo Domingo called Radio Discovery and lays claim to representing Radio Clarin, reportedly in the process of putting up a new antenna.

In March of 1986, I was asked by White to "fill in" for a week as a favor while he conducted some unspecified business in the Dominican Republic. The week turned into two, then three and four. At the close of the month, prodded by my increasing annoyance at this new-found and unexpected chore, White announced his resignation. As I was already involved in *International Radio* magazine, I indicated my inability to become full-time host of the program and asked that the station find a replacement.

White's departure left an enormous void in Radio Earth. As the station's "jack-of-all-trades," it was he who made the contacts, arranged and conducted interviews, did the public relations and produced the show. When I was also forced to take leave, it looked for a time as though the station might collapse.

ENTER MIKE AND SUZANNE

Remarkably, Radio Earth's "cat-with-nine-lives" luck continued. Evanston, Illinois, attorney Mike Poulos and his legal-secretary wife Suzanne, part of the original Radio Earth team, were forced into the spotlight and onto the world's airwaves. Neither had any broadcast experience. "You have to remember," says Mike Poulos, "that when I first took over the show, I thought it would be for a few days until Jeff returned. I was always involved in the business end of things not actual broadcasting. Of course, Jeff never returned to Radio Earth."

"I remember walking into the studio, looking at the console and being terrified," continues Mike. "Then I decided to sit down, spin the dials and produce a program. After a while, I started to have so much fun doing the show that I asked Suzanne to co-host it with me."

For Suzanne, the idea of co-hosting the program was a chance to recapture some of the original magic from the early days of Radio Earth "when we had a two-man show with Jeff and Matt Bell."

This time, however, a remarkable thing happened. Not only did Radio Earth, in traditional form, refuse to die, but an amazing transformation began to take place. The Poulos' began to blossom as broadcasters. Mike became more causal, comfortable on the air, and Suzanne, generally rather quiet, began to play a more active role in the show.

"When you're on the air and things are happening right," says Suzanne, "you feel this extraordinary sense of creation. And we're being able to feel that now." "That," adds Mike, "is called momentum."

But Radio Earth is more than just Mike and Suzanne Poulos. It's a whole cast of characters ranging from program producers to a full range of behind-the-scenes people in correspondence, marketing, engineering and more. "The program hosts are just the spokespeople for the whole group," says Mike. The result is that today, Radio Earth's daily program, heard at 0300 UTC on 7400 kHz, provides a full range o information and entertainment.

Has Radio Earth finally made it? Says Mike Poulos, "I do feel that shortwave has reached the point where it is commercially viable. Heck, the front page of a recent *Advertising Age* was two-thirds global marketing. And people in the advertising community are getting to realize that shortwave is out there. For now, though, we just want to make sure that every hour on Radio Earth is an exciting, entertaining experience for our listeners."

TOURING PARADISE ISLAND

Over the past few years, Radio Earth has invited its listeners to their home away from home, the island of Curacao. This year, Radio Earth is having their third Curacao group tour, an exciting mix of travel, sightseeing and shortwave. "Yes," chuckles the genial Mike Poulos, "we'll be taking everyone to see the three wonders of the island, Mt. Christoffel, Boca Tabla and the Radio Earth transmitter site."

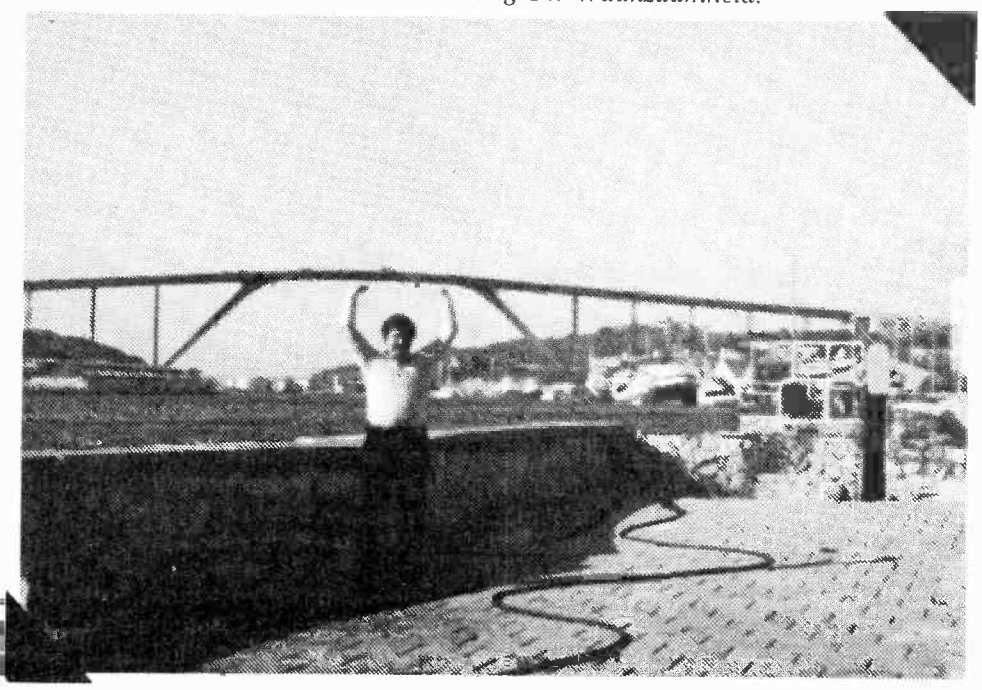
But Curacao is more than shortwave, although listeners often make the side trip to Trans World Radio in Bonaire and the Radio Netherlands and Deutsche Welle Caribbean relay stations. It's a wonderland of shopping, restaurants, and casinos, underwater parks and other sightseeing. "Our hotel this year is right next to the new Curacao Seaquarium" says Suzanne. "And, of course, there's the Christmas shopping -- it's unbelievable."

Radio Earth organizes the tours, not as a profit-making venture, but kind of as an extension of their programs, which oft-times focus on the Caribbean. Apparently, they are successful. Many of the vacationers on this, their third tour, have been on all three.

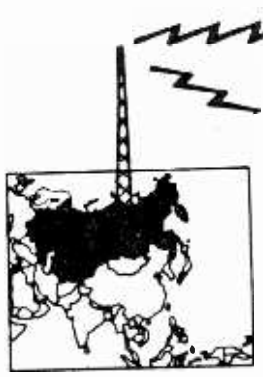
This year's Curacao tour is from December 6 to 13th. The price is $550.00 based on double occupancy, from Kennedy Airport in New York and includes seven nights at the Princess Beach Hotel, breakfast included. Reservations are requested by November 12 and require a $100.00 deposit. For more information, call Mike or Suzanne Poulos at (312) 492-9200.

Suzanne at Penha & Sons, the oldest building in Curacao.

Suzanne overlooking Ft. Waakzaamheid.



Michael "holding up" the Queen Juliana Bridge.



A Monitoring Times exclusive!

FCC RELEASES RUSSIAN JAMMER LOCATIONS

by Bob Grove

For many years broadcasts by western countries, most notably the United States and Great Britain, have been deluged by high powered jamming transmitters from the Soviet bloc.

On behalf of the International Frequency Registration Board (IFRB) of the International Telecommunications Union (ITU), the Federal Communications Commission (FCC) has assisted in the collection and collation of over 17,000 loggings of intentional interference to international broadcasters.

During a concentrated monitoring effort in 1985, 55 monitoring stations in 22 countries (12 locations within the U.S.) contributed bearings for outstanding accuracy. Recently, *MT* was privileged to receive the results of this monumental task to share with our readers.

In preparation for the World Administrative Radio Conference of 1987 (WARC 87) to be held in Geneva, four distinct monitoring sessions, each three weeks in length, were conducted in October, 1984; March/April, 1985; January, 1986; and June, 1986.

Jamming Signals

Not surprisingly, the overwhelming majority of these disruptive noise emissions came from Soviet bloc countries, designed to prevent--or definitely discourage--their citizens from listening.

The sounds are easily recognized and normally fit into four distinct categories:

Spark: Broadband electrical pulses designed to wipe out a wide spectrum of frequencies;

Sweeper: By far the most common, a strong carrier is swept at an audio rate back and forth across the targetted frequency, sounding much like a diesel engine;

Step tone: A constant series of randomly-selected tones (usually 3-5 bagpipe-like tones) repeated constantly over the program frequency; may be confused with "Piccolo" data transmissions legitimately transmitted on utilities frequencies;

Noise: White noise (background "hiss" static) is transmitted over the jammed signal.

Identifiers

In most cases, the jamming transmitters have an automated Morse identifier which sends a two-character ID every few seconds. The identifiers in Figure 1 and their three-letter country prefixes show that the USSR, Czechoslovakia, Roumania, Bulgaria, China, and Iraq head the list of noisemakers.

FIGURE 1

ID	Location	Country
1G	58-47N X 029-31E	URS
4F	38-28N X 066-09E	URS
AW	64-42N X 175-30E	URS
B1	50-30N X 015-30E	TCH
BD	52-39N X 032-48E	URS
DR	54-21N X 021-00E	URS
DU	54-30N X 034-29E	URS
GI	56-18N X 032-04E	URS
GM	49-54N X 131-56E	URS
GR	48-45N X 135-16E	URS
IG	49-13N X 135-29E	URS
KB	48-32N X 134-20E	URS
MP	49-00N X 023-00E	URS
MU	41-50N X 064-46E	URS
NS	47-27N X 030-30E	URS
R6	43-17N X 027-073	BUL
S5	49-05N X 016-36E	TCH
TK	40-56N X 067-41E	URS
TU	55-18N X 037-17E	URS
UA	48-39N X 135-47E	URS
U7	49-09N X 018-41E	TCH
UD	47-04N X 134-30E	URS
US	49-32N X 027-54E	URS
WI	55-43N X 034-40E	URS
Z1	44-03N X 024-39E	ROU
-	27-59N X 117-24E	CHN
-	55-43N X 034-40E	URS

While there may be some slight difference in bearings from time to time, the IFRB feels that the same identifier will be used time and again from the same location. Favored jammer transmitter locations include Moskva, Kiev, Tashkent/Dushambe, and Khabarovsk.

How About Those Letter Beacons?

Over the last decade considerable speculation has been ventured by the radio press as to the identification of the mysterious single-letter high-frequency beacons (SLHFB) which may be heard endlessly transmitting over a wide variety of frequencies.

Monitoring Times, *Popular Communications* and many of the club bulletins have ventured educated guesses as to their nature and origin. Now, perhaps for the first time in public print, the FCC shares some informed insight into these phantoms of the spectrum.

A number of years ago a "W" beacon was heard on many frequencies, even at the lower end of the amateur 80 meter band. It disappeared as suddenly as it had appeared and an anonymous tip was sent to *MT* that the transmitter in Cuba had been blown up during a guerilla raid.

And Finally, What About the 'Spy Numbers' Broadcasts?

The FCC has remained somewhat inaccessible on this subject. Their routine procedure is to report interference encountered by a U.S. licensee (amateur, aviation, marine, etc.) to the Commission's Treaty Branch for resolution with the country of origin.

Monitoring Times would like to express our thanks to the Federal Communications Commission for sharing this useful information with the monitoring community.

FIGURE 2

ID	Frequencies (kHz)	General Fix and Location	
C	10644.00, 13636.00 17016.00	56N x 41E	Moskva, URS
D	6803.00, 8647.00, 10645.00 13637.00, 17017.00	46N X 29E	Odessa, URS
G	13637.40	NO FIX	---
K	3977, 3978, 13979, 4005, 7905, 7906, 8144, 8158, 9043, 11155, 11476.5, 14967	48N X 135E	Khabarovsk, URS
O	10646.00, 13638.00, 17016.00	56N X 32E	Moskva, URS
P	8646.50, 13636.00, 17016.00	56N X 19E	Kaliningrad, URS
S	17015.50	65N X 45W	Arkhangelsk,URS
U	3637, 4448, 6247, 7395, 7569, 8077, 8136, 8670, 9057, 10215, 12185, 12328, 13339, 16655	No definitive fix area observed Most likely transmitting from multiple locations	
YU	10647.00, 10680.20, 13637.00	45N X 66E	Kzyl Orda, URS
Z	05308.60, 17018.60	49N X 23E	Mukachevo, URS

The Toughest Top Ten

If time travel existed outside the imaginations of science fiction writers, if we could set the controls on such an imaginary machine and take a quick trip back to, say, 1980, we'd get a quick lesson in the changeability of shortwave broadcasting. Or back to the decade's beginning would serve as a jarring reminder that the lower bands weren't so crowded then, that there weren't so many international broadcasters clawing at the ionosphere with 500 kilowatt transmitters.

Such a visit would tell us something else, too. We would discover that, from a DXing standpoint, then and now show great differences in the really tough-to-log countries. We'd be struck that much of what was considered unattainable or nearly so back at the turn of the decade doesn't apply today -- even though they haven't yet reached the category of "hear 'em anytime you want."

A top ten toughest countries list, for most people in 1980, would probably have included such places as Tristan da Cunha, Bhutan, Zanzibar, the Maldive Islands, Hong Kong, the Comoro Islands, Mauritius, Reunion, the Falklands and Antarctica. But that list, gleaming up there high on the mountaintop, has become tattered and tarnished in recent years. Some have withered away which others have slid partway down the mountain, making them easier to snatch. Only a couple on the original list still stand proud and tall up there, daring you to log them.

What's happened on the top-ten mountain? Let's grab the binoculars, and take a closer look.

Antarctica - Once, only the Armed Forces Antarctica Network at McMurdo represented the bottom of the globe. You could hear it if you were very careful, studied the lay of the land carefully and tossed in a little luck. The station, on 6030 kHz now as then, could be found during a narrow window around dawn in the middle of the winter. Most any other time there was simply no chance and if you weren't aware of that single best time period, chances are AFAN eluded you.

Then Argentina put Radio Nacional Archangel San Gabriel on the air. This offered an early evening logging opportunity (around 0000 UTC) on 15474, making Antarctica much easier to hear (although still far from easy). Antarctica, nonetheless, had to be scratched from the "super hard" list.

The ***Falkland Islands*** Broadcasting station once fit into the "you can hear it if you get very, very lucky" category . But a stronger transmitter installed after the Falklands War has made FIBS a fairly regular visitor in the evenings on 3958 kHz, even with the ham QRM.

St. Helena sat atop the mountain for a brief period. Or perhaps it was only a mirage, no one seems to know for certain. At any rate, some years ago the International Telecommunications Union's "White Book" showed a listing for test broadcasts from a low-power transmitter on the island. Whether such tests were ever conducted has never been reported and if they were, no one seems to have logged them. They aren't listed today so perhaps St. Helena, real or imagined, never belonged up there among the tough targets at all. At any rate, it is not there today.

Mauritius achieved something of an impossible status for a time since there had been no loggings of the Mauritius Broadcasting Corporation for some years. But then it began showing up again, occasionally at least, and is still being snagged by DXers now and then around its 0300 UTC sign on using 9709 kHz. It's still no cinch to hear but it's equally distant from being impossible, too.

The Comoro Islands - It's one of the few which still cling to a handhold near the mountain's peak. U.S. DXers, prowling around 3331 kHz looking for Radio Comoro at its 0300 sign on time run against a brick wall in the form of time station CHU on 3330 kHz, which, 999 times out of 1000, will dash all hopes for a logging. A better chance, but only slightly better at best, is the 0800 sign on on 7260 kHz but this, too, is almost never reported here.

Radio TV ***Hong Kong*** used to demand many a sleepless night spent monitoring 3910 before one's luck might turn and one could discover looking forward to receiving that fantastic QSL card. Then, what appeared to be a death blow was dealt DXers when the shortwave outlet was closed down.

But RTHK wasn't finished toying with us. As we know, the station makes a practice of carrying information for the South China Sea boat races every other year and this year's broadcasts were heard by a number of DXers over the event's 10 day period.

When the BBC's Hong Kong relay station gets on the air near the end of the decade, Hong Kong's hold on it's place on the "tough ten" mountain will end.

The Maldives were a frustration for nearly all of us. We hung around 4754 kHz at dawn's early light on cold winter mornings hoping fortune would smile. A few of the even dreamier types made it a habit to cruise by 9555 kHz around 0100 UTC, hoping for a miracle. The great majority of us came away empty handed on both frequencies. And then the bottom fell out. The Voice of the Maldives left shortwave leaving us high and dry. The occasional rumors of a return to shortwave haven't yet come to pass.

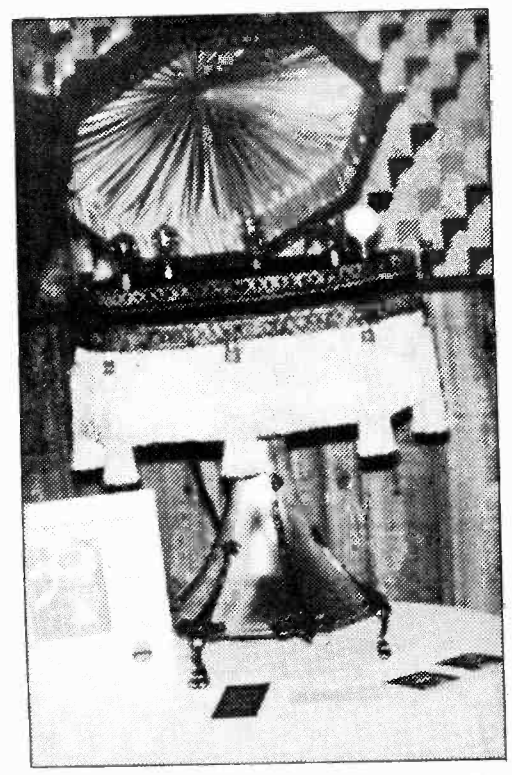
Zanzibar was one of the easiest of the difficult. Given good African reception, the right season of the year, and remembering to check, Radio Tanzania-Zanzibar could sometimes be picked off its 3339 kHz perch at its 0300 sign on. QSLing it was an even tougher proposition. Now, with Chinese-supplied 50 kilowatt transmitters in use on the 49, 31 and 25 meter bands, Zanzibar -- though still not a snap to log -- is not nearly as challenging as it once was.

Bhutan is standing with one foot on ground that is about to give away and betting is even odds that it'll slip at least partway down DX Mountain this season. It's former 400 watt transmitter, beaming from high in the Himalayas, reached U.S. shores perhaps only two or three times in the past. But now Radio NYAB has a new 5 kilowatt transmitter which may put it in approximately the same difficulty category as Nepal and it seems almost certain that a few determined DXers will hear this one in the months to come. Careful pursuit of the areas around 3400 and 7040 kHz at the appropriate times may result in a thrilling logging.

Which leaves us with the granddaddy of them all -- ***Tristan da Cunha***. It's not hard to envision Tristan Radio soon standing up there all by its lonesome at the rate things are going. Tristan Radio, operating merrily along, with its puny 40 watt broadcasts in the middle of the afternoons in the 90 meter band represents the ultimate DX country challenge for the shortwave broadcast listener. Somehow, it is comforting to know that Tristan will probably always be there, representing the virtually unattainable, smiling down on us and daring one and all to make the climb up.

Olde Tyme Radio Delights Visitors

by Frederick W. Chesson
144 Fiske Street
Waterbury, CT 06710



Need to "see what you're hearing?" How about this elegant radio-lamp combination!

AN ERA IS BORN

"It's In The Air!" This slogan, appearing on an otherwise unidentified crystal set receiver of the early 1920s, voiced the thrill of America's most exciting technical decade.

Exploding out of the chaos of the First World War, the new genie of radio was everywhere in the air: radio topics were on every tongue--along with bootlegging, baseball heroes, mahjonng, crossword puzzles, the Return to Normalcy, and ladies' hair and skirts, both cut short, short short!

Conversations among comuters, speakeasy patrons, farmers, housewives, and even school children revolved around such matters as who could receive the most distant stations (now called DXing), how to best cope with man-made and natural interference (known as QRM) and what receiver circuit was going to surpass all others.

With new stations coming on the air almost nightly (when long-distance reception was at its best), competition in the infant industry to supply a new consumer public with all the requisites of broadcast listening soon became intense. Hundreds of little manufacturies sprang up, virtually overnight, competing in a frantic business atmosphere as foot-loose and free-wheeling as any in the America of the classic Roaring Twenties.

Not only was there an instant market for complete receivers, but a large and growing need developed for radio tubes and a host of other components and accessories by a flood of build-it-yourself hobbyists. These included headphones and loudspeakers, batteries and eliminators, indoor antennas, and outdoor lightning arrestors.

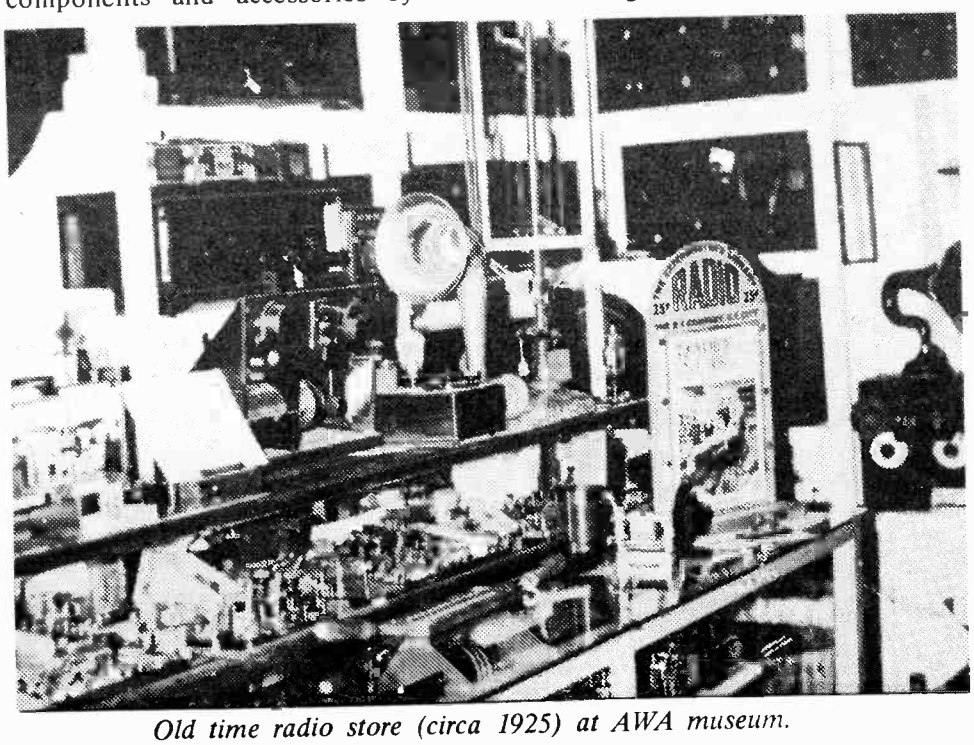
Scores of radio magazines proliferated, much in the way that journals for the home computer craze of 1973-1984 did on contemporary newsstands. Leading the way was publisher Hugo Gernsback, whose *Radio Electronics* magazine is still very much alive.

Many other periodicals carried radio departments, as did various newspapers, while radio clubs sprang up like mushrooms after a warm rain.

The "radio boom" was very much like the recent "personal computer decade," which saw the exotic world of the lonely hardware-hacker suddenly explode into a multi-billion dollar industry, wracked by initial exponential growth, unending product improvement and innovation, and corporation-shattering mergers and shakeouts. It has all climaxed into a mellowed and somewhat exhausted maturity.

The situation was comparable in the Twenties. Crystal sets with headphones were followed by vacuum tube amplifiers with loudspeakers, then all-tube receivers with massive ganged tuning condensers appeared; Art Deco cabinets finally made the radio a respectable and essential piece of living room furniture.

The early squealing and interference-generating regenerative circuits were tamed, giving way to true superheterodyne systems; bulky, acid-fuming batteries were replaced by internal line-operated power supplies. The once-arcane rite of multi-dial radio operation was reduced to today's simplistic three steps: "Turn on, Tune In and Enjoy."



Old time radio store (circa 1925) at AWA museum.

The entry of large manufacturing entities like General Electric, R.C.A. and Atwater Kent into commercial radio manufacturing brought about a sharp contraction of receiver makers, and the impact of the Great Depression spelled "power off" to a host of small set builders and component suppliers alike. Today, once familiar names like Grebe, Murdock, Fada, Federal, Farnsworth, Sparton, and Tuska are known only to specialized collectors and historians.

In a gathering of such electronic archivists, conversations revolve around such topics as the endless variations of the classic WD-11 and 201-A vacuum tube; how to restore a Radiola 17 cabinet to its original finish; or perhaps how to tune a Tuska Neutradyne in the face of interference from a nearby TV set.

PRESERVATION OF A PRECIOUS HERITAGE

All these topics, and a host more, lie within the scope of the Antique Wireless Association of America of Holcomb, New York. Its goal is to preserve both the artifacts and lore of a technology and way of life which flourished widely--and a little wildly--on the American Scene, now vanished almost completely.

The A.W.A. was founded back in 1952 by a group of amateur radio operators who were also collectors and historians of the early electronics industry. Several had been actively associated with some of the pioneer firms, and all had an abiding interest in preserving the written, spoken and tangible history of wireless communication.

Twenty-five years later, the organization now has over 2,000 members worldwide. These range from scientists, radio pioneers, amateur and commercial operators, historians, and broadcast personalities, some with experience going back to primitive spark-gap transmitters and pre-crystal coherer-type detectors.

AN EXTENSIVE COLLECTION

A nucleus of equipment and components collected mainly by Bruce Kelley, W2ICE, of Holcomb, New York, formed the nucleus of the now-extensive collection housed in the East Bloomfield Historical Society, about twenty miles southeast of Rochester. Other acquisitions, mostly donations from private and corporate sources, have filled every available inch and have spilled over into an extensive storage annex.

The exhibit area includes sections dedicated to such interesting branches of the wireless tree as phonograph and television history, early amateur equipment, telegraph apparatus for both wires and undersea cable installations, classic Atwater Kent sets (the Model-Ts of radio), vacuum tubes ranging from tiny glass bulbs to monster water-cooled transmitting units, exotic Tesla Coils, and even a collection of pseudo-medical therapy apparatus confiscated by the authorities.

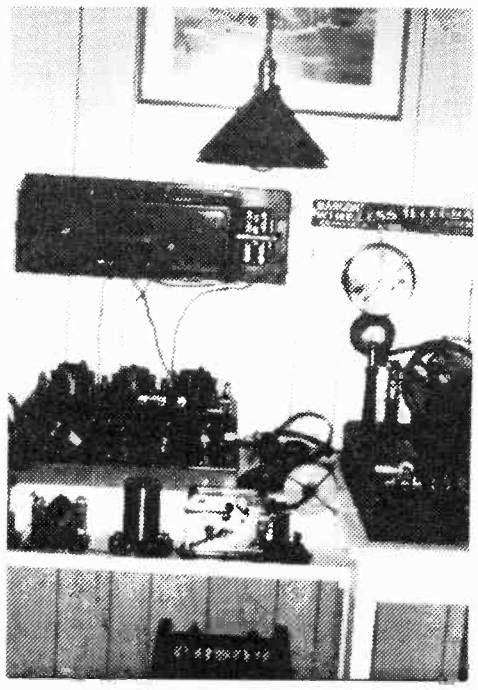
Several collections have been displayed to show their components as they would have been in actual use. These include a ship's radio shack of the "pre-Titanic" era using Marconi apparatus, and old-time radio store of the mid-Twenties, and a trans-oceanic cable telegraph shore station, with its many pre-World War One instruments of polished brass.

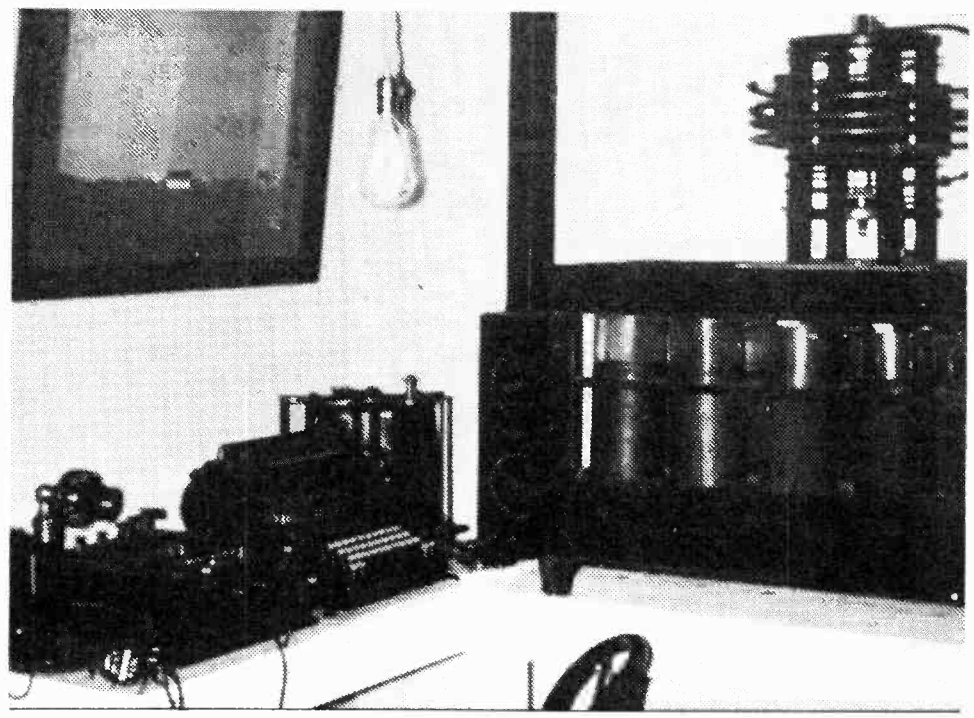
The great days of entertainment are there, too, with classic movie posters looking down on another pair of classics: the famous "His Master's Voice" dog, Nipper, sitting entranced before an antique phonograph accented by an elegant morning glory horn.

THE "RADIO SHACK"

On an upper floor is to be found a representative amateur station of 1922, complete with six spark transmitters (at least two of which are operational) complete with awesome fireworks and equally formidable wide-band QRM! The museum also operates a modern Collins KWM transmitter under its own call (W2AN) and members

Ship's wireless room circa 1905; Marconi equipment includes coherer detector and paper tape register in foreground, multiple tuner in back, magnetic detector on wall and 10-inch spark transmitter at far right. ➔





Lyden jar storage condensers in the glass case, with HF coil above.

regularly get together on its SSB and CW nets.

SPREADING THE WORD

In addition to collecting and restoring electronic antiquities, the A.W.A. conducts research into wireless and related history and makes its findings known both through its quarterly "Old Timers Bulletin" and a series of tape and slide presentations. An extensive collection of books (including the famous Radio Boys series), photographs, technical and popular journals, and technical manuals all assist in maintaining and propagating a knowledge of this fascinating world.

The outside world reciprocates in visiting the museum and by contacting fellow members via the Association's amateur radio network of code and voice transmissions. An even more wide-spread focus on the A.W.A. comes in late September, with its Annual Convention. Held in Canandaigua, at the head of one of the beautiful Finger Lakes of the same name, interested parties come from all over to hear speakers and view exhibits of rare and restored equipment.

Guest speakers have included specialized collectors and living personalities of the great days of radio manufacturing, research and broadcasting. In 1984, the Guest of Honor was Mrs. Gioia Marconi Braga, daughter of the famed inventor. In 1986, Dr. John Bardeen, twice a Nobel Prize Winner and co-inventor of the transistor, was so honored by the organization.

FLEA MARKET MANIA

There are also contests for restored classic radios and related apparatus, and auctions for tubes, communications receivers, and general interest items. However, many of the attendees spend a great deal of their time happily prowling the extensive flea market set up in a field adjacent to the conference site. here, gathered from the far corners of the country and even from parts unknown, are complete sets, battered hulks and a myriad of components ranging from pre-Twenties crystal detectors to TV-age tuners.

Amidst cigar boxes of gridleaks and Sparton dial knobs, and between heaps of *RadioCraft* magazines and *Rider's Manuals* of the Thirties, one has a good chance of finding that elusive CX-199 tube, an Atwater Kent No. 4340 variable capacitor, or perhaps a mint Navy ARB aircraft receiver. Meeting old friends and making new acquaintances also enlivens the electronic flea mart.

Searching for a unique antique? The unusual becomes commonplace at an AWA convention!

Truly, the Antique Wireless Association has something for everybody.

The A.W.A. Museum is open between June 1st and August 31st on Saturday from 2 to 4 pm and 7 to 9 pm on Wednesday. Between May 1st and October 31st, hours are 2 to 5 pm, Sunday.

For additional Museum information, contact Mr. Charles Brelsford, 222 Danbury Circle, Rochester, NY 14618. ■

Monitoring Military Aircraft

Part One: GETTING STARTED

Jack Sullivan WA1TEJ

War games, air-to-air combat, mid-air refuelings - these are just some of the exciting and unusual communications activities found frequently in the 225-400 MHz military aviation band. Add to that list air traffic control, coded Strategic Air Command transmissions, flight service and many other types of routine and non-routine traffic and you will begin to understand the curiosity and anticipation I felt a number of years ago.

I began to devote most of my monitoring time and efforts to finding out the how, what, who and where of "Uniform" (code for UHF) armed forces radio traffic. This series of articles is intended to share some of my experiences with the many monitoring enthusiasts who are looking for interesting new horizons.

Publications

Initial impressions about this huge band are misleading and can be disappointing at first. you can tune, scan or search the 1750 100-kHz channels between 225 and 400 MHz for days and find very little of interest. The first step in getting in on the action is to do some basic research to find out what is available to the public about what is going on in this band.

Several military publications are available to the public. The *IFR-Supplement/United States*, a Flight Information Publication (FLIP), is available through the National Ocean Service, Distribution Branch, N/CG3313, Riverdale, Maryland 20737.

Like most Department of Defense FLIPs, it is published every eight weeks. At the time of writing, individual copies could be obtained for $4.50 by calling (301)436-8194. A one-year subscription was also available for $28 by calling (301)436-6993.

The IFR-Supplement contains all the information necessary to operate a military aircraft in the United States, Canada and Mexico, including complete lists of all communications frequencies operating at all airports and military airbases, as well as complete lists of all Air Route Traffic Control Center frequencies by Center name and by location. With much, much more as well, a copy of this handbook is a must for anyone interested in monitoring the military.

Here are some of the more interesting common frequencies given:

243.0	Emergency ("Guard")
372.2	Pilot-to-dispatcher(PTD) (military common)
255.4	Flight Service Stations (FSS) (primary)
381.3	Tactical Air Command(TAC) Wing Command Posts (callsigns "Raymond")
311.0	Strategic Air Command (SAC) Wing Command Posts (callsign "Skybird")

Another indispensable military FLIP handbook is *AP/1B:Area Planning/ Military Training Routes/ North and South America.* Available for $5.50 for single copies and $35 for a one-year subscription, this reference work comes with a set of two maps that cover the entire U.S. and much of Canada and Mexico. All low- and high-altitude military training routes (and there are hundreds of them) are described in detail in the book (communications frequencies, navigation fixes, aircraft types, etc.) and are also printed on the maps in different colors.

MAC (Military Airlift Command) Transport C-5A

These excellent maps show major cities, airports and so forth and are themselves worth the price of the handbook. Airborne refueling (AR) training areas are described in the book and are illustrated on their own one-page map. (The serious monitor may want to obtain the relatively expensive FLIP subscriptions due to the changes the military frequently make in their operations. For the person just getting started, though, single copies are all that's needed.)

Another invaluable set of references on military aircraft communications (and much, much more!) are the government microfiche frequency file (FCH-1) and FAA file (FCH-2) sold by Grove. These give frequencies, agency (Navy, Air Force, etc.) and locations for thousands of channels. Obtaining a set of these microfiche and the required reader (RDR-4) is not an absolute necessity for getting started but you will find references to frequencies here that you will find nowhere else.

So now you're all set to go, armed with a pile of books and maps. But if you're curious like me, here's where the fun begins. Using tacks or tape, mount a set of aviation maps on a wall or table. These maps are designed to overlay each other accurately and the resulting mosaic map makes as dramatic a wall decoration as it does a valuable monitoring tool.

Find your location and put a brightly colored map pin there. Now get a piece of string or thread and, using the scale found on the map, measure 100, 200 and 300 miles worth. Using a felt-tip pen, you can now draw these three range circles around your location pin. There you are, right in the middle of the area that will give you a lot of future enjoyment in military monitoring!

Make a list of all the larger airports and airbases located within the 300 mile-radius circle. Checking the AP/1B maps, make a list of the training routes that enter that circle. And then check the AP/1B for refueling tracks or areas within that range. Anyone living anywhere in the U.S. is within range of a lot of potentially interesting monitoring!

A SAC (Strategic Air Command) E4-B (Photo by Art Lewis)

Using your lists, consult the IFR-Supplement for each airport or airbase of interest. Make a separate sheet for each big one and copy down things like approach and departure frequencies, tower and ground control frequencies and the frequencies and callsigns used by command posts (CPs). Do the same thing for military training routes in your area with AP/1B.

Check the IFR-Supplement also for the Air Route Traffic Control Center(s) in your area and note the locations and frequencies within your 300-mile circle. Make a separate sheet for these. If you have the Government or FAA microfiche, just start at 225 and scan all the listings up to 400, noting the listings for locations within your 300 mile circle as well as for those listings designated as "USA" and "USP" (United States and possessions). These are country-wide frequency assignments and any of them could be fair game for use in your area.

Now put all of this information together: on file cards, make a card for each frequency and put on it who uses it (FAA, Coast Guard, etc.) along with the location of each transmitter you've identified. A number of frequencies may be used several times in your area, such as 364.2 (Airborne Intercept Control Common, or AICC) or 257.8 (for FAA control towers). Add any additional information of importance, such as the training or refueling route designation, operating unit, etc.

When you've finished you'll have an impressive stack of cards...and an impressive amount of stuff to listen to! A computer is the ideal way of keeping track of all this information and the stuff you'll pick up as you get further into UHF monitoring. We'll talk more about this in a later article.

Antenna Systems

Now that you have a fair idea of the "who, what and where" of monitoring the military from your location, let's get into the "how" part of it. While receiving ground transmitters requires about the same amount of effort as it does in the Public Service FM bands, picking up aircraft in flight is very different.

An airplane flying at 25,000 feet has a line-of-sight range of 225 miles! As long as you have an outside antenna at a reasonable elevation above surrounding nearby obstacles, you'll find this kind of DX to be routine. You will also probably be able to hear ground stations in a 20-40 miles radius as well.

At these frequencies the losses found in coaxial cable become very significant. Keep your cable run between antenna and receiver as short as possible. Use the lowest loss cable available. The longer your cable the better should be its loss characteristics. While 1/2-7/8 inch jacketed hardline is probably the ultimate in cables, a good grade of RG-8 or RG-6 (as sold by Grove) will probably satisfy most monitors. Do not use RG-58 or cheap -59 unless you're willing to accept missing most of what's going on.

Due to the enormous bandwidth involved in monitoring the UHF aviation band (175 MHz wide) most common monitoring antennas will not do the job. A simple ground plane or coaxial-type antenna will work fine at the frequency it is cut for plus 10% above and below. Thus an antenna of this type cut for 300 MHz will do a good job from 270 to 330 MHz. Operation beyond those limits will result in loss of signal and poor reception.

Because a military aircraft transceiver can switch from 225.0 to 399.9 in seconds, a broadband antenna is required, one that will give equivalent reception characteristics all through this band.

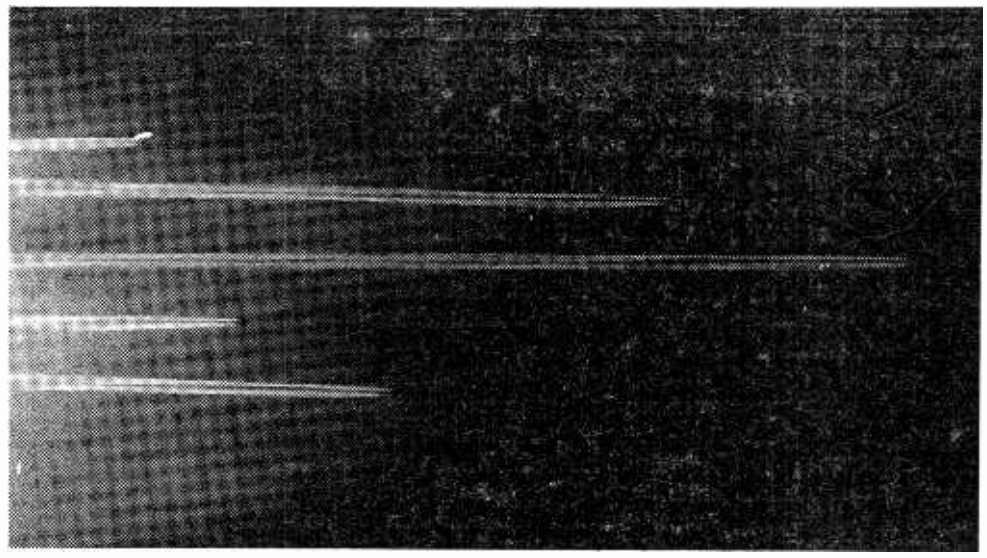
Several different types of broadband antenna are available to the monitor at low cost: the discone-type such as the Hustler DCX unit and the premium ICOM AH7000; the off-center-fed vertical dipole-type, such as the Grove OMNI II; and the log-periodic-type, such as the Grove Scanner Beam. The first two types are omnidirectional. The Scanner Beam is a directional antenna suited either for fixed operation (such as staying pointed toward a single point of interest) or rotating, mounted on a ham or TV antenna rotator.

Receivers: AM mode for military UHF

There are several different types of receivers available that will work well in this band--besides war surplus which offers both good stuff and junk that could be put to better use as boat anchors. Anyone ever try to get an AN/ARC-27 receiver up and running? I tried for a long time.

For the sake of simplicity, I'll limit this discussion to equipment that is currently available that I am personally familiar with. If anyone writes to me with comments on other types of equipment, I'll try to plan a future article to review other gear.

A company called CEI (now part of Watkins-Johnson) built some excellent quality, 19-inch, rack-mountable receiving equipment during the 1960s and 1970s. My first UHF reception was with a 901-1 receiver, CV-1750/U and SM-9300A Spectrum Display Unit (SDU). Nice equipment! Very stable, sensitive, highly linear and nearly indestructible (ceramic Nuvistor-type tubes throughout, the same types of tubes that were developed for artillery shell proximity fuses).



Wave of B-52 bombers on a practice bombing run during war games

Basically a tunable receiver from 30 MHz to 1 GHz, I can just tune it through the UHF band at random until I spot a signal on THE SDU scope. Between the dial calibration and a crystal calibrator, I'd then check the frequency of the signal. A lot of interesting noises have come out of that system!

Equipment of this type is available from Tunho, Inc, RFD #1 Box 152N, Skillman, NJ 08558; telephone (609) 466-9174.

Most of my current listening has been with the Regency MX-5000, an excellent piece of engineering at the price. This compact unit (and its MX-7000 big brother) do a fine job of searching and scanning the 225-400 MHz band. Sensitivity is excellent, probably better than the specifications. Intermod-type interference is almost nonexistent, thanks primarily to the extremely high intermediate frequencies utilized.

Add the wide- and narrow-band FM receiving capability to the AM and throw in the very useful scan/search hold trick discovered recently by Greg Doerschler and reported in *Monitoring Times*, as well as the scan/search modification offered by Grove, and you have a radio that's nearly perfect for UHF aircraft monitoring.

Put your system together and turn it on. From your card file of frequencies, select those nearby and program them into your receiver. If your antenna, feedline and receiver are all working well you should be able to hear the airport tower or nearest FAA Center remote transmitter site.

There are two completely parallel Air Traffic Control systems in the U.S.: VHF (118-136 MHz) and UHF (225-400 MHz). At most facilities the equipment for the two bands is tied together so that VHF traffic is sent out on UHF channels all the time.

If you don't hear anything, check your coax with a VOM and check your antenna installation. Once you can receive the known local stations routinely, start programming in military channels from your card file. Remember, the Armed Forces operate seven days a week, 24 hours a day, 365 days a year, but use of any given frequency or group of frequencies may be highly sporadic. Be patient--don't give up on a frequency until you've heard absolutely nothing on it for at least several weeks.

What you do hear, write down in a long book: date, time, frequency, callsigns used, other frequencies mentioned, type of activity involved, etc. After a while the odd bits and pieces that you hear will start to take shape into some very interesting monitoring.

* * *

In the next installment we will look at mid-air refueling communications. In the meantime, if you would like to hear more, drop me a line at: P.O.Box 701, Franklin Park, NJ 08823. Include an SASE if you would like a personal response. 73! ■

ANNUAL SURVEY POSTPONED

In order to achieve the most accurate polling of radio monitors, *MT* has decided to delay the survey which *International Radio* has traditionally conducted in the fall of the year. *MT* has its own tradition of sending a promotional copy of the January issue of *Monitoring Times* to the entire mailing list--subscribers and non-subscribers alike. So in order to reach the largest number of listeners to the spectrum, we are postponing the survey until the January issue. Then you can fill out your reply card and really tell it like it is!

Interview

*"Greg Shafritz was glad when they said to him, 'Let us go to Kol Israel,' and now we here here, standing inside the gates of Jerusalem!"**

Broadcasting from Israel

Greg Jordan is one of DXing's rising stars. Not only was he resident Middle East columnist for the old International Radio magazine, but recently the young University of Pennsylvania freshman spent the summer working at Kol Israel in Jerusalem. We spoke to him about his first experience as an international broadcaster in the volatile Middle East.

MT: You are just back from Kol Israel in Jerusalem.

SHAFRITZ: That is correct.

MT: Doing what?

SHAFRITZ: Doing what? Hmmm. I don't know. You couldn't say I had an official title when I was there. I hosted *DX Corner* [Kol Israel's DX program] for the summer while [regular host] Ben Dalfen was on vacation.

I called up the people at Israel Radio and said that "I am going to be in Israel this summer for two months and was wondering if you'd like to make use of my talents." They said, "Hmmm. We'll have to think about it and get back to you." And when they did get back to me the answer was that "Normally we don't do things like this. We get hundreds of requests each year from the Jewish Agency and from individual students and others seeking to do internships and we always turn them down. But right now we need someone who can fill in for Ben Dalfen when he is away..."

So I started off just doing the DX Corner but as time progressed I ended up doing some other things as well, sort of on a free-lance basis. When I came up with something that I thought should be a story for the *Travel Magazine* program or something like that, then I'd ask Sara Manobla, who is the head of the English Department, what she thought and if she wanted to use it.

MT: When you went into this you didn't have any other previous broadcasting experience, did you? You were a DXer, right?

SHAFRITZ: I had done some high school radio. In fact, I was one of the founders of the station. But that was as a disc jockey. Here at U of P I've done some sports and news. This was my first time working at a big international station and my first time working professionally.

MT: In just a few short weeks, you changed the entire focus of *DX Corner*. Dalfen's show is invariably very technical, "ham" oriented.

SHAFRITZ: I did. What I did was shift the emphasis away from "ham" and, how should I say it, "radio nitty gritty," and into broadcasting.

MT: Successfully?

SHAFRITZ: I think so. What I tried to do was editorialize a lot. Whenever someone gives me a microphone I'm bound to put my two cents in. And there were a lot of things that not only were bothering me, but other people, I think. Like the lack of listener feedback. Listeners always expect broadcasters to improve their programs, but no one will take the time to write.

MT: A favorite refrain of Radio Canada International's Ian Mc Farland....

SHAFRITZ: The problem is that everybody sits around saying that the programs on shortwave are so boring. But until the listeners start telling the broadcasters what they want to hear, the broadcasters can't do anything about it. That was the subject of my very first DX Corner.

Unfortunately, the people who write in are primarily looking for QSL cards, stickers, pennants, free trips to China...

MT: Funny. Broadcasting internationally in Israel has to have some unique aspects being that Israel is essentially a state under seige. How does that affect journalism?

SHAFRITZ: You mention that Israel is a "state under seige." I suppose that a lot of the world perceives it that way. Although living in Israel, one doesn't feel as though he's under a constant state of seige.

MT: But you've also told me on previous occasions that there are people, soldiers, walking about the streets with with uzis hanging from their shoulders. You've also told me stories about people scattering in horror when an unidentified piece of luggage is found on a bus because it might be a bomb...

SHAFRITZ: If you're not used to that, it might cause some shock, seeing a soldier walking down the street with a loaded rifle on his back. But in Israel, it's the norm. People are desensitized to it. That military presence is everywhere and Israelis accept it as a fact of life necessary for their own safety and the continuation of the country, literally. You could look at it as if Israel is under a constant state of seige, yes. But Israelis don't think of it that way.

MT: It doesn't affect the actions of broadcasters, his access to events and how he reports stories?

SHAFRITZ: Well, it doesn't necessarily affect his access to stories, but it does effect his reporting of them. There are a lot of things that for security reasons, you can't say on the radio.

MT: Give me an example?

SHAFRITZ: It sounds strange, but I wanted to mention on *DX Corner* that there are two countries in addition to Israel, which broadcast on shortwave in Hebrew. They are Iraq and the Soviet Union. And when I wanted to put that in the program, there was a lot of uproar over whether or not it was "kosher" to mention those broadcasts on the air. Because they are deemed subversive propaganda and are aimed at undermining the state of Israel.

MT: That's censorship.

SHAFRITZ: Well, yes. The government body which regulates what you can and can't say on the air is known as the military censor. And, yes, it is indeed censorship.

I'd say that main problem is that everything has to be cleared by the military censor to make sure you're not putting something on the air that might jeopardize the security of the state. For example, by publicizing those two [Iraqi and Soviet] Hebrew broadcasts, you could be said to be jeopardizing the security of the state in two ways, I suppose. First, it's undermining nationalistic feelings of Israeli citizens and second it's supporting the anti-Israeli sentiments of Palestinians or Arabs living in Israel who might listen to those programs. And to publicize those programs is only going to serve to increase the tension in the country because people might listen to them and be affected by them. Incidentally, I was eventually able to get that cleared to go on the air.

But there are things you simply can't say. A good example is back when we did a story on Kol Israel for *International Radio* magazine, there was the question of "why can't we print any photos of the station?" I was not permitted to take any pictures of the Kol Israel building inside or outside, nor was I able to take pictures of the transmitter site. And that's because if the photos fell into the wrong hands and were used to assist in a terrorist attack, that's jeopardizing the safety of the lives of Israeli citizens to include those photos in a publication, according to the military censor. And I'm not just talking about a foreigner like myself. This goes for Israeli citizens as well.

There are also a lot of things you can witness but you can't talk about.

MT: How can you report the news, then? This sounds like a pretty pervasive attitude.

SHAFRITZ: Reporting in Israel tends to be extremely objective and extremely unbiased except for when it comes to military considerations that are labeled dangerous to the national security. In which case they are simply omitted and you may well end up hearing the thing on the BBC first. It happens every day in the media.

There's a constant media war going on between journalists in Israel and the government censors.

MT: Tell me about some of the people at Kol Israel. Tell me about the people who work in "the asbestos hut, high atop radio house..."

SHAFRITZ: The staff at Israel Radio is a marvelous bunch of people. Working with them really made the summer. Both being in Jerusalem and having the opportunity to explore the city with [broadcaster] Yishai [Eldar], was just fascinating. We'd eat lunch in the old Arab market, then visit historical sites. When you get right down to it, working at any radio station -- a radio station is a radio station. It's really the people who make the difference. And at Israel Radio, the people made my summer a very, very worthwhile experience. ■

**With apologies to Psalm 122*

Radio Prague
REQUESTS HELP

Radio Prague marked its 50th anniversary this year back on August 31, 1986. From its beginnings back in the late 1930s, the station has gradually expanded its coverage to include 50 daily programs in 12 languages on 22 frequencies. North America receives a daily 57 minute program at 0100 UTC which is repeated for the west coast at 0300 UTC on 5930, 6055, 7345, 9630, 9740, and 11990 kHz. There's even a DX program on Thursdays.

Unfortunately, even after 50 years on the air, Radio Prague does not have any transmitters abroad to relay its programs -- as do many other major broadcasters. And caught in this period of minimal sunspot activity, this sometimes means serious disruptions in the service and quality of their signal.

As a result, the technical department of Radio Prague is seeking your help. They'd like as many reception reports as possible from all across North America. Can you help? The address is Radio Prague, Prague, Czechoslovakia, 120 99.

RADIO IN THE CLASSROOM

Craig Dible isn't an ordinary teacher. True, he is a classroom teacher at Horace Mann Middle School in Beverly Hills, California, but he has gone a little farther than most teachers.

Craig is a listener, not only to the radio spectrum (he's into broadcasting and utilities) but to his kids as well. A teacher of seventh grade world history and English as a second language (ESL), he recognized the enormous potential that shortwave would have in the classroom.

Last year Craig applied for, and received, a grant from the state of California with which he bought an ICOM R71A and an ICOM R7000. How's that for starting with style? Next, Craig erected a trap dipole for SW broadcast monitoring and a wideband discone for VHF/UHF. A few minor accessories later they were in business!

Since a large number of foreign born students populate the school district, primarily from Israel and Iran, the ESL program is particularly important.

"My kids can't believe the amount of activity that goes on outside the 'normal' broadcast spectrum", Craig continues; "It really opens their eyes--or would that be ears?"

Classes began September 19 and Craig hopes to add amateur radio to the curriculum next. He will hold those special meetings during the normal school lunch period.

MT would like to congratulate Craig Dible for his motivation and his dedication in helping young men and women explore their world through radio.

Craig Dible may be reached at Horace Mann School, 8701 Charleville Boulevard, Beverly Hills, California, 90211. For a limited time, Monitoring Times *will supply free of charge a copy of Craig's grant proposal to any educator submitting the request in writing and supplying a self-addressed, stamped envelope.*

Scribo-Morse

by Don deNeuf WA1SPM

The unique SCRIBO-MORSE code practice device and a description of its modus operandi is shown below. This was sent to me by Tony Smith, G4FAI, who has one of the units in his collection and who says it was fabricated circa 1923.

Perhaps it could also be useful to a person who wishes to send Morse Code signals, but who has no knowledge of the code itself, by disconnecting the buzzer and battery and connecting the "pen" and metal plate directly to a landline telegraph or radiotelegraph circuit! Great for secret agents who have only to transmit and who would run the risk of local discovery by speaking or making key clatter!

The Pioneers of Broadcasting

W
4
X
B

by Tom Williamson

"By the palm-fringed shores of blue Biscayne Bay, in tropical America... this is W4XB, Florida..." How many *MT* readers have ever heard this exotic station identification?!! Well, you'd have to go back to the 1930's to have a logging like this!

Yes, dear reader, these were the "good old days" when the U.S. had several so-called "experimental" stations on the SW broadcast bands. They all had an "X" in their callsigns, following the regional number for the region of transmitter location, similar to the system used by amateur stations. You can follow this in the list below.

The majority of these stations were engaged in relaying a broadcast band affiliate (e.g. W4XB relayed WIOD). Powers were very low by today's standards--anything from 1 to 50 kW. All the stations were commercial or cultural; there was no such thing as a government operation like the present Voice of America.

Some of the famous names of the day included: General Electric, RCA, Crosley Corporation, and the World Wide Broadcasting Foundation of Boston. In addition the networks had their affiliates such as W2XE, W3XAU for CBS, W8XK, and W3XL for NBC, to name a few. These were the days of the famous "Red" and "Blue" divisions of the NBC, so that one heard such identifications as *"NBC Red Network; W2XAD relaying WGY Schenectady"* ...and so on.

The types of programs formed an interesting contrast to the present situation in which we are seeing a revival of domestic SW activity in the U.S., but much of it now has religious motivation. The 1930s, in part because of the station relayed, were more frankly commercial although independent programming might include news broadcasts and special local events or national events with a special ethnic appeal.

Occasional news and commentaries such as French or Italian were heard, but these were not very frequent until later years when the Second World War provided the impulse for countering enemy radio propaganda (Indeed, in the early '40's several utility "point-to-point" radiotelephone stations were put into service for the purpose of presenting news from the allied viewpoint).

The sound of static electricity discharge in the G.E. labs opened the broadcasts of W2XAD/F, hence the slogan "The Voice of Electricity"! Let's take a look at what was available on the dial from the U.S. in those times. Table I lists the main stations.

You will note that I have included a list of call sign changes here, because in August, 1939, just before the outbreak of WW II, all the stations dropped their "X" calls and presumably were no longer "experimental!"

For a look at what one organization was into in those days, here is a look at the published schedule of the Crosley Corporation of Cincinnati. Their main SW station was W8XAL, but you'll see they had some other experimental outlets, even on 700 kHz!

Now this leads to the matter of frequencies; as you can see from the above list, in addition to the familiar 13-16-19-25-31-49 meter bands, there were stations operating on 11 meters! This was truly a fascinating, fun band, with highly variable reception conditions using low power transmitters, usually using between 100 and 1000 watts!

Some of the best known of these included:

W2XJI New York City, relay WOR
W2XQO New York, Knickerbocker Bcg. Co.
W4XA Nashville, Tenn. relay WSM
W8XNU Cincinnati (see above)
W9XJL Superior Wis. Head of Lakes Bc.Co.
W9XUP St. Paul, Minn.

These low power stations provided much fun and pleasure, due in part to the technical "skill" required to tune them in! We didn't have the sensitive, stable, solid state receivers of today; indeed, my rig was a home-built "kit," a five-tube regenerative battery-operated set in a wooden (!) cabinet with massive primitive dials and tuning knobs!

One of the big problems at 25 MHz frequencies was "body capacity"; if you moved your hand you lost the station!!

Calibration of that old receiver was by charting the dial readings in degrees against any known frequency stations in the band, and the resultant graph was used to identify new signals. Changing bands meant changing COILS!! Yes, two new coils for each new part of the radio spectrum!! Kinda slowed things up!!

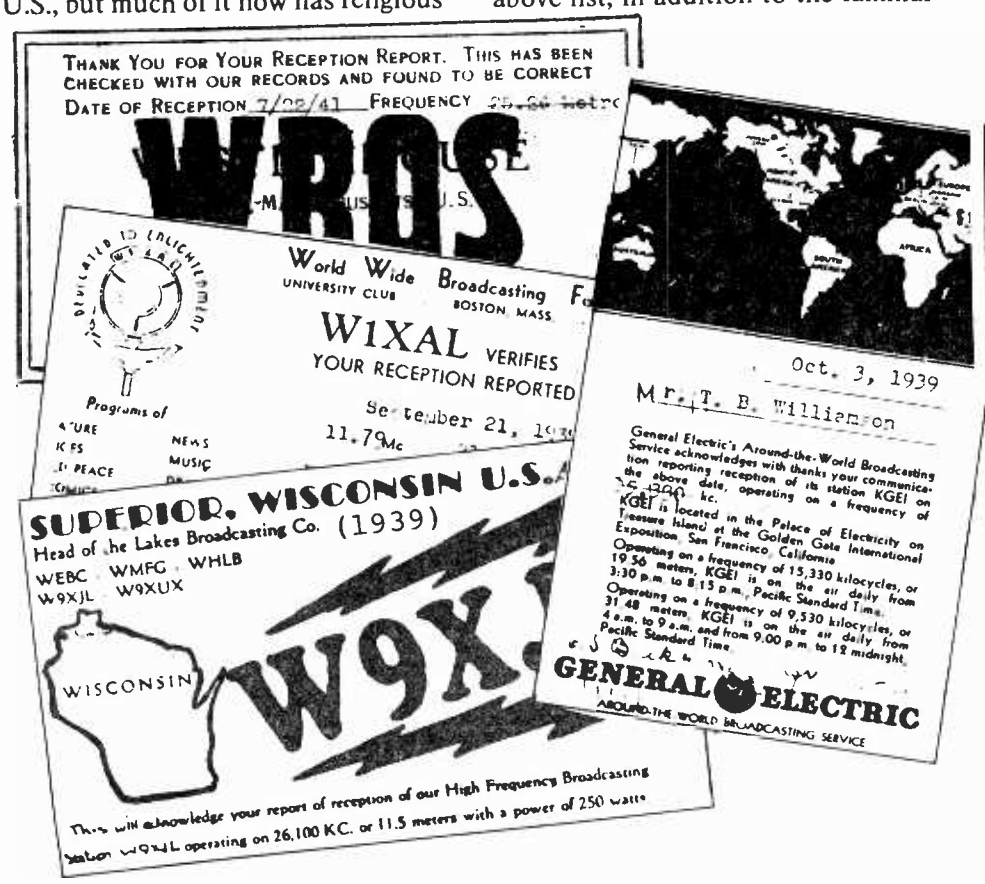
As the forties progressed, the well-known commercial network stations with their new callsigns became incorporated into official government broadcasting and although large industrial concerns like Westinghouse continued to have their name associated with SW stations, gradually all became involved first in the Office of Information and Education (Dept. of State), and later the Voice of America.

On the west coast there was considerable radio development with new stations like KWID and KCBA coming on the air; later the Armed Forces Radio Service appeared...but now we are getting into the war period, and that's a story for another day! ■

TABLE I

W1XAL	-WRUL	Boston, Mass.	10 kW World Wide Broadcasting Foundation
W1XK	-WBOS	Millis, Mass.	- Westinghouse
W2XE	-WCBX	Wayne, N. J.	1 kW CBS
W2XAD	-WGEA	Schenectady, N.Y.	40 kW General Electric; NBC relay WGN
W3XAU	-WCAI	Philadelphia, Pa.	10 kW Relay WCAU; CBS
W3XL	-WNBI	Bound Brook, N.J.	35 kW RCA
W4XB	-WDJM	Miami, Florida	1 kW Isle of Dreams Broadcasting Co; relay WIOD
W6XBE	-KGEI	San Francisco, Cal.	- General Electric
W8XK	-WPIT	Pittsburgh, Pa.	40 kW Westinghouse; relay KDKA
W8XAL	-WLWO	Cincinnati, Ohio	10 kW Crosley Co; relay WLW

There were also two Chicago stations, W9XAA and W9XF, one of which relayed WCFL of the Chicago Federation of Labor.



Program Schedule - Crosby Corporation

Station WLW	-	50,000 watts	-	700 Kilocycles	-	428.3 Meters
Station W8XO	-	500,000 watts	-	700 Kilocycles	-	428.3 Meters
Station WSAI	-	5,000 watts	-	1,330 Kilocycles	-	225.4 Meters
		1,000 watts	-	Night		
Station W8XNU	-	1,000 watts	-	25,950 Kilocycles	-	11.5 Meters

The present operating schedule of WLWO is as follows:

EASTERN STANDARD TIME

Sundays	8:00 A.M. to 6:30 P.M.	11:00 P.M.	to 2:00 A.M.
Mondays	5:45 A.M.		to 2:00 A.M.
Tuesdays	5:45 A.M. to 5:30 P.M.	11:00 P.M.	to 2:00 A.M.
Wednesdays	5:45 A.M. to 5:30 P.M.	8:30 P.M.	to 2:00 A.M.
Thursdays	5:45 A.M.		to 2:00 A.M.
Fridays	5:45 A.M. to 5:30 P.M.	11:00 P.M.	to 2:00 A.M.
Saturdays	5:45 A.M.		to 2:00 A.M.

The major portion of the programs for Station WLWO are relayed from stations WLW and WSAI. Some programs, however, are produced especially for WLWO in the interest of short wave listeners throughout the World.

Miller Publishing NEW

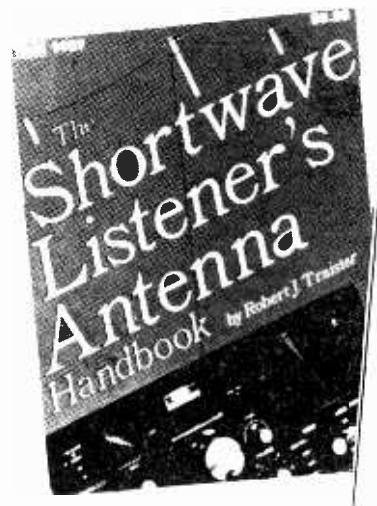
3 Lisa Drive, Thorndale, PA 19372 Phone: (215) 384-8944

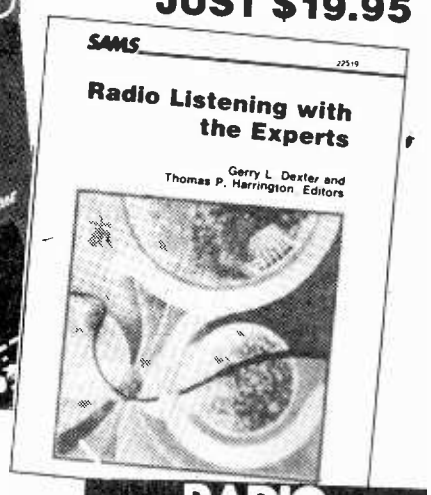
SHORTWAVE LISTENING WITH THE EXPERTS

Finally, a shortwave book that takes you from A-Z. A massive, 500+ page book filled with 25 chapters of information on all aspects of radio monitoring—from "How to Get Started" to antennas, DXing and much, much more by some of the best known names in the business: Magne, Jensen, Helms, Berg and others. It's **the definitive book on shortwave listening**. No SWL or DXer should be without this valuable, informative, new shortwave book. Paperback just $19.95.

THE SHORTWAVE LISTENER'S ANTENNA HANDBOOK

Even the most sophisticated receiver can only pick up 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. 204 pages. Just $10.95.





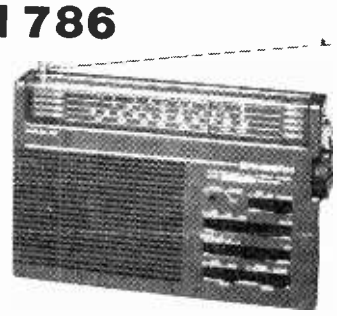
JUST $19.95

THE EAVESDROPPER ANTENNA JUST $55.00 POSTPAID

Our sale on the Eavesdropper has been so popular that we've decided to extend it. But for how long, we can't say. The 1986 World Radio TV Handbook says about the Eavesdropper: "The Best . . . Made the way an antenna should be." Only 40 feet long, the Eavesdropper comes completely assembled and ready to use. Constructed of heavy, 14-gauge antenna wire, it includes 100 feet of transmission line (to connect the antenna to your radio) and can be installed either outside or in. Specially tuned trap circuits bring you the best reception for whatever band you're listening to. Peak performance on 11, 13, 16, 19, 25, 31, 41, 49 and 60 meters. And it's made in the U.S.A.! Get the most out of your receiver with the best trap dipole antenna—the Eavesdropper! Not available outside North America.

$49.95! SANGEAN 786

Amazing! Continuous shortwave coverage from 2.3 to 26.1 MHz plus AM and FM, all in a package the size of a paperback book! And it weighs in at under a pound. A handsome little radio that's great for basic listening, taking on trips or for introducing friends to the exciting world of international radio. Uses 4 "AA" batteries or optional 6v adapter ($9.95). Take the world of shortwave with you—or give it to a friend—with the inexpensive new Sangean 786 from Miller Publishing.



JUST $12.90

1987 RADIO DATABASE INTERNATIONAL

IT'S HERE AND WE'VE GOT IT!

On September 12, 1986, the first editions of the new, 1987 Radio Database International book will roll off the presses—and we'll be there to pick up your copy and mail it to you that same day. Radio Database International is the **ultimate** frequency guide to the shortwave bands and with it's computer-generated graphics, high accuracy and reliability, it was the smash hit of '86. Reserve your copy today and get it first, fast from Miller Publishing. Just $12.90.

THE COMPLETE SHORTWAVE LISTENER'S HANDBOOK - 3RD EDITION JUST $16.45

The classic Hank Bennett & Harry Helms shortwave sourcebook has finally been updated in this new, completely revised edition. A best seller for over a decade, the Complete Shortwave Listener's Handbook is designed to acquaint the reader with all aspects of the SWL hobby. Whether you're an "old timer" at the radio dials or about to discover the hobby for the first time, you'll want to have this book by your receiver! 304 pages. Paperback just $16.45; hardback only $23.95.

RESERVE YOUR COPY TODAY! 1987 WORLD TV HANDBOOK JUST $15.99 REGULARLY $19.95 SAVE $4.00!

It's not getting older, it's getting better! The 41st annual edition of this authoritative directory of world radio and TV continues in the proud tradition of previous years. Over six hundred pages of station names, address, broadcast schedules and other information. No wonder it's called the "bible" of international radio!
Ships January, 1987. Save $4.00. Just $15.99.

MILLER PUBLISHING U.S. MILITARY COMMUNICATIONS

The U.S. Military is on shortwave. All over the bands. Find out how to tune it in with this exhaustive series of books by Michiel Schaay. Three big volumes available for a total of just $38.50.

GREAT BUYS LOW PRICES

BASIC RADIO ELECTRONICS

A unique all-in-one introduction to radio electronics for the hobbyist from the early days of experimentation to solid-state construction projects. 352 pages. #1542 (paperback) just $14.95.

BROADCASTING AROUND THE WORLD

William E. McCavitt's classic sourcebook for information on broadcasting around the world. 336 pages. Hardback only just $22.95.

RADIO RECEIVER—CHANCE OR CHOICE

Reviews of over 60 radio receivers from around the world. 224 pages. Just $18.50.

LOW PRICES AND WE PAY SHIPPING

ACROSS THE BACK FENCE

Shortwave is the world's largest source of news. Across the Back Fence, by Gerry Dexter, examines the medium as a news source, looking at the sources used by international broadcasters, their accuracy and use of propaganda as well as comparing the output of several stations on a single day. In addition, you'll find stations, times and frequencies, for all the news you'll need to get a well-rounded view of your world. Just $8.95 paperback.

AM Stereo and TV Stereo

By Stan Prentiss. The guide to the brave new world of AM stereo and TV stereo. Where is it going and how does it work. Fascinating reading! 192 pp., 103 illus. T#1932. Just $12.95

BROADCASTING AROUND THE WORLD

William E. McCavitt's classic sourcebook for information on broadcasting around the world. 336 pages. Hardback only just $22.95.

GUIDE TO UTILITY STATIONS

Joerge Klingenfuss's big, new 4th edition! Over 15,000 frequencies, including RTTY stations. An ugly cover (orange!) but the best utility guide ever. Just $21.95.

HOW TO REPAIR OLD TIME RADIOS

The classic "how to" book for putting antique and old-time radios back into like-new condition. 252 pages and tons of illustrations. #1230. Just $8.95.

CLANDESTINE CONFIDENTIAL

A lightweight and easy-reading guide to shortwave's dark underbelly. Revolutionary movements, rebels, and crazies take to the shortwave bands to make their cause known. Just $4.95. This book available only in combination with any other book.

WORLD BROADCAST STATION ADDRESS BOOK

Addresses for over 1,200 broadcast stations throughout the world. Includes how-to-information on QSLing, and rating system for station's response rate to reception reports. 128 pages. Just $8.95.

SECRETS OF SUCCESSFUL QSLING

Gerry Dexter's highly acclaimed "how to" book on QSLing. "Mr. QSL" puts his 40 years of experience to work for you with tips on how to increase your success rate, tricks and techniques of follow-up, reporting codes, little known "pull-out-all-the-stops" techniques. Just $9.95.

Price includes shipping. Books are non-returnable except for damaged copies which must be reported to and acknowledged by the shipping agent at time of receipt. Prices subject to change without notice. We reserve the right to limit quantities and all that stuff.

Shipping is free in North America. All others add $2.00 surface mail, $7.50 airmail per book. All payment in U.S. Dollars, Int'l. money orders or U.S. $ checks drawn on banks with American branches.

Great Prices, and We Pay Shipping!

Please send me the following:

_____

_____

_____

_____

_____

Name _____

Address _____

City _____

State/Prov _____

Zip _____

Enclosed is a check or money order for $_____. Checks should be made payable to Miller Publishing and sent to 3 Lisa Drive, Thorndale, PA 19372.

TeleCheck

Want to get that order even faster?

Your personal check is always welcome at Miller Publishing. And no delays while we wait for your check to clear with Telecheck! To qualify for Telecheck same-day shipping. simply add your driver's license number and state to your check.

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

The MT Monitoring Team

West Coast:
Gunner Danneels
Jim Young, CA

East Coast:
Joe Hanlon, PA
Greg Jordan, NC

Midwest:
Rich Foerster, NE

0000 UTC [8:00 PM EST/5:00 PM PDT]

0000-0015		Voice of People of Kampuchea	9693, 11938
0000-0025		Radio Tirana, Albania.....	7065, 9760
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..	9570, 9605
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**
			15355, **17765**
			9910, **11715**
0000-0100		All India Radio.....	
0000-0100		CBC Northern Quebec Svce....	**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	TES	KSDA, Guam (AWR).....	15115
0000-0100	TES	KVOH, California.....	15250
0000-0100		KYOI, Saipan.....	15405
0000-0100		Radio Australia.....	**15160**, 15240
			15320, 15395
			17795
0000-0100		Radio Baghdad.....	11750
0000-0100		Radio Beijing,China.....	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.....	**5940**, **6170**
			7115, **7185**
			7195, **7215**
			7310, **13665**
			15425, **15590**
			9700, **11720**
0000-0100		Radio Sofia Bulgaria.....	9650, **9665**
0000-0100		Radio Thailand.....	11905
			9740
0000-0100		Radio Veritas, Philippines..	11780, 15150
0000-0100		Radio New Zealand Int'l....	**6090**
0000-0100		RTL Luxembourg.....	**6125**, **9630**
0000-0100		Spanish Foreign Radio, Spain	**5995**, **6125**
0000-0100		Voice of America.....	**6130**, **9455**
			9650, **9775**
			11580, **11680**
			11740, **15205**
			15290, 17740
0000-0100		WHRI, Indiana.....	**11770**
0000-0100		WRNO Worldwide.....	**7355**
0000-0100		WYFR, Florida.....	**15365**, **15440**
0015-0100		AWR, Costa Rica.....	**15460**
0030-0100		BBC, England.....	**5975**, **6005**
			6075, **6120**
			6175, **7325**
			9515, **9590**
			9915, 11750
			5910, **9925**
0030-0055		BRT, Belgium.....	**9870**, **11910**
0030-0100		HCJB, Ecuador.....	**15155**
			15340
0030-0100	(A)	KTWR, Guam.....	3285
0030-0100		Radio Belize.....	**7205**, **9685**
0030-0100		Radio Kiev, Ukrainian SSR...	**11790**, **13605**
			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.....	**6150**, 9605
			11845

0100 UTC [9:00 PM EDT/6:00 PM PDT]

0100-0115		All India Radio.....	6035, 7215
			9595
0100-0115		Vatican Radio.....	**6015**, **9605**
			11845
0100-0120		RAI, Italy.....	9575, 11800
0100-0125		Kol Israel.....	5885, **7465**
			9435
0100-0130		HCJB, Ecuador.....	**9870**, **11910**
			15155
0100-0130		Radio Berlin International..	**6080**, **9730**
0100-0130		Radio France International.	15350
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**
			15425
0100-0200		ABC, Perth, Australia.....	**6030**, **11790**
0100-0200		Armed Forces Radio and TV...	**15355**
			5975, **6006**
0100-0200		BBC, England.....	**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.....	11930
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.....	**5920**, **5940**
			6170, **7115**
			7185, **7195**
			7215, **7310**
			7440
0100-0200		Radio Moscow World Service..	7130, 7315
			11720
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.....	9680
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**
0130-0200		Radio Tirana Albania.....	7120, 9760
0145-0200		Radio Korea.....	6480, 7275

0200 UTC [10:00 PM EDT/7:00 PM PDT]

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		Radio Austria International.	6155
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**, **9725**
			9885, **11925**
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.....	5980, **6015**
			9615
0200-0300		ABC Perth, Australia.....	15425
0200-0300		Armed Forces Radio and TV...	**6030**, **11730**
			11790, **15355**
0200-0300 (S)		CBC Northern Quebec Service.	6195
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 TES		KSDA, Guam (AWR).....	15115
0200-0300 TEN		KVOH, California.....	11930
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
			11810, 11940
0200-0300		Radio Cairo, Egypt.....	**9475**, 9675
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.....	**6100**, **6140**
			9740
0200-0300		Radio Japan.....	15420, **15195**
			17825
0200-0300		Radio Korea, South.....	11810
0200-0300		Radio Moscow.....	**6070**, **7115**
			7185, **7195**
			7215, **7310**
0200-0300		Radio Nacional do Brasil...	**11745**
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**,
			9465, 9575
			9650, **9670**

frequency SECTION

			9775, 11580
			11680, 11720
0200-0300		Voice of Asia, Taiwan.....	7285
0200-0300		Voice of Free China, Taiwan.	5985, **9555**
			11740
0200-0300		WHRI, Indiana.....	9680
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
			9515, 9915
0230-0300		CBC Northern Quebec Service.	6195
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.....	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 **[11:00 PM EDT/8:00 PM PDT]**

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, 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...	7165, **7175**
			7250, 11790
			13605
0300-0330	(T-A)	Radio Portugal.....	9565
0300-0330	(S,M)	WINB, Pennsylvania.....	**15145**
0300-0350		Deutsche Welle, West Germany	6010, **9545**
			9640
0300-0350		Radio Berlin International..	**9560**
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	TES	KSDA, Guam (AWR).....	17840
0300-0400	TEN	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.....	**9640**, 11860
			11970, **15180**
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.....	**7355**
0300-0400		Radio Havana Cuba.....	**6090, 6100**
			6140, 9740
0300-0400	(M)	World Music Radio.....	6910
0300-0400		Radio Moscow, U.S.S.R.....	**5920, 5940**
			6000, 6070
			6170, 7165
			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, 9455
			9575, 9650
			9740, 9775
			11580, 11680
0300-0400		Voice of Free China, Taiwan.	**5985**, 6065
			9680, 11745
0300-0400		Voz Evengelica, Honduras....	4820
0300-0400	(M)	WHRI, Indiana.....	**7355**
0300-0400		WRNO Worldwide.....	**6185**
0305-0400	(A)	Radio Austria International.	5945, **6055**
			6155
0310-0330		Vatican Radio.....	**6150**
0315-0330		Radio France International..	**6005, 6175**
			7135, 9535
			9600, 9790
			9800
0330-0400	(M)	CBC Northern Quebec Service.	6195, **9625**
0330-0400		BBC, England.....	**5975, 6175**
			9410
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**
0335-0340		All India Radio.....	3905, 4860
			9545, 9610
			11830, 11895
0340-0400		Voice of Greece.....	7430, 9420
0345-0400		Radio France International..	6055, 6175
			7135, 9535
			9550, 9800
			97901
0345-0400		Radio New Zealand Int'l.....	9620, 9645
			11705
0350-0359		Radio Yerevan,Armenian SSR	**11790, 13605**
			15180

0400 UTC **[12:00 AM EDT/9:00 PM PDT]**

0400-0410		Voice of Kenya.....	6090
0400-0415		Radio Budapest.....	**6110, 9520**
			9835
0400-0415		Radio Cultural, Guatemala...	3300
0400-0426		Radio RSA, South Africa.....	**3230, 4990**
			7270, 9585
0400-0430		BBC, England.....	**5975, 6175**
			7160, 12095
			15420
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		TWR 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
			11790, 17765
0400-0500		BBC, London, England.....	**6005, 7105**
			7160
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
0400-0500		Radio Beijing.....	15280
0400-0500		Radio Belize.....	**3285**
0400-0500	(T-S)	Radio Dublin International..	**6910**
0400-0500		Radio Havana Cuba.....	**5970, 6090**
			6100, 6140
			9740
0400-0500		Radio Japan.....	**9595, 9675**
0400-0500		Radio Moscow.....	7155, 9500
			11770, **12030**
0400-0500		Radio Moscow World Service.	**5920, 5940**
			6000, 6170
			7165, 7775
			7185, 7270
			7310, 9635
			9765, 11790
			12050
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**
			7170, 7280
			9575, 9670
			15205
0400-0500		Voice of Turkey.....	**9560**
0400-0500		WHRI, Indiana.....	7400
0400-0500v	(M)	World Music Radio.....	6910
0400-0500		WRNO Worldwide.....	**6185**
0415-0430		Radio France International..	6055, 6175
			7135, 9535
			9550, 9790
			9800
0425-0450		RAI, Italy.....	5980
0430-0455		Radio Tirana Albania.....	7300, 9480
0430-0500		BBC, England.....	**5975, 6005**
			7160, 9510
0430-0500		Deutsche Welle, W. Germany..	7150, 7225
			9565, 9765
0430-0500		Radio Austria International.	6155, **9755**
0430-0500		Radio Berlin International..	**9560, 9620**
0430-0500		Radio Netherlands.....	9895, 11720
0445-0500		Radio France International..	6055, 6175
			7135, 9535
			9550, 9790
			9800

0500 UTC **[1:00 AM EDT/10:00 PM PDT]**

0500-0505		Radio Belize.....	3285
0500-0510		Radio Lesotho.....	4800
0500-0515		Deutsche Welle.....	5960, 6065
			6120, 6130
			7150, 7225
			9565, 9700
			9765
0500-0515		Kol Israel.....	7410, 9009
			9435, 9860
			11610, 11960
			21710
0500-0515		Vatican Radio.....	11725, 15190
0500-0525		Radio Netherland.....	9895, 11720
0500-0530		Capital Radio, S. Africa....	3930
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
0500-0545		Radio Havana Cuba.....	**5970, 6090**
			6100, 9740
0500-0550		Deutsche Welle.....	5960, **6120**
			6130, 9700
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		BBC, London.....	**5975**, 6005
			6175, 7105
			7160, 9410
			9510, 9600
			9825, 12095
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		Kol Israel.....	**11610**
0500-0600	TEN	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 Japan General Service.	**9675**, 15235
			17810
0500-0600		Radio Korea World News Svc..	7275
0500-0600		Radio Moscow.....	**5905**
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		VLW 15, Lyndhurst,Australia	15230
0500-0600		VLW 15, Waneroo, Australia.	**15425**
0500-0600		Voice of America.....	**5995, 6035**
			7170, 7200
			9575, 9670
			11925, 15205
0500-0600		Voice of Nicaragua.....	**6015**
0500-0600		WHRI, Indiana.....	**7400**

frequency SECTION

0500-0600v (M)	World Music Radio.....	6910
0500-0600	WRNO Worldwide.....	6185
0530-0600	Radio Cameroon.....	4850
0530-0600	Radio Netherland.....	**6165, 9715**

0600 UTC **[2:00 AM EDT/11:00 PM PDT]**

0600-0605	Radio Ghana.....	**4915**
0600-0610	Voice of Kenya.....	**4808,** 6090
0600-0620	Vatican Radio.....	**6185, 9645**
0600-0625	Radio Netherland.....	**6165, 9715**
0600-0630	AWR, Italy.....	**6185**
0600-0630	Deutsche Welle.....	7290, 9625
		9700
0600-0700	Armed Forces Radio and TV...	**6030,** 15330
		17765
0600-0700	BBC, London.....	**5965, 5975**
		6175, 7150
		7185, 7120
		9510, 9600
		9825, 9915
0600-0700 (S)	BBS, Bhutan.....	**6035**
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, Accra, Ghana.....	3366
0600-0700	HCJB, Quito, Ecuador.....	**6230, 9870**
		11910
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, 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
		9880, 21810
0615-0655 (A,S)	BRT, Belgium.....	6140, 7155
0615-0630 (M-F)	Radio Canada International..	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.....	7080, 9500
0630-0700	Swiss Radio International...	3985, 6165
		9535, 9870
		12030, 15430
0645-0700 (M-F)	HCJB, Quito, Ecuador.....	6205
-0645-0700	Radio Bucharest, Romania...	11940, 15250
		15335, 17790
		17805, 21665

0700 UTC **[3:00 AM EDT/12:00 AM PDT]**

0700-0712	Radio Bucharest, Romania...	11940, 15250
		15335, 17790
		17805, 21665
0700-0725	Radio Tirana Albania.....	9500, 11985
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 (S)	BBS, Bhutan.....	**6035**
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, Accra, Ghana.....	3366
0700-0800	HCJB.....	**6205, 9745**
		9845
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.....	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
		9550, 9670
		5985
0700-0800	Voice of Free China.....	6175, 9750
0700-0800	Voice of Malaysia.....	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.....	9410, **9510**
		12095, 15070
0730-0800	KTWR, Guam.....	11735, 15115
0730-0800	Radio Finland.....	6120, 11755
		15265
0730-0800	Radio Netherlands.....	**9630,** 9715
0730-0800	Radio Prague.....	11855, 17840
		21705

0800 UTC **[4:00 AM EST/1:00 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	Radio Bangladesh.....	11645, **12030**
0800-0830	HCJB, Quito, Ecuador.....	**6130, 6205**
		9745, 9860
0800-0830	Voice of Nigeria.....	7255, 15185
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
0800-0900		21475
0800-0900	FEN, Tokyo.....	**3910, 6155**
0800-0900 (S,A)	GBC, 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	KTWR, Guam.....	11735
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
		9670
0800-0900	RTE Portugal.....	5010, 11940
0800-0900	SBC Radio 1, Singapore.....	7105
0800-0900	TWR Monte Carlo.....	11790, 15150
0800-0900	Voice of Indonesia.....	**7355**
0800-0900	WHRI, Indiana.....	**6185**
0800-0900 (S)	WRNO Worldwide.....	6000, 6155
0830-0900	Radio Austria Int'l.....	11915, 15410
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, 11745
		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 **[5:00 AM EDT/2:00 AM PDT]**

0900-0905	Africa Number One, Gabon....	7200, 15200
0900-0915	BBC, London.....	**9410, 9510**
		9750, 11750
		11860
0900-0915 (S)	Radio Austria International.	6000, 6155
		11915
		17575, 21485
0900-0925	Radio Netherlands.....	**5995, 6080**
0900-0930	Radio Australia.....	**9580, 9655**
		9710, 11720
		7275
0900-0930	Radio Korea.....	9765, 11830
0900-0950	Radio Pyongyang N. Korea....	13650
		4920, 9660
0900-1000	ABC, Brisbane, Australia....	9670
0900-1000 (S)	Adventist World Radio.....	**6030, 6125**
0900-1000	AFRTS.....	**9530, 9590**
		9700
0900-1000	Deutsche Welle.....	**9690,** 11945
		15160, 15185
		15205, 15320
		17780, 17800
		21560
0900-1000	FEBC, Manila.....	11890, 2147
0900-1000	FEN, Tokyo.....	**6155**
0900-1000	HCJB, Quito, Ecuador.....	**6130, 974**
		11925
0900-1000	King of Hope, Lebanon.....	6280
0900-0100	KNLS, Anchor Point, Alaska.	11850.
0900-1000	KSDA, Guam.....	**15440**
0900-1000	Radio Afghanistan.....	6085, 959
		15255, 1765
0900-1000	Radio Japan.....	**9675, 1187**
		11955, 152
		17810
		9795
0900-1000	Radio Moscow.....	9600, 1178
0900-1000	Radio New Zealand Int'l....	9685v
0900-1000	Radio Tanzania.....	6055, 950
0900-1000 (S)	Radio Prague.....	11990
0900-1000	SBC Radio 1, Singapore.....	5010, 119
0900-1000	Voice of Nigeria.....	7255, 151
		15185, 178
0900-1000	WHRI, Indiana.....	**7355**
0900-1000 (S)	WRNO Worldwide.....	**6185**
0915-1000	BBC, London.....	**9760, 97**
		11750
0930-1000	Radio Australia.....	9580, 96
		9710

frequency SECTION

1000 UTC **[6:00 AM EDT/3:00 AM PDT]**

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, 11745, 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
1030-1100		Radio Australia.....	**9580**
1030-1100		Radio Budapest Hungary.....	9835, 11910, 15160, 15220, 17710, 21665
1030-1100		Radio Netherland.....	**6020, 9650**
1030-1000		Radio New Zealand.....	6100, 9620
1030-1100		Sri Lanka Broadcasting Corp	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 **[7:00 AM EDT/4:00 AM PDT]**

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..	11795, 15570, 15585, 17830
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, 9590**, 9700, 11805, 15430
1100-1200		BBC, London.....	**5965, 6195**, 9410, **9510**, **9740**, 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**, 9640, 9820
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...	**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 **[8:00 AM EDT/5:00 AM PDT]**

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		Radio Tashkent.....	7325, 9600, 9715, 15460
1200-1230		Swiss Radio International...	6165, 9535, 12030
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**
1200-1300		AFRTS.....	**6030, 9700**, 15330, 15430, 21670
1200-1300		BBC, London.....	5965, 6195, **9510, 9740**, **11710, 11750**, **15070, 17790**
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**, 6045, **6060, 6080**, **7205, 9580**, **9770**
1200-1300		Radio Beijing.....	**9535**, 9640, 9820
1200-1300		Radio Korea World News Svc..	7275
1200-1300		Radio Moscow.....	**9600**, 9795, **11675, 13615**, **13665, 13690**
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
1200-1300		WHRI, Indiana.....	**5995**
1200-1300	(S)	WRNO Worldwide.....	9715
1200-1300		WYFR, Louisiana.....	**5985**, 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**
1230-1235		All India Radio.....	3905, 4800, 4920, 7280, 9565, 9615, 11620, 15245
1230-1300		Radio Austria International.	6000, 6155, 11915, 11955
1230-1300		Radio Australia.....	**15320, 17655, 17800**
1230-1300		Radio Bangladesh.....	15525
1230-1300		R. Berlin Intl,E.Germany	**15240**
1230-1300		Radio Polonia.....	9525, 9675, 11840, 15120
1230-1300		Radio Sweden Int'l.....	9565, 11940
1230-1300		Radio Tirana.....	9555, 11960
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, 15405, **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 **[9:00 AM EDT/6:00 AM PDT]**

1300-1315		Voice of Islamic Rep,Iran	**11895, 15085**
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.	6040, 15245, 15310, 17770
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.....	9700, **11805**, 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		KTWR, Guam.....	9870
1300-1400		NBC, Port Moresby, Papua New Guinea.....	**4890**
1300-1400		Radio Australia.....	5995, 6060, 9580
1300-1400		Radio Beijing.....	**4460, 5320, 5860, 5880**, 9550, 9730, 11660, 11755
1300-1400		Radio Canada International.	**11955**, 17820
1300-1400		Radio Moscow.....	**11840, 13615, 13665, 13680, 13790, 15210, 15225, 15375, 15475, 15530, 15540, 15595, 17655**
1300-1400		Radio RSA, South Africa....	15220, 21535, 21590

frequency SECTION

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.....	7123v	
1330-1400	BBC, London.....	**12905,**	**15070**
		17790,	**17885**
1330-1400	BBS, Bhutan.....	**6035**	
1330-1400	Radio Korea World News Svc.	15575	
1330-1400	Radio Tashkent.....	**7325,**	9715
		15460	
1300-1400	Swiss Radio International..	**12030,**	15570
		15585,	17785
		17830	
1330-1400	U.A.E. Radio.....	**11940,**	17775
		17865,	21605
1330-1400	Voice of Vietnam.....	10040,	15010v
1330-1400	Radio Austria International	11935	
1330-1400	WYFR, Florida.....	15055	
1330-1355 (M-F)	BRT, Belgium.....	**15580,**	**15590**
1337-1400 (A)	TWR, Bonaire.....	11815	
1345-1400	Vatican Radio.....	7250,	9645
		11740	

1400 UTC	**[10:00 AM EDT/7:000 PDT]**		
1400-1415	GBC, Accra, Ghana.....	7295	
1400-1415	U.A.E. Radio, Dubai.....	11955,	17775
		21605,	21695
1400-1430	Radio Australia.....	**5995,**	6035
		6045,	**6060**
		6080,	**9580**
		9710	
1400-1430	Radio Finland.....	**15400,**	17800
1400-1430	Radio Japan General Service.	5990,	7140
		9675,	**9695**
		11815	
1400-1430 (S)	Radio Norway International.	15245,	15300
		15310	
1400-1430	Radio Polonia.....	6095,	7285
1400-1430	Radio Sweden International.	11785,	**15345**
1400-1430	Radio Tirana.....	9500,	11985
1400-1500	ARFTS.....	**9700,**	**11805**
		15330,	**15430**
1400-1500	All India Radio.....	11810,	15335
1400-1500	BBC, London.....	**7105,**	**9740**
		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.....	**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
1400-1500	Radio Korea, South.....	9570,	**9750**
		15575	
1400-1500	Radio Moscow.....	**6020,**	**6050**
		7160,	**7265**
		9580,	**11840**
		12025,	**13615**
		13665,	**13680**
		13790,	**15225**
		15375,	**15475**
		15585,	**15595**
1400-1500	Radio Pyongyang,N.Korea.....	**9555,**	**9750**
1400-1500	Radio RSA, South Africa.....	9585,	15220
		21535	
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 (S)	WRNO Worldwide.....	11965	
1400-1500	WYFR, USA.....	**11830,**	**11875**
1400-1500	Voice of America.....	**6110,**	**7230**
		9760	
1400-1500	Voice of Nigeria.....	7255,	15120
1415-1430	KTWR, Guam.....	9820	
1415-1500 (S,A)	GBC, Accra, Ghana.....	7295	
1415-1500	Radio Berlin Int'l.....	11795,	15445
		17700	
1430-1445	Vatican Radio.....	11865,	15115
		17845,	

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
1445-1500	Radio Vatican.....	**15090**	
1445-1500	Radio Ulan Bator, Mongolia..	9575	

1500 UTC	**[11:00 AM EDT/8:00 AM PDT]**		
1500-1505	Africa #1, Gabon.....	**15200**	
1500-1520	Radio Ulan Bator Mongolia...	9615,	12015
1500-1530	HCJB, Quito, Ecuador.....	**11740,**	**15115**
		17890	
1500-1530	Radio Austria International.	6000,	6155
		12015,	15420
1500-1530	Radio Bucharest.....	11940,	15250
		15335	
1500-1530	Radio Canada Intl.....	**17825**	
1500-1530	Radio Japan.....	**6120**	
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
1500-1556	Radio RSA, South Africa.....	**7270,**	**15220**
		17780	
1500-1600	AFRTS.....	**9700,**	**11805**
		15330,	**15430**
1500-1600	BBC, London.....	6195,	**7105**
		11750,	**15400**
		17705,	**12095**
		15070,	**11260**
		17885,	21660
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 Japan General Service.	5990,	11815
		15310,	**21700**
1500-1600	Radio Moscow.....	**5905,**	**5950**
		6020,	**11840**
		13790	
1500-1600	RTM, Sarawak, Malaysia.....	4950	
1500-1600	SBC Radio 1, Singapore.....	**5010,**	**5052**
		11940	
1500-1600	Sri Lanka Broadcasting Corp.	6075,	9720
		15425	
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**	
1530-1545	Radio Bangladesh.....	7195	
1530-1600 (M-A)	Radio Budapest Hungary.....	9835,	11910
		15160,	15220
		17710,	21665
1530-1600	R. Prague, Czechoslovakia..	**11730,**	**11990**
		13715,	**15110**
		15205	
1530-1600	Radio Yugoslavia.....	9620,	15240
1530-1600	Swiss Radio International..	**15305**	
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,	15120
		17730	

1600 UTC	**[12:00 PM EDT/9:00 AM PDT]**		
1600-1605	SBC Radio 1, Singapore.....	11940	
1600-1615	Radio Pakistan.....	9645,	11675
		11735,	11925
		15515,	15595
		17660	
1600-1630	Radio Budapest Hungary.....	7220,	9585
		9835,	11910
		12000	
1600-1630 (S)	Radio Norway International..	9510,	11925
		17840	
1600-1630	Radio Polonia.....	6135,	9540
1600-1630 (M-F)	Radio Portugal.....	15105,	15330
1600-1630	Radio Sweden Int'l.....	15110	
1600-1630	Voice of Vietnam.....	10040,	15010
1600-1645	TWR, Swaziland.....	3200	
1600-1700	AFRTS.....	**9700,**	**11805**
		15330,	**15430**
1600-1700	BBC, London.....	**7105,**	**9740**
		11775,	**12095**
		15070,	**15260**
		15400,	**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,	17820
1600-1700	Radio France International..	6175,	**9860**
		11705,	**17620**
		17795	
1600-1700	Radio Jordan.....	9560	
1600-1700	Radio Korea.....	**5975,**	**9870**
1600-1700	Radio Malawi.....	3380,	5995
1600-1700	Radio Moscow.....	**11840,**	**13790**
		15375	
1600-1700	Radio Prague, Czech.....	**17705**	
1600-1700	Radio Riyadh, Saudi Arabia..	9720v	
1600-1700	Radio Tanzania.....	6105	
1600-1700	Radio Zambia.....	9505	
1600-1700	UAE Radio.....	**11955,**	**15320**
		15435	
1600-1700	Voice of America.....	6110,	**9575**
		9760,	11920
		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.....	**11965**	
1600-1700	WYFR, Florida.....	**11580,**	**11830**
		11875,	17845
1610-1620 (M-F)	Radio Botswana.....	4820,	7255
1610-1645	Radio Belem.....	3205	
1630-1655 (M-F)	BRT Belgium.....	**11695,**	**15515**
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	R. Peace and Progress USSR.	11690,	11755
		11865,	12045
		13660,	15140
1630-1700	Radio Polonia.....	7125,	9525
1630-1700	Voice of Africa, Egypt.....	15255	
1630-1700	WYFR, Florida.....	**9535,**	**11830**
1645-1700	Radio Pakistan.....	6230,	9455
		9465	
1645-1700	WYFR, Florida.....	**15566,**	17640
		21525	

1700 UTC	**[1:00 PM EDT/10:00 AM PDT]**		
1700-1710	Voice of Lebanon.....	6548	
1700-1720	Radio Netherland.....	6020,	**9515**
1700-1730	BBC, England.....	**3955,**	**7105**
		9740,	**11775**
		11955,	**12095**
		15070,	**15260**
		15400,	**17880**
1700-1730	Radio Australia.....	6035,	6060
		7205	
		5990,	**11815**
1700-1730	Radio Japan.....	9655,	11925
1700-1730	Radio Norway International..	15310	
		15250	
1700-1730	Radio Portugal.....	3985,	6165
1700-1730	Swiss Radio International...	9535	
		4930	
1700-1800	4VEH, Haiti.....	**9700,**	**11805**
1700-1800	AFRTS.....	**15330,**	**15345**
		15430	
1700-1800	CBC, N. Quebec, Canada....	**9625**	
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	

frequency SECTION

1700-1800		Radio Beijing.....	**9570, 11600**
1700-1800		Radio Korea, South.....	5975, 15575
1700-1800		Radio Moscow.....	**9825, 11840**
			15375
1700-1800	(MWF)	Radio Nacional, Eq.Guinea	9535
1700-1800		Radio Nacional Angola.....	7245, 9535
			11955
1700-1800		Radio Portugal.....	15250
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.....	**9575, 10445**
			11920, 15410
			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.....	15110
1700-1800		WRNO Worldwide.....	**15420**
1700-1800		WYFR, Florida.....	**9535, 11580**
			11830, 11875
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
1730-1800		Spanish Foreign Radio.....	6020, 7275
			9765
1745-1800		BBC, London.....	**9410**, 11745
			12095, 15070
			15260, 15400
1730-1800		Radio Sofia, Bulgaria.....	11735, 11840
			15310
1745-1800		SLBC, Sri Lanka.....	**11800**

1800 UTC	[2:00 PM EDT/11:00 AM PDT]	
1800-1810	Voice of Kenya.....	6135
1800-1815	Kol Israel.....	**13747**
1800-1815	Radio Cameroon.....	4750, 4795
		4850, 5010
		9745
1800-1830	AWR, Italy.....	6205
1800-1830	Radio Canada International.	**15260, 17820**
1800-1830	Radio Japan.....	7250, **9675**
1800-1830	Radio Kiev.....	7175, 7330
		9560, 9710
1800-1830	Radio Mozambique.....	3340, 9620
1800-1830 (M-F)	Radio Portugal.....	15250
1800-1830	TWR, Monte Carlo.....	11965
1800-1900	Voice of Africa, Egypt.....	15255
1800-1830	Voice of Vietnam.....	10040, 15010v
1800-1900	Deutsche Welle.....	7285, 9700
		9735, 11785
1800-1850	Radio Nacional do Brasil...	15155
1800-1900	4VEH, Haiti.....	4930
1800-1900	AFRTS.....	**15330, 15345**
		15430, 17765
1800-1900	All India Radio.....	11940, 15280
1800-1900	BBC, London.....	**3955**, 7325
		9410, **9740**
		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 TEN	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 TEST	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.....	**9825, 11840**
		15375
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
1800-1900	Voice of Nigeria.....	**15600, 17785**
		17870, 17800
1800-1900	Voice of Nigeria.....	11770, 15120
		17800
1800-1900	WHRI, Indiana.....	**15105**
1800-1900	WINB, Pennsylvania.....	**15400**
1800-1900	WRNO Worldwide.....	**15420**
1800-1900	WYFR, Florida.....	9535, **11580**
		11830, 11875
1805-1830 (A,S)	Radio Austria International.	5945, 6000
1814-1817	Radio Suriname Int'l.....	17755
1815-1900	Radio Bangladesh.....	6240, 7505
1815-1900	Radio Berlin International..	6080, 6115
1830-1855 (M-A)	BRT Brussels, Belgium.....	5910, **9905**
1830-1855	Radio Finland.....	6120, 9655
		11755
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.....	6065, 15240
1830-1900	Radio Tirana.....	7065, 9480
1830-1900	Swiss Radio International...	9885, 11955
1830-1900	Radio Netherlands.....	6020, 9540
		17605, 21685
1830-1900	Spanish Foreign Radio.....	**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	[3:00 PM EDT/12:00 PM PDT]	
1900-1905	Vatican Radio.....	6190, 6250
		7250, 9645
1900-1915	Radio Bangladesh.....	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.....	11865, 15310
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
1900-2000	BBC, London.....	**3955, 7320**
		9410, 15070
		15400
1900-2000	B.S. Kingdom Saudi Arabia..	11855v
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, 7215
		9580
1900-2000	Radio Beijing.....	9860, 11500
1900-2000 (A,S)	Radio Canada International..	7130, 9555
		11945, 15325
		17875
1900-2000 TEST	R. Discovery, Dominican Rep	15045
1900-2000	Radio Havana Cuba.....	**11795**
1900-2000	Radio Kuwait.....	11675
1900-2000	Radio Moscow.....	**9825, 9875**
		11840, 11860
		13665, 15375
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.....	**15105**
1900-2000	WINB, Pennsylvania.....	15400
1900-2000	WRNO Worldwide.....	**15420**
1900-2000	WYFR.....	**9535, 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 Tirana Albania.....	7075, 9500
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	[4:00 PM EDT/1:00 PM PDT]	
2000-2005	Radio Ghana.....	4915
2000-2005	Radio Ulan Bator Mongolia...	9575, 15305
2000-2010	Vatican Radio.....	6190, 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
		7215, 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..	7130, **9555**
		11945, 15325
		17820, **17875**
2000-2030 (S)	Radio Norway International..	6015, 11865
		15310
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.....	**3955**, 6175
		9410, **9765**
		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.....	11735
2000-2100	King of Hope, Lebanon.....	6280
2000-2100	KNLS, Alaska.....	**7355**
2000-2100 TEN	KVOH, California.....	17775
2000-2100	KYOI, Saipan.....	**9670**
2000-2100	Radio Kuwait.....	**11675**
2000-2100	Radio Moscow.....	**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.....	**11760, 15300**
		15410, 15445
		15580, 17785
		17870
2000-2100	Voice of Turkey.....	7215
2000-2100	WHRI, Indiana.....	15310
2000-2100 (S,A)	WINB, Red Lion, Penna.....	**15185**
2000-2100	WRNO Worldwide.....	**15420**
2000-2100	WYFR, Okeechobee, Florida..	**9535, 11580**
		11830, 11875
		15170, **21525**
2000-2030	Kol Israel.....	**7465, 9435**
		11610, 12077
2005-2100	Radio Damascus Syria.....	7455, **12085**
2010-2100	Radio Havana Cuba.....	17885
2015-2100	ELWA, Liberia.....	11830
2015-2045	RAI, Italy.....	7235, 9575
		11800
2030-2100	Falkland Islands Bcast Svc..	2380 / 3958
2030-2100	IBRA Radio.....	6110

frequency SECTION

2030-2100		Radio Australia.....	6035, 6045, 6080, 7215, 9580, 9620
2030-2100		Radio Beijing.....	6955, 7480, 9440, 9895
2030-2100		Radio Netherland.....	9540, 9715, **9895**, 11740
2030-2100		Radio Polonia.....	6095, 7285
2030-2100	(M-F)	Radio Portugal.....	9740, 11790
2030-2100		Radio Sofia, Bulgaria.....	9700
2030-2100		Radio Tirana, Albania.....	7065
2030-2100		Voice of Africa (Cairo)....	15375
2030-2100		Voice of Nigeria.....	11770
2030-2100		Voice of Vietnam.....	10040, 12020, 15010v
2045-2100		All India Radio.....	7160, 9550, 9665, 9910, 11620, 11870
2045-2100		Vatican Radio.....	9625, 11700, 11760, 15120

2100 UTC [5:00 PM EDT/2:00 PM PDT]

2100-2105		Radio Damascus Syria.....	7455, **9950**
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
2100-2125		Radio Netherland.....	9540, **9715**, **9895**, 11740
2100-2130		Radio Finland.....	6120, 11755
2100-2130		Radio Australia.....	6080, **9580**, 9620, 15160, 15395, 17795
2100-2130		Radio Bucharest, Romania....	6055, 7145, 7195, 9690
2100-2130		Radio Japan General Service.	7140, 9675, **11815**
2100-2130		Radio Sweden International.	11845, 11955
2100-2130		Swiss Radio International...	**9635, 9885**, **12035**
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
2100-2155		BRT, Brussels, Belgium.....	5910
2100-2156		Radio RSA, South Africa.....	7270, 9585, **11775**, **15330, 15345**, **15365, 15430**, **17765**
2100-2200		AFRTS.....	
2100-2200		All India Radio.....	7412, 9665, 9910, 11620
2100-2200		BBC, London.....	**3955, 6175**, **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	(A,S)	KCBI, Texas.....	11735
2100-2200		King of Hope, Lebanon.....	6280
2100-2200		KNLS, Alska.....	**7355**
2100-2200		KSDA, Guam.....	**7160, 11965**, 17775
2100-2200	TEN	KVOH, California.....	9670
2100-2200		KYOI, Saipan.....	7170
2100-2200		Radio Baghdad, Iraq.....	**11960, 15325**, 6155, **7195, 9635**, 11815, 9530, 11840, 13665
2100-2200	(M-F)	Radio Canada International.	9535, 7245, 15106v
2100-2200v		Radio Jamahiriya, Libya.....	9505
2100-2200		Radio Moscow.....	6090
2100-2200	(M-A)	Radio Nacional Angola.....	15375
2100-2200		R. Nacional, Equat. Guinea.	7445 LSB
2100-2200	(F,A)	Radio Zambia.....	9760, **11760**, **15205**, 15410, **15445, 15580**, **17785**, 17800, **17870**
2100-2200		RTL, Luxembourg.....	
2100-2200		Voice of Africa (Cairo)....	
2100-2200		Voice of America.....	
2100-2200		Voice of Asia.....	**7445, 9845**, **11580, 15440**, 17845
2100-2200		Voice of Free China,Taiwan.	
2100-2200		Voice of Nigeria.....	15120
2100-2200		Voice of Turkey.....	7215, **9770**, **11705**
2100-2200		WHRI, Indiana.....	
2100-2200		WRNO Worldwide.....	
2100-2200		WYFR, Okeechobee, Florida..	**9535, 11830**, **11875, 21525**
2105-2200		Radio Damascus, Syria.....	9950, 12085, 9805
2115-2145		Radio Cairo.....	
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.....	**15270, 17790**
2130-2200		KGEI, San Francisco, CA....	15280
2130-2200		Kol Israel.....	9009, **9435**, 9815, **9860**, 11960, **12080**, 13725
2130-2200		Radio Austria International.	5945, 6000, 9670
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.....	11720, 15330
2130-2200		Swiss Radio International...	9590, **9885**
2130-2200		HCJB.....	17795
2145-2200		Radio Berlin International.	**6125**

2200 UTC [6:00 PM EDT/3:00 PM PDT]

2200-2205		Radio Damascus, Syria.....	9950, 12085
2200-2207		Voice of America.....	11740, 15160, 17730, **17775**
2200-2210		Radio Sierra Leone.....	5980
2200-2225		BRT, Belgium.....	**5910**
2200-2225		Radio Tirana Albania.....	7065, 9480
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..	**9590, 9610**
2200-2230		Radio Vilnius, Lithuania SSR	7165, 7400, 9800, 11750, 11860, 15100
2200-2245		Radio Cairo, Egypt.....	9805
2200-2245		WINB, Red Lion, Penna.....	**15185**
2200-2250		Radio Jamahiriya, Libya.....	6155
2200-2250		Voice of Turkey.....	7215, 9535, **9560**, 17725
2200-2300		AFRTS.....	**6030, 11790**, **15330, 15345**, **17765**, 21570
2200-2300		BBC, London.....	**3955**, 5975, **6175, 7320**, **9410, 9590**, **9915, 15260**
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, 11705
2200-2300		Radio Havana Cuba.....	6480, 7550
2200-2300		Radio Korea.....	**7115, 7160**
2200-2300		Radio Moscow.....	**7195, 7310**, **11770, 15245**, **15065**
2200-2300		Radio Pyongyang, N.Korea...	11735
2200-2300		Spanish Foreign Radio.....	5960, 6020, 7105
2200-2300		Voice of America.....	**11775, 15185**, **15290**, 15305, **15415, 15445**, **15580, 17740**, 17775, 17800, **17820**
2200-2300		Voice of Free China, Taiwan.	**9465, 11890**, **9770**
2200-2300		WHRI, Indiana.....	**11705**
2200-2300		WRNO Worldwide.....	**11830, 11855**, 15055, **15445**, 17750, 21525
2200-2300		WYFR, Okeechobee, Florida..	
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.....	**7465, 9435**, **9860**
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
2245-2300		All India Radio.....	6035, 7215, 9595, 9912, 11765
2245-2300		GBC1 Ghana.....	**4915**

2300 UTC [7:00 PM EDT/4:00 PM PDT]

2300-2330		BBC, London.....	5975, **6175**, **7325, 9410**, **9515, 9590**, 9860
2300-2345		Radio Berlin Int'l.....	**6070, 6125**, **6165**
2300-2330		Radio Canada International..	**9755, 11710**
2300-0000		Radio Japan General Service.	7140, **9645**, 9675, 11815, **15235**
2300-2330		Radio Sofia, Bulgaria.....	**11720**
2300-2330		Radio Sweden International..	**9695, 11705**
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.	**9625**, 11720
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.....	7140, **9645**, 9675, 11815, 15235
2300-0000		Radio Kiev, Ukrain, USSR....	**9640**, 9665, 9685, 9800, 11790, 11875, 13605
2300-0000		Radio Korea, South.....	15575
2300-0000		Radio Moscow.....	**7195, 7215**, **7310, 7400**, **13645**
2300-0000		Radio Prague, Czechoslovakia	6055, 9630
2300-0000		Radio Pyongyang, N. Korea..	11735, **13650**, 9650, 11905
2300-0000		Radio Thailand.....	6090
2300-0000		RTL, Luxembourg.....	9640, 11740
2300-0000		Voice of America.....	15160, 15185, **15290**, 17730, 17740, **17820**, **11770**
2300-0000		WHRI, Indiana.....	**9650**
2300-0000		WRNO Worldwide.....	6300, 7485
2300-0000		WYFR, Florida.....	**11830, 11855**, **15365**
2330-0000		BBC, London.....	**5975, 6120**, **6175, 7325**, **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

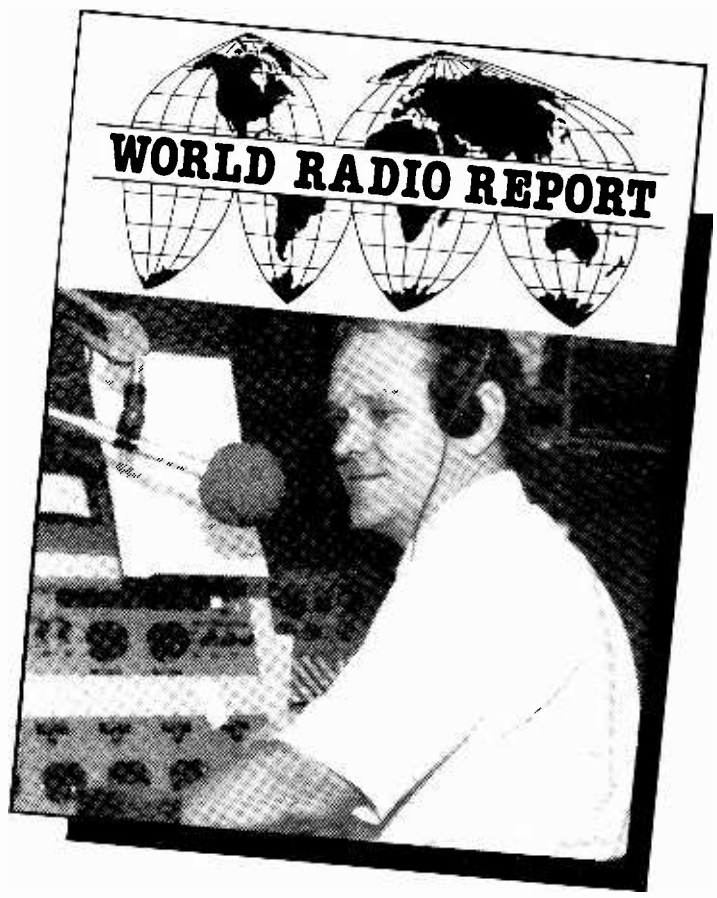
Miller Publishing

3 LISA DRIVE • THORNDALE, PA 19372

NEW MONTHLY

"Simply put, the best there is . . ."
"Like a TV Guide for shortwave radio."

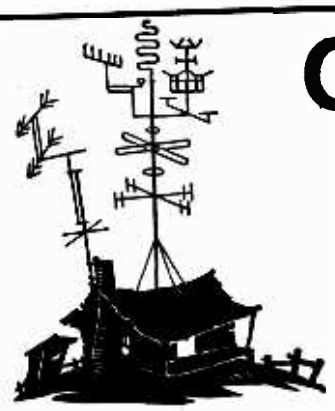
World Radio Report



- **Comprehensive world radio news—news you can use—from stations around the world.**
- **Hour-by-hour listing of English broadcasts to the world.**
- **Advance program details for the major shortwave stations.**
- **DX tips from around the world.**
- **Expert editors like Larry Miller, Jeff White and others.**
- **Articles designed to help you get the most out of your radio.**

Get 12 monthly issues for just $18.00 in North America, $26.00 (airmail delivery) elsewhere in the world. Sample copies $2.50 in North America, $3.50 elsewhere. Payment in US dollars by money order or check (with US branch) to World Radio Report, 3 Lisa Drive, Thorndale, PA 19372 USA.

We bring you your world



GETTING STARTED

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

A Word on Awards

An activity of growing popularity among SWL's is collecting the many awards and certificates that are sponsored by radio societies, clubs, magazines and special purpose groups. These awards are usually diploma type certificates, stating that the recipient completed certain objectives to earn the award.

Often the award is a work of art with fine drawings or photographs depicting the objective the sponsor is promoting. Some awards are plaques and others are trophies or medals. Exactly what the award consists of is always stated in the award rules.

Objectives of Awards

A group may choose to sponsor an award for several reasons: (1) to acquaint the radio enthusiast with the sponsor's country and people; (2) popularize the group's objectives, for example, the 10-10 club wants to encourage the use of the 10 meter band (28 MHz) and they issue awards for hearing stations on that band; (3) present a challenge to the radio buff to test his persistence and operating skill, such as *CQ* magazine's USA-CA award issued to those who have heard all 3076 counties in the USA.

Level of Difficulty

Awards range from fairly easy to extremely hard to earn; initially, it is wise to choose one of the easier awards to work for. Many SWL's will work toward several at once, completing the easier awards in a short time and continuing to work for the more difficult award over a longer period of time.

Award Sponsors

Ninety-five percent of all radio awards are sponsored by amateur radio groups. Because amateurs are interested in promoting their hobby, these awards are often (but not always) offered to the SWL on a heard basis.

How Do I Get Info on Awards?

Several amateur radio magazines have monthly columns that describe the many awards available to the amateur and SWL. *CQ* magazine has, by far, the best column for the SWL, conducted by Dorthy Johnson who takes great care to identify the awards that are available to the SWL. *CQ* also notes special rules or regulations pertaining to the SWL and gives mailing address and full information on how to obtain the awards.

Earning the Awards

In order to understand the requirements to earn an award, let's take a look at the rules for two awards.

The Japanese Northern Kanagawa DX Association offers an award called Single-Mode, Five-Band, All Continent Award. Their rule number one says you must submit proof of having heard stations on six continents on five different amateur bands--that is, six continents on 3.5 MHz, six continents on 7 MHz, and so on for 14, 21 and 28 MHz as well; and all stations must be using the same mode.

Rule two says any amateur or SWL is eligible to receive the award.

Number three states you may choose any single mode being transmitted on the amateur bands to qualify for the award (CW, AM radiotelephone, SSB radiotelephone, RTTY [radioteletype], SSTV [Slow Scan TV]).

Four tells us that a serial number is assigned to the award by mode.

Five explains that if you hear six continents on each of six or more amateur bands, a special endorsement will be issued to you if you indicate that you want it on the initial application.

Number six says the same station may be heard on each of the bands for credit, i.e. if JE1TTI is heard on 3.5, 7, 14, 21, and 28 MHz SSB and sends you a QSL card confirming each report, all cards can be counted for the award.

Seven states that cross-band and cross-mode QSO's cannot be counted. This rule pertains to amateurs and tells them that they cannot hear a station on, say, 28 MHz SSB and call them on 21 MHz CW and receive credit for the contact. This rule does not pertain to the SWL.

Rule number eight verifies that the award is given in the form of a trophy with a medal.

Rule nine tells you where to send the data (Award Chairman, Northern Kanagawa DX Association, JE1TTI, Michinori Jimbo, 2653, Suarashi, Sagamiko-Machi, Tsukui-Gun, Kanagawa-Ken, 199-01, Japan). You do not need to send all the QSL cards in for the award, but you must send a list stating all the pertinent data on each QSL card and have two licensed amateurs state that you have the QSL cards in your possession. You must also send 35 IRC's (International Reply Coupons) to receive the award.

Somewhat easier to earn, the M-50-M Award is issued to any amateur (SWL on a heard basis) for working (or hearing) mobile stations in all 50 states.

The original award is given for 48 states, with red seal and ribbons for 49, blue seal and ribbons for 50, gold seal for working/hearing all 50 states from a mobile station. There is a $1.25 fee for the award; seals will be sent for an SASE.

The award is sponsored by the Mobile Amateur Radio Awards Club, Inc. For information on the other awards this club offers or to make application send SASE to Bill Olsen, WB0UPU, 2221 Ogden Court, Saint Paul, Minnesota 55119.

An award issued for hearing mobile stations (automobiles, trucks, campers, etc.) in all 50 states should be fairly easy to earn; there are several nets on the air called County Hunter nets. Many amateurs operate mobile on the nets to give out contacts in difficult to work counties in the USA for those working toward the USA-CA award. They can be heard on 14.336 kHz SSB from 1400 to 0300Z daily all year long; on (or near) 3.865 kHz SSB 0100 to 0500Z from October to May; and near 7.250 SSB 0100 to 0500Z from June to September.

(Thanks to Dorthy Johnson for the above information on both awards.)

Special Event Stations

Often when an important event is taking place amateurs jump in and set up a special event station, then issue commemorative QSL cards or certificates to stations that have two-way communication with them or to SWL's reporting their signal.

What kinds of events? How's this: The Southern Counties (NJ) Amateur Radio Association celebrates the Miss America pageant with a special events station every year. Other special event stations celebrate the Orville Redenbacker Popcorn Festival, World's Fairs, birthdays of towns or important people, raft races, space shots, and many other interesting events.

Ten or more special event stations are on the air each month. You can find the dates, times and frequencies of operation for these stations in all of the amateur radio magazines. The QSL cards and certificates issued by these commemorative stations make a big hit with everyone; most are decorative and all impart some message about the event.

How about sending me photo's of your shack for *MT*'s "Monitoring Post"? Ham shacks welcome too.

That's all for this month, gang. Have a good Thanksgiving holiday and keep the letters and cards coming. ■

Grove Discontinues Repair Service

After months of searching for a qualified bench technician, Grove Enterprises has found it necessary to terminate its repair and modification service, effective immediately. Only one technician was available and he will be leaving to start his own VCR service center.

Grove points out that all equipment which had been received for service prior to the decision will be repaired and all warranties will be honored.

Radio Common Carriers

In our October 1986 issue (*Ask Bob* column) a reader asked about the availability of a directory of paging and mobile telephone frequencies. We pointed out that lists of licensees are found only on special directories maintained by the FCC.

MT reader Chris White of Philadelphia wrote in to remind us that the frequencies are shared nationwide; he went to the trouble to compile a comprehensive list which he shares this month with fellow monitors. Thanks, Chris.

MOBILE TELEPHONES

Base	Mobile
152.03	158.49
152.06	158.52
152.09	158.55
152.12	158.58
152.15	158.61
152.18	158.64
152.21	158.67
152.51	157.77
152.54	157.80
152.57	157.83
152.60	157.86
152.63	157.89
152.66	157.92
152.69	157.95
152.72	157.98
152.75	158.01
152.78	158.04
152.81	158.07
454.025	459.025
454.050	459.050
454.075	459.075
454.100	459.075
454.125	459.100
454.125	459.125
454.150	459.150
454.175	459.175
454.200	459.200
454.225	459.225
454.250	459.250
454.275	459.275
454.300	459.300
454.325	459.325
454.350	459.350
454.375	459.375
454.400	459.400
454.425	459.425
454.450	459.450
454.475	459.475
454.500	459.500
454.525	459.525
454.550	459.550
454.575	459.575
454.600	459.600
454.625	459.625
454.650	459.650

PAGING FREQUENCIES

35.20	35.58	43.46	152.12	152.78	454.225	454.550	931.2125	931.5625	931.7875
35.22	35.60	43.50	152.15	152.81	454.250	454.575	931.2375	931.5875	931.8125
35.24	35.62	43.54	152.18	152.84	454.275	454.600	931.2625	931.6125	931.8375
35.26	35.66	43.56	152.21	158.10	454.300	454.625	931.2875	931.6375	931.8625
35.30	43.20	43.58	152.24	158.70	454.325	454.650	931.3125	931.6625	931.8875
35.34	43.22	43.60	152.51		454.350		931.3375	931.6875	931.9125
35.38	43.24	43.62	152.54	454.025	454.375	931.0125	931.3625	931.7125	931.9375
35.42	43.26	43.66	152.57	454.050	454.400	931.0375	931.3875	931.7375	931.9625
35.46	43.30		152.60	454.075	454.425	931.0625	931.4125	931.7625	931.9875
35.50	43.34	152.03	152.53	454.100	454.450	931.0875	931.4375		
35.54	43.38	152.06	152.66	454.125	454.450	931.1125	931.4625		
35.56	43.42	152.09	152.69	454.150	454.475	931.1375	931.4875		
			152.72	454.175	454.500	931.1625	931.5125		
			152.75	454.200	454.525	931.1875	931.5375		

(See page 31 for more VHF/UHF allocations)

Like to have a by-line in MT?

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

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!

ANTENNA ADAPTOR FOR THE HX2000

A common question we receive here at *MT* is, "How can I use my Regency HX2000 with an external antenna? With the unusual threaded hole for the custom flex antenna provided with the unit, the question could be expected.

Centurion International (P.O. Box 82846, Lincoln, NE 68501-2846; phone 1-402-467-4491) will provide their type HTBN adaptor for $7.50 plus shipping, designed to fit the HX2000.

The resultant BNC female connector will accommodate a variety of antennas including the popular Gove ANT-8 telescoping whip.

NEED AN N-ADAPTOR?

The ICOM R7000 is the first consumer radio utilizing a type N antenna connector, although the commercial and TVRO industry has used them for years. N connectors are inherently very low loss and maintain impedance integrity up through several thousand megahertz.

But what of us who are already equipped with UHF (PL-259) antenna connectors? Are there commercial adaptors available? Not at Radio Shack, although some of the larger cable TV installers may have one or two lying around.

Fortunately, there are some options. If you are willing to abuse the N connector on the radio, the center pin leaves may be spread to accept the large-diameter pin of the male UHF connector; the outer shell will screw onto the shell of the female N device. This brute force procedure is not recommended.

A better technique would be to make an adaptor by simply breaking off the loose BNC ring of a Radio Shack 278-120 UHF/BNC adaptor. By slightly spreading the smaller-diameter leaves of the remaining sleeve, a reasonable facsimile of a push-on UHF/N adaptor has been fashioned (with thanks to Mike Lempuhl of Monument, Colorado, for this tip).

A third possibility is to replace your original PL-259 with a type F connector; many more adaptors are available for this connector, including an F-N from Grove as the ACC25 for $2 (free shipping with other order).

800 MEGAHERTZ ANTENNAS

Letters received from David Wilson of Bridgeport, Connecticut, and David Marshall of Springfield, Ohio, prompt a recommendation for readily-available antennas for the 806-960 MHz land mobile spectrum.

Scanners such as the Regency MX7000, MX4000, Bearcat BC800-XLT, and the ICOM R7000 all cover this portion of the spectrum. Most general purpose scanner antennas don't. However, these is one TV antenna that does.

Dave Marshall has had excellent success using a conventional UHF-TV corner-reflector Yagi--in his case the Radio Shack U-75 (stock #15-1660) costing $16.95.

David Wilson, however, has experimented with the corner reflectors and feels that he gets better 800 MHz band performance from an inexpensive bowtie antenna in front of a screen reflector.

Both antennas will require a standard VHF/UHF balun transformer to match the coax downlead to the receiver and both are readily available from a variety of discount stores and TV retailers.

One more point: since land mobile communications are vertically polarized, it would be a good idea to mount the antenna with the elements in a vertical position, not horizontally as used in the TV industry.

A PORTABLE INDOOR ANTENNA

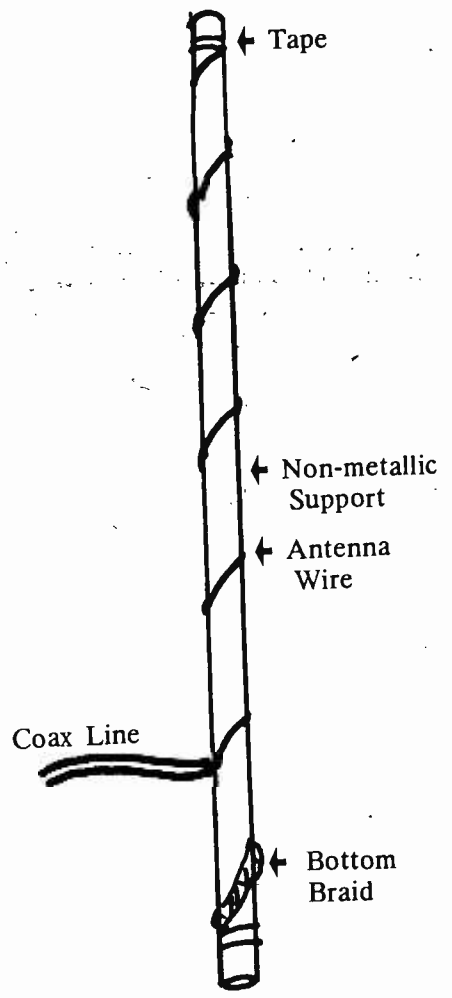
A recent letter from Jeanne Freitag of Burbank, California, suggested an excellent modification for the new and popular Grove ANT-6 indoor Hidden Antenna which can be used with a preamplifier for long, medium and shortwave reception, with or without a preamp for scanner VHF/UHF listening.

As sent from the factory, the Hidden Antenna consists of a flexible wire antenna which must be hung and stretched for appropriate reception, Jeanne has found that by winding the antenna wire a few turns around a broomstick handle, then taping the ends tightly in place, she can move the antenna anywhere convenient.

Try to keep the antenna nearly as long as it was before, wrapping as few turns as necessary to stabilize the device, for maximum "aperture" (signal capture area).

Jeanne adds that it would be wise to keep the Hidden Antenna away from metal doors and windows, electrical wiring and extension cords, or any other obstacles to efficient signal capture.

The concept is a natural for those listeners who like to take their equipment on trips, but don't have room for an elaborate antenna system.



Hidden Antenna may be wrapped around broomstick, plastic pipe or wood dowel for convenient portability. Tape both ends securely.

DROP-IN CHARGER FOR THE HX-1500

Regency has advised owners of the their popular new HX-1500 hand-held scanner not to charge it with their MA-256 drop-in charger, designed for the HX-1000 and 1200, at the risk of damaging the 1500's AA size NICADs. One *MT* reader may have found an answer.

Kenneth Roberts of Ft. Lauderdale, Florida, found that he could charge his HX-1500 safely with his MA-256 charger by the following method:

1. Insert radio into charger normally (red light will come on);
2. Lift radio up slightly until light goes out;
3. Quickly reinsert radio into charger (green light will come on for trickle charge).

Kenneth admits that the procedure may have to be repeated several times, but after the green light comes on the current should not exceed 50 milliamperes, a safe trickle rate for the AA size cells.

GROVE PRE-3 OWNERS TAKE NOTE

Grove Enterprises has discovered that a number of DC cords sent out with their PRE-3 Power Ant have reversed polarity markings. While this will cause no harm when connected to the source of 12 volts, it will prevent the preamplifier from operating.

If you connect the PRE-3 to your own source of power and the LED does not light, it is probably cross-connected. Merely reverse the connections of the two wires (striped and unmarked) and try again. If the light comes on, all is well.

After this mismarking was reported to Grove, instructions in all successive units were changed to note the markings correctly, but a few units in the field still have the reversed power cord and the connections must be reversed for the preamp to work.

The original instruction sheet is still valid for power instructions when using the Grove ACC20 universal AC adaptor as well as for all other operational aspects.

SIX METER BAND INDICATES PROPAGATION

Hams have established hundreds of automatic beacons worldwide which constantly transmit, in Morse code, call sign identifiers so that listeners may detect their signals to determine whether certain frequency ranges are "open" to that part of the globe.

Listed below are six-meter frequencies compiled by Bill Tynan, W3XO, and published in the June 1986 issue of *QST* Magazine.

Freq (MHz)	Call	Location
50.005	ZS1SIX	Cape Province, RSA
50.008	PY1RO	Rio de Janeiro Brazil
50.033	LU8YYO	Cordoba, Argentina
50.010	JA2IGY	Mie, Japan
50.010	ZS1STB	Still Bay, RSA
50.010	ZS6STB	Vereeniging, RSA
50.015	PJ2B	Bonaire Neth Ant
50.015	SZ2DH	Athens, Greece
50.020	GB3SIX	N Wales (IO73TJ)
50.020	JA6YBR	Japan
50.023	HH2PR	Haiti
50.025	6Y5RC	Jamaica
50.025	5Z4YV	Kenya
50.025	ZS6SIX	Kempton Park, RSA
50.029	ZS6PW	Pretoria, RSA
50.035	ZB2VHF	Gibraltar
50.038	FY7THF	French Guiana
50.040	ZS6VHF	South Africa
50.041	WA8KGG	Ohio
50.045	OX3VHF	Greenland
50.048	VE6ARC	Alberta
50.048	WA6IJZ	S California
50.050	ZS6LN	Petersburg, RSA
50.050	GB3NHQ	London (IO91VQ)
50.055	WA9FEF	Chicago
50.059	GB3RMK	Cornwall
50.060	KH6EQI	Pearl Harbor
50.060	WA8ONQ	Cincinnati
50.060	PY2AA	Sao Paulo, Brazil
50.060	GB3RMK	Scotland (IO77UO)
50.062	W3VD	Laurel, MD (FM19)
50.064	WB8IGY/4	Florida
50.064	N4PZ	Sarasota, FL
50.065	WØJR*	Aurora, CO (DM79)
50.065	WB5ZRL	New Orleans
50.065	WA5VAS	Metairie, LA
50.069	NØBJ	Nebraska
50.070	KS2T	Toms River, NJ (FM29VX)
50.070	W2CAP/1	Cape Cod (FN41)
50.070	K1NFE	Burlington, CT
50.071	W9KFO	Eaton, IN
50.071	WA2YTM	Victor, NY
50.072	VE1CCP	Prince Edward Is
50.075	N5JM	New Orleans (EL49)
50.075	VS6SIX	Hong Kong
50.077	VE3DRL	Toronto
50.077	NØLL	Smith Center, KS
50.080	TI2NA	San Jose, Costa Rica
50.080	W1AW	Newington (FN31)
50.085	VE2YB	Michel, Quebec
50.086	VE2STL	
50.088	VE2TH	Val Belair, Quebec (FN46)
50.088	VE1SIX	New Brunswick
50.090	WA6JRA	S California
50.095	K7IHZ	Arizona
50.098	KG6JIH	Guam
50.100	HC2FG	Guayaquil, Ecuador
50.112	JD1YAA	Minami Torishima
50.498	5B4CY	Cyprus
50.740	TV Sound	Auckland, NZ
50.750	TV Sound	Kaukau, NZ
50.760	TV Sound	Whakapunake, NZ
50.945	ZS1SIX	Piketberg, RSA (JF98BJ)
51.002	ZL1BPW	Auckland, NZ
51.020	ZL1UHF	Auckland, NZ
52.013	P29BPL	Papua, New Guinea
52.020	FK8KAB	Noumea, New Caledonia
52.100	ZK2SIX	Niue
52.200	VK8VF	Darwin, Aus
52.250	ZL2VHM	Manawatu, NZ (RE79)
52.310	ZL3MHF	Hornby, NZ
52.320	VK6RTT	Wockham, West Aus
52.325	VK2RHV	Newcastle, Aus
52.370	VK7RST	Hobart, Aus
52.420	VK2RSY	Sydney, Aus
52.425	VK2RGB	Gunnedah, Aus
52.440	VK4RTL	Townsville, Aus
52.450	VK5VF	Mt Lofty, Aus
52.460	VK6RPH	Perth, Aus
52.470	VK7RNT	Launceston, Aus
52.490	ZL3SIX	Blenheim, NZ
52.510	ZL2MHF	Upper Hutt, NZ

*also signs KA8CDN

MODIFY THE GROVE LEATHER SCANNER HOLSTER

Although the Grove ACC26 leather holster fits the Regency HX1000, 1200 and 1500 hand-held scanners well, the bottom hole does not provide easy access to the charge jack which is not centered at the base of the scanners.

A simple remedy is to cut a small notch outward from the existing hole in the bottom of the holster using a sharp knife. Alternatively, a quarter-inch hole can be drilled through the bottom of the leather holster adjacent to the existing hole, making certain that it lines up with the jack on the base of the scanner.

Honduran U.S. Embassy Heavily Guarded

A reporter just returning from the United States embassy in the Honduras reports that U. S. Marine Corps personnel carrying Motorola walkie-talkies provide security for diplomatic representatives inside. The frequency reportedly used is 163.040 MHz.

Profiles

Radio Botswana

by Gayle Van Horn

THE ELUSIVE QSL COMES WITHIN REACH

My first encounter on shortwave with Radio Botswana was one of surprise and curiosity. The broadcast began like most sign-ons, with an interval signal. But this was no simple piano melody; rather one of cow bells and farm animals. Immediately, I envisioned a solitary announcer, broadcasting with antiquated equipment from some dusty little village in backwater Africa.

I recently discovered that my fantasy was far, far from the truth. Radio Botswana is a modern, fully-staffed station broadcasting from Gabarone, the capital city of this African nation. A look into the station's past reveals a history just as interesting that that barnyard interval signal.

Botswana originally came on the air from the city of Mafeking during the early 1940s when Botswana was known as Bechunaland Protectorate and Mafeking was its administrative center.

During World War II, the Army's Veterinarian Department had installed a 5 kW transmitter to communicate with troops in the field. Its reach was somewhat limited, getting out in a radius of only 20 miles or so.

About that time, a British vet working in Mafeking went to the Army and asked for permission to broadcast a short program of "light" entertainment. Once permission was obtained, he began a daily one-hour program of classical music under the code name, ZND Radio.

As time went on, ZND introduced additional programs, most designed to counteract wartime propaganda coming from a massive German transmitter known locally as Radio Xizzen. As was to be expected, Xizzen's message was one of continued victories for the Nazi forces. According to its broadcasts, the German army was virtually immortal.

The people at ZND steamed at those broadcasts. After all, their troops were in the field. They needed to know the truth! So ZND hired two new announcers and their job was to translate and counter the German broadcasts. There, in the middle of colonial Africa, was a tiny, brave voice, standing up to the "invincible" forces of the Third Reich. ZND had made it its business to counter the Nazi propaganda and raise the morale of the troops. It continued to do so until the end of the conflict.

It wasn't until 1963 that ZND faced its first real change. At that time, the station picked up and moved its operations to an abandoned prison in Lobatse and became Radio ZNB. One thing that didn't change was the station's old 5 kW transmitter. It followed the staff, still struggling to reach the people of this largely rural nation. Then, something big happened -- and happened quickly!

The British were preparing to grant Bechunaland it independence. Two years after moving into the prison at Lobatse, ZNB moved again, this time to the capital city of Gabarone. And with the move came a new home, the Gaborone Information building, and a new name -- Radio Bechunaland. But the old ZND wasn't about to stop there. Less than a year later, it again moved, this time to a site at the Bank of Botswana. And with this latest move came a power increase to 10 kW.

In 1966, Bechunaland did gain its independence. Now called Botswana, the country needed its own radio voice. And Radio Buchunaland quickly took the country's new name for its own. And the current Radio Botswana was born.

In five short years, the new Radio Botswana had added four 50 kW transmitters, plus units on AM and FM. Radio Botswana could not lay claim to the whole of the country.

One of the things that makes Radio Botswana unique is the fact that despite the fact that its people are largely made up of the Bantu-speaking Tswana group (including the Bamangwato and Bangwaketse) the country's official languages is English. Christianity is the main religion, literacy holds at 20 percent and the life expectancy of the average citizen is just 46 years. As a result of these factors, you're likely to hear a rather strange mix of programs on the station.

The tape library is well stocked and reflects the heritage of the country. There are over 20,000 different selections available to the air staff, ranging from American rock to African gumba-gumba.

News, too, occupies an important place on the airwaves. The Radio News Desk has a workforce of nine, which are divided into two shifts. Workers begin at four in the morning preparing the first bulletins which air at seven AM. The late shift reports to work at 2 pm and also produces a fifteen minute program *Around the World Today* as well as compiling the two evening newscasts. All news is prepared in English and broadcast in either that language or Setswana. Four international wire services provide the input to feed the news department although they also have two fully equipped "outside vehicles" which are used to collect local news from villages across Botswana's 231,818 square miles. News collected on these forays is also used in the Botswana *Daily News.*

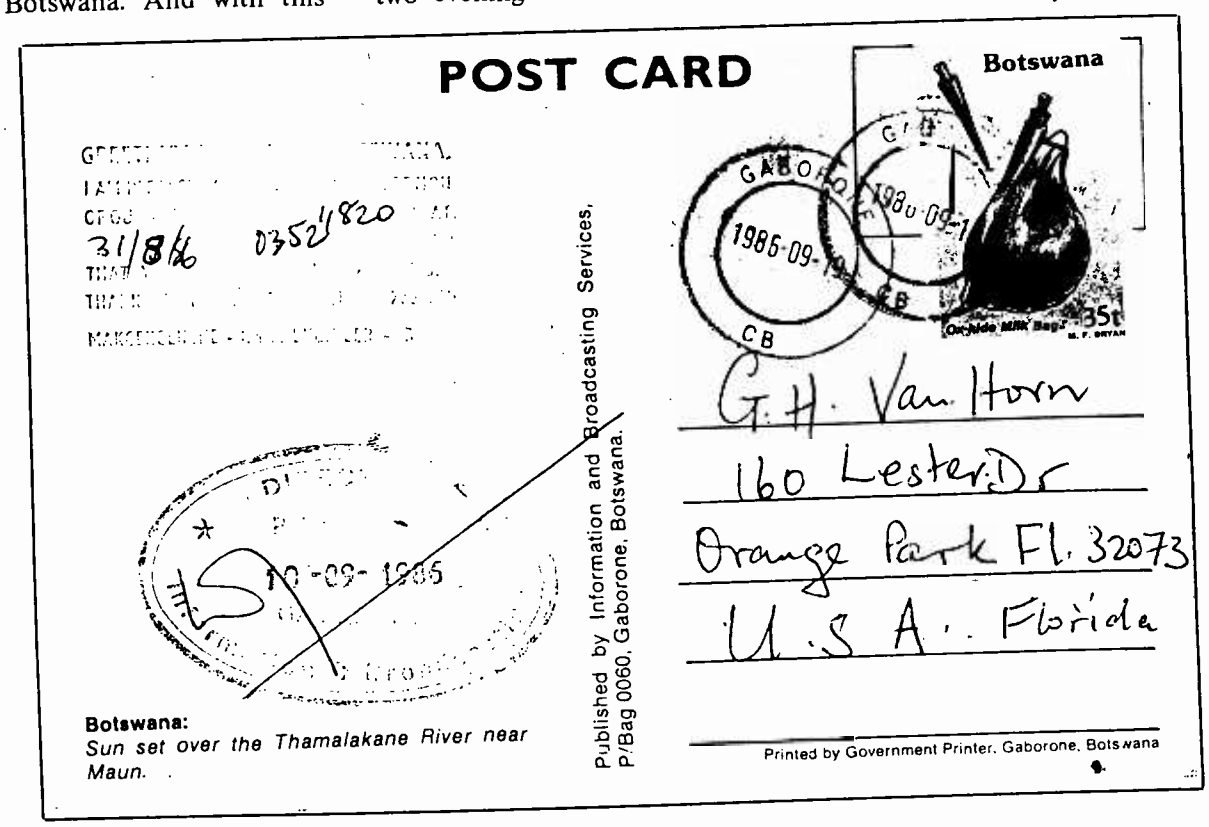
For shortwave listeners, Radio Botswana offers a difficult but hardly impossible challenge to hear. Best of all for QSL card collectors, the station -- after a long period of refusing to confirm reception reports -- is now issuing a card (see above).

For those who would like to travel to this remote and exotic destination, try tuning in the following frequencies at the following times. All programs are in Setswana and English.

0330 - 0700 on 3356, 4820, 7255 kHz
0700 - 1500 on 5955, 7255 kHz
1500 - 1700 on 3356, 4820, 7255 kHz
1700 - 2100 on 3356, 4820 kHz

Recent monitoring in eastern North America has shown a sign on time varying from 0350 to 0358 UTC. Best reception is often found in the local evenings.

What is the future of Radio Botswana? Television -- commercial or perhaps just a second channel. All of these and more are presently under consideration. No doubt, the future looks bright for this station. Let's hope that the barnyard interval signal -- cowbells and all -- will remain on the shortwave bands for many years to come. ■



America's Cup Race to Use Motorola DVP

Motorola will be competing in the America's Cup -- the world's foremost sailing event -- to be held in Perth, Australia, in 1987. A Motorola digital voice protection (DVP) system will provide secure communications to a support crew.

"As in many other sports today, the use of two-way radio communications technology will be a key factor in enhancing a competitor's sailing capabilities," said Buddy Melges, skipper of the "Heart of America," one of the yachts challenging for the America's Cup.

"Our ability to privately communicate with the chase boat and our base on shore is imperative," said Melges. "We need to relay messages such as boat speed, sail changes and strategy. All our work and racing strategy could be jeopardized if a competitor, or any unauthorized person, overheard."

VHF/UHF Frequency Band Allocations

30-50	Low band
50-54	Amateur
54-72	TV broadcast (ch.2-4)
72-76	Low power relay
76-88	TV broadcast (ch.5-6)
88-108	FM broadcast
108-118	Aero navigation
118-136	Civilian aero comms
136-138	Weather/nav. satellites
138-144	Military aero comms
144-148	Amateur (2 meters)
148-150.8	Military base comms
150.8-152	Civilian land mobile high band
162-174	Federal land mobile high band
174-216	TV broadcast (ch.7-13)
216-220	Inland waterways comms & navigation
220-225	Amateur (1-1/3 meters)
225-400	Military aero UHF comms
400-406	Radiosonde & sat uplink
406-420	Federal land mobile UHF
420-450	Amateur (3/4 meter)
450-512	Civilian land mobile UHF
512-806	TV broadcast UHF band
806-960	Civilian "cellular" high UHF

"Operation Red Face" Lives Up to its Name

Tired of competitive broadcasters listening to their two-way news reporting and using the information for their own stations, news director Dan Shelley of KTTS-AM and FM in Springfield, Missouri, decided to get even.

Contriving a story about a raid by the sheriffs' department on a local summer camp for troubled youngsters and code-nameing the siege "Operation Red Face," Shelley and his reporters went to work.

Feeding the story back on their two-way press frequency at 4:56 PM on a Friday afternoon, KTTS officials knew that interceptors would not have time to verify the story before pilfering it for their own broadcast.

While several local broadcasters did, indeed, monitor the story, none broadcast the erroneous information, but most were very upset with Shelley for the ruse. (From David Alpert, New York, NY)

Making Waves

AM DXing with

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

The past couple of columns have been somewhat philosophical in nature, possibly even cathartic. But as we move right in to the broadcast band DX season, I feel that it's time to get back to the nuts and bolts of DXing; that is, the techniques you need to master in order to pull in those elusive stations.

Although I still maintain that patience is the most important component of DX technique, one still has to have the hardware to DX. H. G. Schormann of Miamiville, Ohio wrote to remind me that antennas sometimes pose a major problem for the DXer in that many portables lack terminals for connecting external antennas, whether loop (box or Ferrite) or longwire.

The internal ferrite rod antenna utilized by these portables may be inadequate for DXing, and an external antenna with more signal gain, as long as it doesn't also magnify unwanted noise, may turn a seemingly mediocre portable into a hot DX machine.

Most DXers who have the room have already experimented with longwire antennas, which are the simplest to set up and use. Let me caution you right now. Keep your antenna away from any electrical wires; don't run a longwire under an electrical wire, as not only will you tend to pick up electrical noise, but you always run a chance of frying your receiver, or worse, yourself, if your antenna somehow comes in contact with the power line or if lightning (which tends to follow electric lines) jumps to it during a storm.

If you're erecting a temporary longwire, you may be able to get away with draping it across non-conductive surfaces or by tapping it onto a long fence, as long as it isn't grounded and the weather has been dry. If you have the room to stretch one over, say, 800 feet, you might want to try your hand at a beverage antenna. 2,500 feet is perhaps optimum for general broadcast band DXing, but less may work surprisingly well. Aim the wire in the direction you wish to receive. Erect posts 1 x 2s, four to six feet long work well but permanent posts high enough to clear animals and vegetation are ideal. Affix the wire to the posts with insulators, pieces of wire, or staples. Keep it as straight as is possible for the best directional characteristics.

If you want to receive from one direction only (the direction away from the end where you'll park your receiver), run the distant end of the antenna to a fixed resistor or potentiometer of a value of between 500 to 1000 ohms and ground the wire from the resistor. You'll find that signals arriving broadside to the antenna are nulled considerably, and the longer and straighter the wire is, the tighter the reception pattern from the end of the antenna. If you can't ground the end, you'll simply pick up signals from both ends of the antenna.

The preceding paragraph is somewhat oversimplified but enough literature exists and is readily available that I won't pose as an antenna expert.

Now, how do we get the signal from the longwire to the radio? Inductive coupling works just fine. When I take mmy Sharp FV-610 on beverage DXpeditions, I just wrap three or four turns of lead wire from the antenna around the middle of the radio... and hang on to a bare strip of wire! Some radios don't need this human touch, but for some reason, the Sharp does.

If you feel up to modifying your radio slightly, you might want to wrap an insulated wire around your ferrite rod antenna and attach the other end to a terminal on the outside case. This terminal will allow you to attach the wire directly to your radio, should you wish. You may wish to place a potentiometer between the antenna and the terminal to attenuate the signal strength. Almost any value will do. ■

ARE YOU STILL WAITING TO BE COUNTED?

Well, relax and set a spell! The annual fall listener's survey has been delayed two months so that we can reach everyone on our mailing list (see item on p. 13). Anyway, by waiting until January you'll be able to list all those receivers and accessories you've asked Santa to bring you for Christmas!

THE OUTER LIMITS

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

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

You Can Help Captain Midnight!

Don Cochran, spokesman for the Captain Midnight Grassroots Coalition, has given us a thorough report on that group's efforts to come to the aid of America's most famous pirate. The Coalition is currently engaged in a nationwide effort to help John MacDougall, alias "Captain Midnight," pay the $5,000 fine levied against him August 26 in federal court. To the best of my knowledge, this is by far the largest fine ever imposed on a pirate broadcaster, and Home Box Office claims it spent $99,000 assisting the FCC in tracking down MacDougall. It is obvious that both the FCC and the cable industry were determined that the battling Captain would not get away.

In addition to accepting outright donations, the Grassroots Coalition has a variety of merchandise for sale to help with its fund raising efforts. The items include t-shirts, hats, headbands, and bumper stickers. Among the various t-shirt designs is one with the Captain's now legendary message attacking HBO's plan to charge satellite dish owner's $12.95 a month for its programs. As a proud owner of one of these, I can assure you it attracts attention!

If you wish to donate or are interested in merchandise, the address is Captain Midnight Grassroots Coalition, P.O. Box 525, Silver Springs, Florida 32688. Be sure to enclose a stamped, self-addressed, legal-size envelope if inquiring about merchandise. The Coalition can also be reached by telephone. The number is 1-904-629-3377.

Closely allied with the Coalition is the organization, STORM, Satellite Television Owners Rights Movement, which will lobby for rights of satellite dish owners. So keep reading *The Outer Limits*. We will keep you posted on the latest activities of the Coalition, STORM, and of course, Captain Midnight himself!

Honduras

These days, any radio activity in Honduras is worth watching. If the Reagan administration decides to further increase the heat on the Sandinistas in Nicaragua, it will probably first be noticeable by additional activity here. Recently, after a considerable period of inactivity -- or at best, occasional transmissions -- clandestine Radio Miskut has begun broadcasting on a regular basis. Its target is the Indians of eastern Nicaragua and Honduras. This is one clandestine on which you can hear English as well as Spanish and the Indian language of Miskito. Look for it weeknights between 5560 and 5565 kHz from around 0100 to some time past 0200 UTC.

In the past, Radio Miskut did issue a very few verifications. There is no guarantee this address is still valid, but if you care to try, you can send your report to Comision--Politica MISURA, Apartado Postal No. 1668, Tegucigalpa, Honduras. If possible, a Spanish report, prepared verification card, and return postage might considerably improve your chances of a reply.

Recently, a licensed Honduran broadcaster appears to be trying to reach the same Indian audience as Radio Miskut. It is Sani Radio out of Puerto Lempira, which has been assigned the call letters, HRRI. Most programming is in Miskito or Spanish, but there has been some English as well. The station can be heard with a solid signal nightly on 4755 kHz until it signs off at 0200 UTC. Reception reports can be sent to Apartado 113, La Ceiba, Honduras.

What makes Sani Radio of particular interest is that it claims to be run by the International Rescue Committee and freely admits to having been funded by a grant from the United States Agency for International Development. At present, programming from its 10 kilowatt transmitter is essentially popular music, news, and cultural information. However, this one is definitely worth watching closely. After all, in Honduras, anything can and probably will happen.

The McClellan Report

And speaking of things worth watching closely, it's time for another report from our pirate expert, Scott McClellan. So, take it way Scott!

Labor Day weekend was a popular time for pirate broadcasters to take

The "Other" License Free Bands

by Robert C. Homuth
5215 North 11th Avenue
Phoenix, Arizona 85013

Given the report of LOWFER beacon "Z2" on 165.67 kHz located near San Simeon, California, being heard in Hawaii, and the regular 900-mile-plus reception of 1 watt LOWFER beacons, I am curious if anyone has done much DX'ing in the other FCC Part 15 unlicensed communications bands.

From 510-1600 kHz, one can run a 100 milliwatt input transmitter into a ten-foot antenna using any mode of transmission. CW would offer the best efficiency.

If the antenna was well grounded, used a low-loss litz-wire loading coil, and the transmitter final amplifier was located directly at the base of the antenna with the keyer and frequency synthesizer located remotely indoors, maximum field strength and range would be accomplished.

Ken Cornell, in his *Low and Medium Frequency Scrapbook*, reported that his radio beacon on 1585 kHz CW was heard around 18 miles away with excellent copy. For DX purposes, frequencies from 512 to 527 kHz are clear all across the U.S.A. except for a small number of aero beacons. As indicated by Mr. Cornell in his book, "split" channels in between the 10 kHz AM BC channels could be used also.

From 49.82-49.92 kHz an experimenter may run a 100 mW input transmitter with any mode into a 39 inch antenna permanently attached to the transmitter. If a microphone is used, it must be permanently fastened to the transmitter.

Most units that I have seen are room monitors, handheld transceivers, headset units, cordless phones, and remote microphones. AM is commonly used for cheap walkie-talkies and FM for the other devices. Considerable range improvement would be noticed by using suppressed carrier DSB, SSB, tone modulated Morse code (AM or FM) and CW. Maximum range in FM or AM is about 1/2 mile. Even though the power is limited, an amplified, tuned antenna for the band would offer quite a bit of improvement in range.

IS ANYONE OUT THERE INTERESTED?

The FCC rules state that remote operation of 49 MHz equipment is not permitted except for telemetry... would a propagation beacon sending a CW ID located on a high building or on a balloon or model rocket count as "telemetry?" It is not transmitting data, only an ID for location purposes.

How about a manufacturer offering any of the following items?

- 510-1600 kHz SSB transmitter
- 510-1600 kHz loaded 10 foot antenna, loaded and tuned for maximum output and 50 ohm impedance
- 510-1600 kHz CW transmitter with the frequency synthesizer located remotely from the final amp
- 1750 meter transmitter
- 160-190 kHz converter for shortwave radio
- Mini 160-190 kHz receiver
- Below 10 kHz "whistler" receiver with a portable loop antenna for monitoring odd static in the VLF and ELF range
- Top of the line, maximum range 49 MHz FM transceiver, built like a regular Ham or CB handheld, with speech processing, multiple channels, loaded and matched 49 MHz antenna, maybe even CTCSS!
- 49 MHz to shortwave downconverter, enabling one to monitor SSB or CW in this band. Advantages would be extra sensitivity, narrower bandwidth, and an extra stage of frequency conversion for better image rejection
- 49 MHz CW beacon for propagation purposes
- 49 MHz F2 mode beacon that is compatible with FM scanners
- 46 MHz equipment
- SSTV loop tape with prerecorded monitoring related pictures and optional special order station callsigns imprinted, so that experimenters without SSTV equipment can send photos for experimental purposes.
- Device for converting Morse Code tones on a tape loop into pulses that open and close a relay...and easy way to make an instant Part 15 beacon
- Morse code key and CPO for the above
- SSTV converter for TV or computers
- Multimode, multiband Part 15 transceiver, SSB, CW, AM, FM, on 1750 meters, 510-1600 and 49 MHz
- Audio filter for CW, SSB, voice

to the airwaves, as the following loggings prove.

Canadian Club Radio was heard on 7440 kHz between 0327 and 0400 UTC, with a good signal. Two announcers played rock music by Canadian groups and treated listeners to the various noises their reverb machine would make. The address given for QSLs was box 140, 3090 Danforth Avenue, Toronto, Ontario M1L 1V1, Canada.

WHOT was heard by William Martin on 1627 kHz at 0430 UTC. The announcer, Jim Nazium, took phone calls, and said that they were also on 91.5 MHz on the FM band. William also logged this one at 0339 UTC on 1629 kHz with a weak signal.

TNFM is still going strong. I heard it on 7437 kHz at 0307 UTC with a fairly good signal. They played rock music from the early '70s era, including Elton John. The announcer also took phone calls, and acknowledged one from San Francisco.

William Martin also logged WPRN, on 1619 kHz between 0430 and 0500 UTC. Apparently this is a new station. The play pop music, and announced their power as 25 watts. At 0500 they were covered by an unidentified pirate playing airchecks from licensed stations.

Radio North Coast International was another station logged by William on 7425 kHz at 1907 UTC with a good signal. Captain Willy presented a variety of music, ranging from new wave to old television theme songs. I heard a repeat broadcast of the same program the next night on 7440 kHz between 0045 and 0107 UTC. RNCI can be contacted via P.O. Box 245, Moorehead, MN 56560.

Remember, when writing to a pirate station, be sure to include three first class stamps to cover postage costs.

Phyllis D. Werlin of Massachusetts writes with some nice words about the column (thanks!) and also shares some of her loggings of numbers stations. She hears one in Spanish every night around 0310 UTC, usually on 6805 kHz, but also 6780 and 6840 as well. She logged her first English numbers station on 6785 kHz at 0310 UTC and a German one on 7000 kHz, also at 0310 UTC. 0310 seems to be your lucky time, Phyllis! Welcome to the column. We hope you'll be a regular contributor.

Other News

Our thanks to Scott for that pirate update. Be sure to look for him again next month! Now on to a few other items. Although I do not have all the details, Havana Moon informed me that a few weeks ago he heard a "soul" version of pirate WMTV. Meanwhile, I understand that the folks at WMTV have denied they made this particular broadcast. Are pirates now pirating pirates?

This write heard an unidentified pirate on 7518 kHz around 0330 in early September. Could this be a sign that at least some pirates plan to shift to slightly higher frequencies in order to avoid interference? If so, the move would be welcomed.

Finally, we have the two North American winners in our contest for the Contra records. They are: (drumroll, please).... Mr. Herbert Ashe of Galveston, Texas and G. S. Richardson of Urbana, Virginia. Congratulations, gentlemen!

That's it for this month. We will be back again in the next issue. Scott and I are always happy to receive your comments, suggestions and contributions. Until then, good listening. ■

MT UTILITY INTRIGUE

Don Schimmel
516 Kingsley Road SW
Vienna, VA 22180

• In response to the ALERT carried in the September *MT* concerning the Electronic-Communications Privacy Act of 1986, I sent a packet of information to my two senators. The material included a letter (reprinted below) based on the sample in the September issue. Several days later I sent another letter to them plus a newspaper clipping of a commentary by Glenn Martin which appeared in the *San Antonio Express-News* Saturday, May 17, 1986 (among other papers).

• A great book has been revised and reprinted by SAMS. Shortwave Radio Listening with the Experts is edited by Gerry L. Dexter and is chock full of interesting and very helpful information providing across-the-board coverage of the many phases of the SWL hobby.

Fred Osterman and Larry Cunningham lead off with good advice for getting your monitoring position set up for efficient operation. This is followed by Tom Harrington offering tips on antennas for receiving and Larry Magne talks about shortwave receivers. And so it goes throughout the entire volume with each category written by an expert in that particular field.

Among the subjects treated are propagation, language identification, QSLing, radio clubs, applications of computer, pirate stations, SW broadcasting, numbers stations, scanner bands, utilities, RTTY press, and much, much more.

The 518-page book is an outstanding reference for those new to the hobby and those with years of monitoring experience. It lists for $22.95 and is available from many *MT* advertisers.

• Hugh Hawkins from Texas sent in a nice letter and a request for some information relating to a service message he picked up which was sent from Havana to ITT WorldCom New York. I was happy to provide him with an explanation of the message.

• A word on the "Utility Intrigue" antenna farm. I have two longwires, one whip and three off-center dipoles. Two of the dipoles were made up following the measurements for the Grove "Sky-wire" antenna with legs of 22 feet for one side and 45 feet for the other side. I have been very pleased with the reception afforded by these antennas.

I was cramped for space for the installation of another dipole of the same size so, as an experiment, I halved the legs making the short one 11 feet and the long one 22-1/2 feet. I have noted already that while this antenna does not provide the gain of the other two dipoles, it does have less noise. I feel confident it would be an acceptable antenna for those of us confronted with space limitations.

• I want to bring to your attention several more U.S. Government publications that I really believe you may be interested in. "Electronic Surveillance and Civil Liberties" will give you a lot of background information relating to the Electronic Privacy Act presently being considered in the Senate. It bears stock number 052-003-01015-1 and the cost is $3.00.

The next booklet is "LA Insurgencies," stock number 027-000-01246-9, $5.00. The final title is "Sandinista Military Buildup," stock number 044-000-02055-6, $1.75. To give you a taste of the contents of the latter document, note the reproduced photo which shows one of the Sandinista Communications Intercept facilities.

In the last two years, three more such intercept stations have been constructed and placed in operation at Puerto Cabezas, a port on the Caribbean Coast; San Francisco, located to the northeast of Managua; and Santa Rosa, situated northwest of Managua up toward the Honduran border.

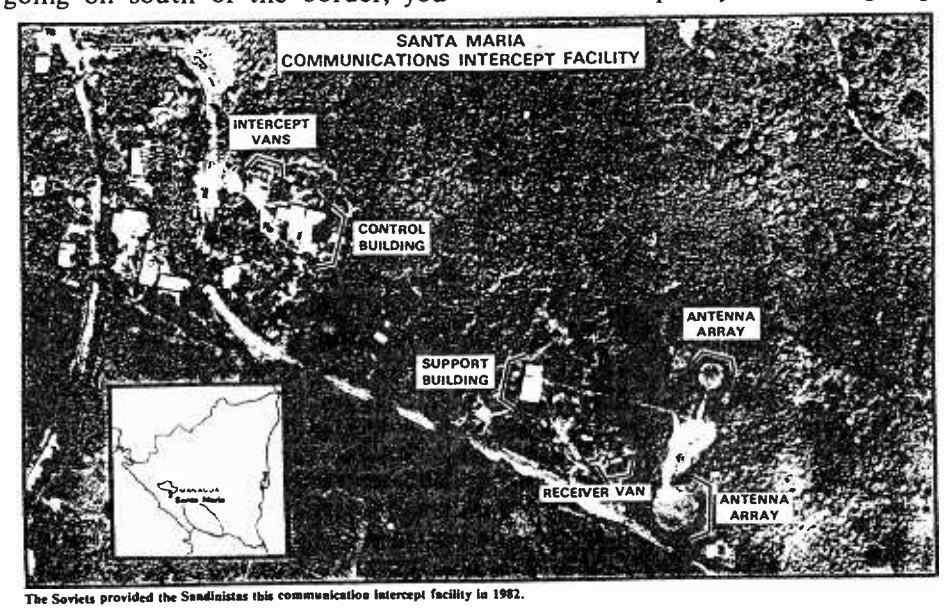
If you are interested in what is going on south of the border, you will get a lot out of this booklet as well as the one listed preceding it.

• **More Unknowns:** An unidentified transmission consisting of 9 dits followed by one dash (repeated) took place 21 August at 1647Z on 6133 kHz in modulated CW. In consulting my back logs I noted I had previously copied this sequence on 11192 kHz 26 May 1985 at 1321Z.

A check of 4622 kHz revealed that practice traffic is still being sent on that frequency--5 letter groups

AUGUST 1986 LOGGINGS

KHZ	DTOI	MODE/IDENTIFICATION/COMMENTS
1920	260932	CW/ C Marker
1923	260931	CW/ ITI Marker
2724	150046	CW/BOF DE YTF (?)/Sent msg but vy weak
3434.7	182334	CW/DE GYA (Whitehall,London) Naval Radio, England)/QSX 3 4 6 8
3464	150041	CW/NO CS/5 charac grps, ltrs A-Z, Spanish Nyeh and figs 2,3,&8
4391	202314	USB/EE-OM talking to unhrd stn re obtaining axle for some piece of equip
4536	180103	CW/OCMV DE 5IQP (?)/Calls & sends V's
4589	260907	CW/WX in French
4726	200344	CW/5F grps, cuts zero as T went down with BT followed by 3 dashes
5692	291624	USB/Two EE-OM conversing re one stn picking up something (signal) like that they had seen on VHF & UHF. One stn is aircraft, gives position and requests instructions on how they shud creep, east or west. This is CG freq. Possibly Air/Search ops.
5906	260913	CW/No CS/5L grps, hand sent, weak,fade
6104	201307	MCW/V's DE VK30
6256.3	211355	RTTY 50-170/Soviet cities in msg hdngs, shifts to CW & sends 73 VA E E
6289	260924	CW/No CS/English text mentions port of Singapore
6326	211650	CW/WX in English for Caribbean area
6461	260927	CW/VVV DE FUM (French Navy Papeete, French Polynesia)
6506	291616	USB/WX in English for Gulf area
6756	131246	CW/No CS/5L grps
6894.1	151306	RTTY 50-425/G10BE HABANA/Running Quick Brown Fox and RY's
6897.8	191603	CW/ZTG,XQI,XEV DE LIA (?)/5-Charac grps, A-Z, Nyeh, 2,3, & 8
6980	260930	CW/VVV DE CCS (Santiago, Chile)/Poss new freq
7423.1	122058	RTTY 50-425/DE Y2V53-5 7425 BEAMED TO SOUTHERN ASIA (ADN Berlin, GDR)
11226	251221	USB/SS-OM & YL in conversation
13400	181524	RTTY 50-850/JUJUY (City in Argentina) mentioned in test. Appears be banking tfc, listing of currency exchange rates.
13495	171441	CW/5F grps, cuts zero at T, auto sent
13503.1	210016	RTTY 50-425/Leningradskoj Lenina in hdg
13629	171727	CW/5F grps
13637.8	122312	RTTY 50-850/Press in Spanish, poss TELAM (Argentine National News Agency)
13642	311246	USB/EE-YL with 5F groups. You can hear the click as each voice character was produced by the speech synthesizer. Seems like she has a slight accent, not British nor U.S., slight fading
13665	312109	RTTY 50-425/CW DE 6VY41-6VU73-79/(Dakar, Senegal) sending RY's
13785	181517	RTTY 50-425/Polish Press Agency PAP WARSAW-SOQ221 16210 KHZ and SON27813785 KHZ
13888.5	111814	CW/No CS/Weak stn sending cut nbr grps 1 2 3 4 5 6 7 8 9 0=A U 3 4 5 6 7D N T
14640	171719	CW/DE EBA (Madrid Radio Naval, Spain) Sends 5F tfc & PT Spanish WX
14953.5	181703	RTTY 50-425/5F grps/Poss Cuban MINREX



The Soviets provided the Sandinistas this communication intercept facility in 1982.

Dear Senator _____:

I am sorry but I just do not understand who is supposed to be protected by Senate Bill 2575. If I monitor certain electromagnetic radiations that are available to me in my house because I have the appropriate communications receiving equipment, I could be breaking the law per the "Electronic-Communications Privacy Act of 1986" which the Justice Department has confirmed will be unenforceable in most cases.

However, the Russians can obtain, with apparently little difficulty, prime "high ground" in Washington, D.C.; Riverdale, NY; and San Francisco, California, for the express purpose of establishing a facility for intercepting electronic transmissions.

Now please tell me, who constitutes the greater threat to the security of the United States and/or to the privacy of the communications of its citizens? Why is Congress legislating against U.S. citizens who are scanner and short wave listening enthusiasts, yet permits others to not only engage in the same activity but to do so at excellent receiving sites?

Sincerely,

Donald W. Schimmel

and a typical heading like -R-030200Z APR 85 -GR 100 BT UNCLAS UEHDF (etc.). The current intercept was made 23 August at 0413Z and was automatic CW. Similar practice traffic was earlier monitored on 19 July 1985 at 0309Z on the same frequency.

A OM/SS was heard on 6211.1 kHz, 21 August at 1520Z on AM. Dinome traffic (2-figure groups) was being transmitted. The operator spoke the groups very rapidly and would pause for a couple of seconds after a series of groups, apparently awaiting the go-ahead from the other end (which I could not hear). The signal was fluctuating and the audio was not completely clear. I heard nothing that would indicate what this activity might be.

Spanish language chatter has been heard along with callups on 6241 kHz. Activity commences shortly after 1300Z with a station having a raspy CW signal calling FST in lengthy sequences followed by calling XTB also for prolonged periods.

The operator has a very sloppy fist and sometimes sends FST and INST and XTB as GTB or QTB. He was also heard calling after 1400Z sending the same calls as above. This took place on 18 and 19 August.

On 29 August at 1408Z the callups were sent slowly and clearly and the calls were now CTB and TLP. Both calls were sent in long strings followed by V's and QSV.

Rick (?) of Harrisonburg, VA, advised me of a mysterious callup he heard evenings (approximately 2300Z) in the vicinity of 11320-11330 kHz. A chirpy CW station was sending PQU DE MBA CL K. I followed up on this on 17 August at 2249Z and observed POP calling CHT.

He started out on 11320 kHz then to 11307, 11298, 11300, and at 2314Z was on 11290 kHz. On 20 August at 2341Z a callup of WWJ DE GRQ CL K was heard on 11354 kHz. The other end was heard but was quite weak. That stations started to exchange chatter in broken English.

I started to check through my back logs because this activity rang a bell with me. Sure enough I found that I had discussed this odd net in the June 1985 and December 1985 issues of *MT*.

• **Scramblers and Sweepers:** Since first detecting this next signal to be described, I have monitored it with different receivers and from receiving sites several hundred miles apart. On 22 August at 1355Z I stopped searching the 6 MHz band when I heard a scrambled voice mode on 6222 kHz. A male operator came up and said in English, "Say again in plain."

At this point in time I noted a warbly CW tone sweeping slowly back and forth across this frequency so I followed it up and down the band. It went up to approximately 6250 as a high and down to 6211 as a low. The sweeper disappeared but was again noted at 1431Z at approximately 6220 kHz sweeping down to 6111.8 where it paused for about 10-12 seconds and then it started sweeping back up the band. At 6242 kHz it disappeared.

At 1446Z a similar tone, but much louder, was heard at 6311 kHz and it swept down to 6293.7 and disappeared. At 1448Z the weaker tone was heard again, this time at 6247 kHz and it swept down to 6185, paused for 5 seconds, and then went back up the band. At 1451Z it reached 6199.2 and was gone.

On 25 August during the period of roughly 1230-1245Z the sweeping signal was observed again, and then again on 27 August at 1258Z at about 6900 kHz. The warble signal went down to 6869 kHz where it disappeared at 1302Z. It was found again at 6912 kHz at 1304Z but I lost it due to local QRM. It was relocated on 6798 kHz at 1329Z and it went up to 6925 kHz and started back down. At 6920 kHz it disappeared.

Several times during the above activity, a stronger signal was also heard and this one was sweeping up and down the band at a faster rate than the weaker signal.

To follow these signals up and down the band required constant tuning of the main tuning control in very small increments, thus keeping pace with the sweeping tone. Very strange, indeed!

Listener's Log

Seattle City Light

Steve Paulsen of Seattle, Washington, has contributed a comprehensive list of base stations used by his city's electric utility. One low band frequency (37.58 MHz) is populated by no less than 12 base stations and 243 mobile units as shown below!

Location	Call Sign
Queen Anne Radio Terminal	KOB233
West Seattle Radio Terminal	KOB238
Cedar Falls Powerhouse	KOA962
Bothell Substation	KOB237
Gorge Powerhouse	KOB234
Diablo Powerhouse	KOB232
Ross Powerhouse	KOB236
Ross Dam	KOB239
Hozameen Camp	KOH728
Newhalem T.V. Site	KDC583
Boundary	KJM953
243 Mobile Units	KA2079

Additionally, one UHF installation (Queen Anne Radio Terminal, KOG329) is heard on a 451.15 MHz repeater, with 40 mobile units calling in on 456.15 MHz.

Sports Event Communications: A "Team" Effort

When the Little League World Series was played in South Williamsport, Pennsylvania, last August, William Dickerman was there with his scanner. On August 23, the day of the finals, these frequencies came alive:

46.125	Williamsport Police
119.1	Wmsprt Airport Tower (Army helicopter w/parachutists)
152.27	Taxi dispatcher
155.22	Civil Defense
155.25	South Wmsprt Boro
155.31	Lycoming Co. Police
155.565	S.Wmsprt Police
155.580	PA State Police (base)
155.64	Duboistown Boro
155.79	State Police (cars)
156.45	Williamsport Police
157.47	Auto Emergency
157.53	Taxicabs
161.645	Radio Sta WWPA Remote Broadcast
162.4	NOAA weather WXL55, Montoursville
450.8	Cue chan for ABC Wide World of Sports TV

Scanner enthusiasts within Williamsport radio range will appreciate the additional comprehensive list of frequencies William contributes this month.

35.075	PA Power & Light, KTA864
37.82	"
40.15	Med paging (Wmspt Hosp?)
43.725	Mobile telephone
43.835	"
44.185	"
45.555	Ambulance dispatch?
46.125	Wmspt police
75.3	PA Dept of Trans KGB566
49.87	Cordless phones ?
49.895	Transport of prisoners
49.1	NOAA wx (cf 162.4)
49.525	Paging (hosp?)
119.1	Wmspt airport tower
119.8	(NY)
120.45	Wmspt Hosp
121.4	(CLE)
121.9	Wmspt Airpt Ground
122.0	Pittsburgh Flight Watch
122.2	Wmspt & Wilkes-Barre/ Scranton Flight Serv Sta
122.4	Wmspt Flight Service
122.6	"
122.65	"
122.75	Lock Haven & Univ Park Unicoms
122.9	Wmspt Airport Unicom
122.95	"

(LISTENER'S LOG, cont'd)

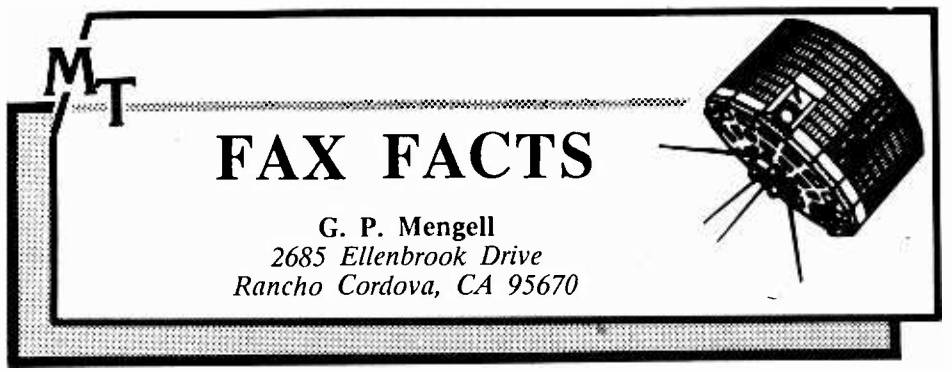
124.5	W-B TRSA
124.6	"
124.9	"
126.85	(NY)
127.45	"
128.2	"
128.25	(CLE)
128.5	(NY)
128.65	(CLE)
128.925	Eastern Airlines - La Guardia
129.1	TWA
129.35	"
129.85	People's Express
130.425	"
130.525	"
130.7	Eastern
131.45	(BOS)
131.5	"
131.7	"
132.0	"
132.025	"
132.075	(CLE)
132.1	(NY)
132.2	"
132.5	"
132.6	"
132.75	(CLE)
133.05	"
133.075	"
133.1	(BOS)
133.15	(NY)
133.35	"
133.375	(CLE)
133.5	(NY)
133.75	(CLE)
133.85	(BOS)
133.9	(WASH)
133.95	(CLE)
134.475	"
134.55	(BOS)
134.6	(NY)
134.65	(NY)
135.25	(BOS)
135.55	"
135.6	(CLE)
135.75	(NY)
135.775	(CLE)
151.775	Wmspt Hosp paging
152.09	Sunbury mobile tel.
152.12	"
152.18	Paging
152.21	Taxi Dispatcher
152.27	"
152.37	Paging
152.57	Wmspt telephone
152.685	Paging
154.4	Wmspt fire
154.89	Medical paging
155.17	"
155.4	Wmspt Hosp
155.565	So.Wmspt. Police
155.64	Duboistown Boro
155.16	Life Flight
155.25	So. Wmspt. Boro
154.755	State police (car-car)
154.43	Lycoming Co. Fire KGB841
155.31	Lycoming Co. Police
155.22	Civil Defense (Emerg Mgt)
155.34	Lycoming Fire Tac 4
155.58	State Police (base)
155.79	State Police (cars)
155.805	Montoursville Police
156.03	Co. Police Tac 3
156.45	Wmspt Police
156.495	Taxicabs
157.53	"
160.56	Civil Defense
160.8	Newberry railroad yards
161.07	"
161.645	Radio Sta WWPA Remote broadcast
163.25	Medical paging
162.4	NOAA WX-Wmspt
162.55	NOA WX Wilkes-Barre
450.8	Cue Chan for ABC Wide World of Sports (Little (League World Series)
461.45	Mobile telephone
454.175	"
462.95	Med 9
463.025	Med 2
463.05	Med 3
463.175	Med 8
467.95	Med 9
468.025	Med 2
468.175	Med 8
157.47	Auto Emergency

NY = New York Center ARTCC
CLE = Cleveland ARTCC
BOS = Boston ARTCC
WASH = Washington ARTCC
W-B = Wilkes-Barre

Central Wisconsin Scanning

45.08	Tomah
158.805	Inter-agency mobile freq & Juneau Co Hwy crews
450.4	State Criminal Investigation Bureau
122.00	Air Flight Watch
124.4	Minn. Center
146.91	West Central Ham Net
155.475	WISPERN statewide
155.370	Point-point statewide
154.905	WSP Dist 5,8 base
159.450	WSP
151.460	WSP car-car
154.680	WSP Dist 1,6 Base
159.420	WSP Dist 1,6 Mobile
151.280	WSP car-car simplex
122.925	Dept Natural Resources Aircraft Statewide
159.225	DNR Fire Net (N.Cent)
159.255	DNR Fire net (NW,S,SW)
151.43	DNR State Fire Net
151.40	Parks and Forests
151.16	Fish & Wildlife (Game Wardens) Car-car
34.81	Federal Fish and Game
34.83	"
154.295	State Fire Interagency
154.235	Monroe Co. Fire
155.340	State EMS
155.625	Monroe Co. Sheriff's Office
155.715	Monroe Co. Local Gov't
155.925	Monroe Co. Hwy Dept
155.085	Sparta PD
155.070	Tomah PD
156.210	Juneau Co. So.
154.815	Jackson Co. So.
155.43	La Crosse Co. SO.
163.20	U.S. Marshal SW,NW
155.205	Monroe Co.Schls & Buses
41.9	U.S.Army;Ft.McCoy Range Control Medevac Helicptr
122.7	Air UNICOM, small airports
122.8	"
122.9	Air MULTICOM, small Airports (Tomah)
122.95	UNICOM with control twr
165.0875	Ft. McCoy military police; also Veterans Hospitals statewide
163.5624	Ft. McCoy Range Control
128.6	La Crosse Airport Arrive and Departure
124.6	Ft. McCoy Army Airfield Arrive and Departure
126.2	Volks Field Airforce Base Tower
125.6	"
134.1	" Radar Control

UHF Military Air:
358.2 373.1 379.4 389.9 392.0
395.1 396.9 347.7 351.2 229.4
299.9 314.2 297.1
Hardwood Range 358.2



FAX FACTS

G. P. Mengell
2685 Ellenbrook Drive
Rancho Cordova, CA 95670

A.P.T. Primer

A weather facsimile station is usually comprised of three distinct RF downlinks feeding one facsimile or end user terminal: (a) Polar orbiting receiver; (b) GOES receiver; and (c) shortwave (high frequency) terminal.

None of this is as formidable as it may seem. We will follow this in a logical order, first with an explanation, then with circuit and component description.

Polar Orbit Satellite Receiver

The polar orbit satellite gives those receiving it a comparatively close look at the earth's geographic and weather systems, and is somewhat regional in nature. An observer in California would see the west coast from Nicaragua to Prudhoe Bay, whereas a listener in the British Isles may see Norway to the Mediterranean.

Rivers, bays, mountains and snow packs are usually quite evident. This is not landsat imagery, but as close as most of us will ever get to it.

To receive this, you need a stable VHF radio, approximately 40 to 50 kHz bandwidth, capable of reception in the 137 to 138 MHz band. There are many such receivers on the market, both new and surplus.

Probably the receiver easiest to operate is the Vanguard FMR 260 PL. It is reasonable, does yeoman service, and is extremely easy to use. It is also available equipped with an optional synthesizer which eliminates crystal purchases.

Mounted on the antenna mast is the necessary preamp (Vanguard 102 WG), optimized for 137 Mhz. The input usually comes from either an Omni VHF antenna or a steerable array. Before spending money on a beam, I would recommend a VHF omni such as the trombone or top hat antenna, which can give you surprisingly good results. The preamp output goes to the receiver input.

The audio from the receiver goes into the facsimile machine, and there you have it. It is then merely a question of leaving the radio on the desired frequency and waiting for the polar orbiter to come within range and then adjusting the framing and tone contrast for a suitable picture.

A system diagram of this easily-assembled system in shown in Figure 1.

GOES

The Geostationary Orbiting Environment Satellite (GOES) is probably more familiar to us as the TV weather map's "eye in the sky," providing majestic views of the earth from 23,500 miles out in space. Very

Figure 1

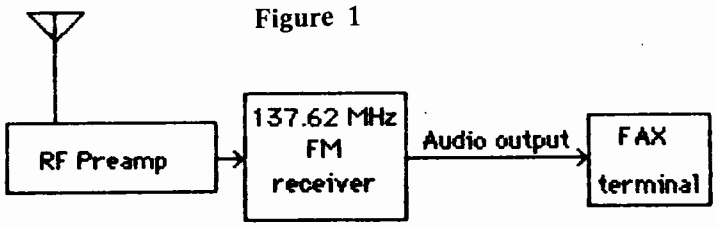
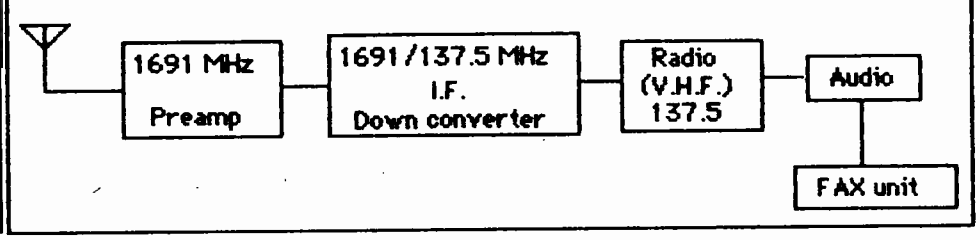


Figure 2



simply put, it just sits out there in a fixed location and continually scans the surface of the earth, giving us timely wide angle views of the world we live in.

GOES gives us a chance to plot the movements of storms at sea days in advance; it also provides relays of Europe's Meteo satellite and a great number of NOAA passes that are relayed, mosaicked, and then rebroadcast over the GOES system.

It is commonplace to see cloud cover over Iran, Vietnam, India, Australia, and even parts of Antarctica. It is, in short, a very valuable tool for users worldwide.

A GOES receiving system is again quite rudimentary, providing the proper route is taken. There are two antenna routes to take: the microwave dish, which until recently was difficult to obtain; or the 1691 Yagi (beam). The antenna feeds a 1691 MHz preamp which, in turn, feeds a down-converter which is fed into the antenna connector of the Vanguard receiver tuned to 137.5 MHz. The audio from the radio is then fed into the end user terminal (figure 2).

The third component is, at least on the "RF" end, familiar to all of us as the shortwave receiver. In facsimile, like RTTY, stability is every bit as important as selectivity and sensitivity.

Today's listeners have never been so fortunate (as many long time RTTY buffs will attest)--the days of frequency drift are a thing of the past. Today's digital-readout, solid-state receivers offer freedom from that malady.

Among the best are the Japan Radio NRD 515, 525, and 505. The less expensive Kenwood R-2000 is a good performer in this mode, as well.

In the surplus market there are a bevy of radios--both to look for and to look out for! Ironically, some of the more famous names such as Hallicrafters, Hammarlund, etc., just do not have the stability required; that is, the drift is pretty severe.

Collins radio has for years produced the best in military gear and much is on the surplus market. Among the most desirable are the 51S1 series, the "S" line receivers with crystal paks, the R-390/A, 51J3 and 4 radio receivers as well.

Possibly the penultimate in RAX receivers was the FRR-59A - WRR2. It was a "man's" radio in that it takes three strong men to to get it in its rack, weighing in at 300 lbs! It was built by National Radio for the Navy. Its strong point is accuracy and stability plus independent sideband. I have one here at this QTH per performing dual function of reserve receiver and holding down the garage floor!

FAX Converter

The next device in this chain of devices is the facsimile converter, a beast known to cause confusion among the troops. Suffice it to say, there are varying theories and interpretations, but to keep things to the point, it is a device that takes the receiver's audio output and converts all of that into tones the FAX machine can use.

Military converters commonly available are of the rack-mount variety, typically five inches in height and about 30 pounds in weight. Such tried and true units as the CU172 and CU1066A are very common on the surplus market, ranging in price from $50 to $160. Both converters employ a green "eye" tuning indicator, with the CU172 also having accessory outlets and ability to switch between machines or between machine and tape.

It should be pointed out that these units are of tube vintage, with the CU172 using octal base tubes and THE CU1066 using miniature tubes.

Alden Electronics over the years has produced a line of facsimile converters. Their earlier effort, the 421A converter, is indeed a work of art. It employs tube technology, is efficient, and simply constructed. It employs swing-meter tuning or flashing light indicators and sells for $250.

Alden's alternate is their 421Cm, an IC version of the same converter. It is 19 inches wide, about 3 inches high, is cosmetically gracious, and works exceedingly well. It also employs swing meter and flashing light indicator. They are available through Alden for about $500 reconditioned.

Radar Balloons Watch for Drug Smugglers

Divisions of TCOM (Westinghouse) and RCA are vying for the contract to deploy a balloon-lofted radar system for the U.S. Coast Guard off the coast of Florida to sweep the sea for suspicious vessels.

Congress has directed the Coast Guard to purchase five of the aerostats, each with a range of about 60 miles and capable of relaying the direction and speed of suspect vessels. (Item courtesy Bill Black, Washington, DC)

The FAX Machine

Finally, a word about what all these devices need to look into: the facsimile terminal. Over the years there have been many manufacturers--Alden, Muirhead, Litton, Westrex, Raytheon, and Nagra to name a few.

One needs to exercise some caution when trying to find a facsimile unit. It is very easy to pick up a unit that seems appropriate, only to find that it was made for another purpose altogether (even these can be modified).

It has been my experience that for HF work the Muirhead D-649 and K-649 give superb performance. I cannot speak too highly of these machines in the HF mode. They have been reliable to a fault.

The D-649 is a three speed machine, with 60 and 120 RPM most commonly used; the 180 rarely used. The K-649 is the solid (85 lbs!) state version of the same which operates at four speeds 60/90/120/240 RPM; AM or FM. Two picture sizes are available through switchable IOC (index of cooperation).

Alden Electronic Impulse and Recording Co. has been a major force at the cutting edge of weather FAX for some time now, and has produced legions of machines for the military and weather service over the past four decades.

Due to recent developments, many of these units are being released as surplus, usually in very good condition, such as the 9244 (HF only) and 9244 T (satellite capable).

Both give 18 inch charts (as do the aforementioned Muirhead machines).

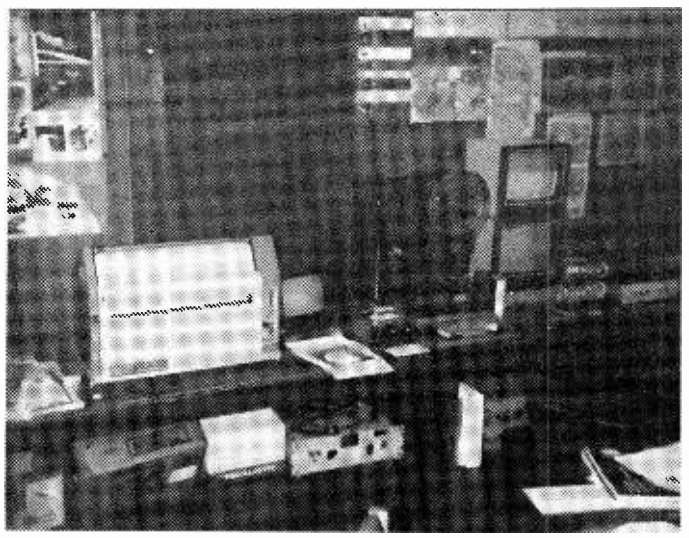
Alden's offerings in the 11-inch-wide prints include the 9225-E and H and the 9303. A newer version, the 9137, is also seen on the market from time to time. These are very versatile units capable of both satellite and HF reception with a mode change switch on the front panel.

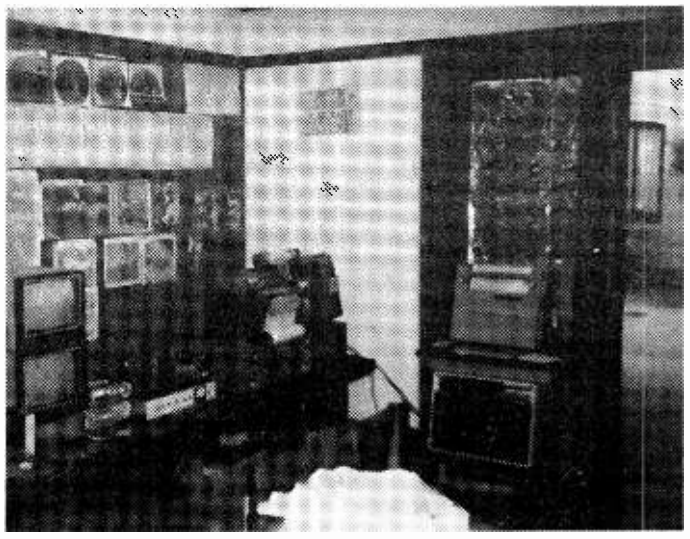
Litton makes an 18-inch recorder, the DC-19W, which is very popular with those in the weather satellite field. Modifications are needed, but can be arranged before delivery. As is, they are exceptional HF units.

The Bottom Line

Facsimile, in short, is an exciting mode, oft-times even beating out TV to get candid views of events both near and far--which leads into next month's column.

If you have a question or input (please do) give me a call at 916-364-1572. 73's. ■





The ideal receiving station--This is the set-up APT Associates installed at the Space Sciences Academy at Stanford University. It includes four machines: one for the polar orbiter (Tiros); another for the geostationary weather satellite (GOES); one for shortwave interpretive support from WWD in La Jolla; and one in reserve. It also includes a Wrasse video FAX terminal for "real time" spacecraft views.

Monitoring FDM

...Those Shortwave "Buzzsaws"!

by Jack Albert
203 York Place
New Lenox, IL 60451

PART I: Introduction

If I asked you, "Have you ever heard a 'buzzsaw' on the shortwave bands?" you may answer "Yes, it's one of those 'Russian Jammers'." *Nyet*--The buzzing I am referring to is a roaring sound similar to a twin-engine prop airplane. It sounds like a buzzsaw when your shortwave receiver is in the AM mode.

When I was just a young guy in the early 60s, I remember hearing the same roaring, buzzsaw sound on an old Philco consoles. I though I had just tuned in "Sky King"! I never heard those famous words from the series, "Roger--Wilco--over and out"; all I heard was the same old buzz. What I was really hearing was frequency division multiplexed radioteletype--FDM RTTY for short!

I received my ham license when I was a teenager in 1965 and when I heard the buzzsaws on a better receiver, I noticed that there were RTTY signals mixed in with the buzzing sounds. I figured the Russians, in their cold war efforts, were jamming American military RTTY stations.

In 1983 I purchased an ICOM R70 receiver and the 250 Hz narrow CW filter. When I switched to narrow CW, I could receive many channels of RTTY on a single buzzsaw. I will attempt to explain without getting too technical. You should already know basic RTTY principles before reading on; if not, the ARRL Radio Amateur's Handbook has a wealth of information on the subject.

The Basics

If you owned a 40 kW shortwave transmitter, how would you transmit three news services at the same time? You could purchase two more transmitters and antenna systems, or you could time share. The second method would be cheaper but you would still have an electric bill that would light the city. There is a better solution to the problem; frequency division multiplex.

FDM is a method whereby many FSK (frequency shift keying) channels are connected to a special mixing amplifier called a "summing amp." The channels operate at different audio frequencies and mark/space shift at 120 Hz (which can be copied using normal hobby equipment). FDM channel frequency assignments are shown in fig. 1; this table is called "R.70 bis" and is taken from the C.C.I.T.T. Red Book, VII.I, page 63.

The CCITT is the International Telegraph and Telephone Consultative Committee, a group of engineers from all over the world who set the telephone, teletype and computer data standards used worldwide. They make recommendations, for example, as to which frequencies would work the best for the V.F.T. (Voice Frequency Telegraph) channels and how should the channels be numbered.

The VFT schemes used in the telephone industry are also used in radio; R.37 is the scheme that is most used on the SW bands, although I have used R.36 and R.38B using normal RTTY equipment.

Figure 2 is a block diagram of a simple FDM RTTY system showing three of the twelve channels. Twelve oscillators are combined in the summing amp and fed to the audio input of a single sideband transmitter.

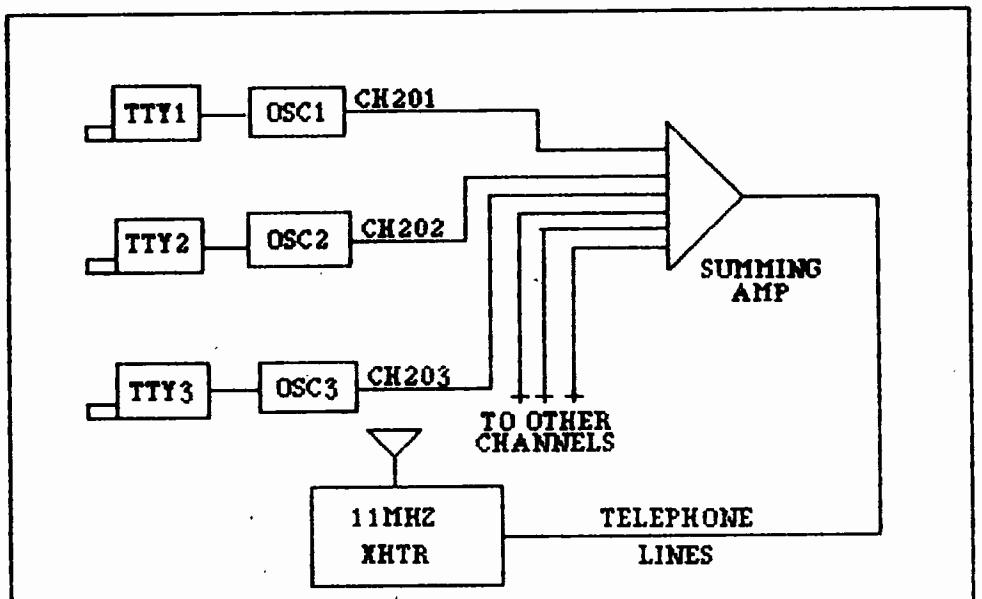


FIGURE 2

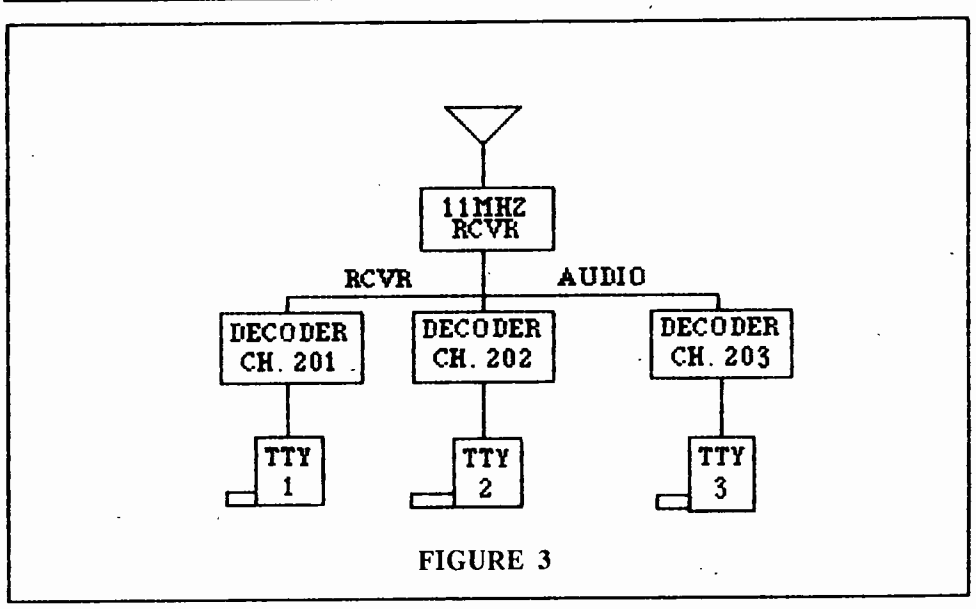


FIGURE 3

When combined audio frequency tones are transmitted by an SSB transmitter, the buzzing, hash sound is heard on an AM SW receiver because the receiver has a wide bandpass and all of the tones are clustered together. No carrier is being transmitted because it is suppressed by the SSB filters in the transmitter.

If the transmitter is set at 11 MHz and you wanted to receive ch.202 (figure 1 R.37), for example, you would have to select the USB mode and set your receiver to 11 MHz. You would need a special narrow filter to select only the FSK frequencies of 660 Hz and 780 Hz (see figure 3). Then the decoder would change the FSK tones to a loop current which would run the ch.202 RTTY machine.

The only problem with this system is you can only receive one channel. More filters and RTTY decoders would have to be added to decode other channels.

In the next issue, I will show you how to copy FDM RTTY using a standard SW receiver like the ICOM R70 or R71, a notch filter and a good RTTY decoder. ■

Scheme of Numbering of Frequencies and Multiplex
CCITT - R 70 bis

Mean frequency (Hz)	420	540	660	780	900	1020	1140	1260	1380	1500	1620	1740	1860	1980	2100	2220	2340	2460	2580	2700	2820	2940	3060	3180
Channel No.	001 101	002 102	003 103	004 104	005 105	006 106	007 107	008 108	009 109	010 110	011 111	012 112	013 113	014 114	015 115	016 116	017 117	018 118	019 119	020 120	021 121	022 122	023 123	024 124

According to Rec. R.31 / Rec. R.35 } 50 baud / 120 Hz

Mean frequency (Hz)	480	720	960	1200	1440	1680	1920	2160	2400	2640	2880	3120
Channel No.	201	202	203	204	205	206	207	208	209	210	211	212

Recommendation R.37
50 baud / 100 baud } 240 Hz

Mean frequency (Hz)	600	1080	1560	2040	2520	3000
Channel No.	401	402	403	404	405	406

Recommendation R.38 A
200 baud / 480 Hz

Mean frequency (Hz)	540	900	1260	1620	1980	2340	2700	3060
Channel No.	301	302	303	304	305	306	307	308

Recommendation R.38 B
200 baud / 360 Hz

Mean frequency (Hz)	420	540	660	780	900	1020	1140	1260	1560	2040	2340	2460	2640	2880	3120
Channel No.	101	102	103	104	105	106	107	108	403	404	117	118	210	211	212

One example of the application of Recommendation R.36
2 channels-200 baud / 480 Hz
3 channels-100 baud / 240 Hz
10 channels- 50 baud / 120 Hz

FIGURE 1

FCC Continues CB Linear Crackdown

Chester Massie, proprietor of H&Y Electric Supply in Louisville, Kentucky, was paid a visit by FCC officials early last month; $10,000 worth of illegal high-powered CB equipment was seized in the raid according to the FCC.

Although H&Y was not a manufacturer of the contraband equipment and Massie stated that he was merely doing warranty work on equipment from other manufacturers, the FCC itself was formerly on his mailing list.

Violation of the law carries a maximum fine of $100,000 and one year imprisonment. (From David Alpert, New York, NY)

Satellites and More Satellites

At last count, thousands of satellites and related debris orbit the earth at an altitude of 23,000 miles. Some of the newer birds are providing hi-tech communications and navigation.

INMARSAT - Hovering above the Hawaiian Islands, the 22-foot-long, 2213 pound INMARSAT was launched in 1984 by the Maritime European Space Agency, transmitting earthward in the 1530-1545 MHz range.

Although expensive to access ($20 per minute voice, $10 data) U.S. Bureau of Land Management and U.S. Forest Service spokesmen speak highly of the satellite relay, used recently in firefighting efforts in the American Southwest.

SPOT - Although a civilian satellite, the French SPOT provides extraordinary resolution of terrestrial targets; sharp details of streets and marinas were readily visible during recent tests.

LANDSAT - the U.S. competitor, also produces good images at lower cost ($80-$500 as compared to $155-$1790), and both satellites have been the target of security questions like, "What areas should be denied photographic access?" and "Could terrorists benefit from satellite photos?".

Still, SPOT has photographed sensitive regions for the private sector, and with cameras much better than those on LANDSAT and, with cameras on both sides of the satellite, can photograph twice a week what it takes LANDSAT two weeks to accomplish.

NAVSTAR/GPS - The U.S. Navy's NAVSTAR Global Position System can clock terrestrial vehicle motion within one mile per hour and pinpoint its position within 100 feet, and this information is also being made available to the private sector.

Particularly interested in the system is the railroad industry; Burlington Northern should be coming on line as you read this. Both data and voice will be used over some 200 miles of track in a demonstration involving 20 locomotives.

The NAVSTAR system is still experimental; eventually, 18 satellites will provide 24 hour global coverage on a frequency of 1575.42 MHz.

SARSAT - Following a series of experiments with the USSR using the COSPAS satellite, the new Search and Rescue Satellite has been saving lives by receiving signals on the two emergency locator transmitter (ELT) frequencies, 121.5 and 243.0 MHz and relaying the information to the ground station at Scott Air Force Base in Illinois.

GEOSTAR - Another navigational location satellite, this one is entirely a project of the private sector. Geostar Corporation has so far been able to find investors to the tune of about $40 million, while looking for a total of some $2 billion! Many setbacks have plagued the program, hopefully (and optimistically) set for implementation by 1990.

Employing spread spectrum technology, the ambitious undertaking uses tiny, portable transceivers that fit in a pocket, each with full keyboard and digital display for data. Calls through the satellite are targeted at a low $.25 each.

SIGNALS FROM SPACE

Larry Van Horn
160 Lester Drive
Orange Park, FL 32073

Soviet Geodetic Satellites

Several months ago I mentioned that the hunt was on for the frequency used by the Soviet geodetic satellite program. The hunt is now over and the frequency was found in a place in the spectrum that surprised me.

Prior to 1957, geodesy, the study of the shape and size of the earth and the determination of geocentric coordinates of points on its surface, was dependent only upon ground measurements over small areas, limited by the borders of states and continents.

The availability of artificial satellites as objects for geodetic measurements greatly increased the scope of geodesy and satellite geodesy and it is now an important applied science.

From 1968 to 1978, the Soviets used geodetic satellites that were launched by the C-1 rocket. These satellites represented the first generation of Soviet geodetic satellites. More information on these satellites will be presented in the third edition of Communications Satellites when it becomes available some time in the future.

The Soviets started launching their new second generation geodetic satellites in 1981 with the launch of Kosmos 1312. Follow-on launches in this series included: Kosmos 1410 (1982), Kosmos 1510 (1983), Kosmos 1589 (1984), and Kosmos 1660 (1985).

There have been two orbital inclinations noted for the second generation satellites over the last five years; the reason for this is not known. To help monitors recognize these parameters on their NASA prediction bulletins, they are summarized for you in Table I.

These satellites all transmit on 150.300 MHz using 300 kHz-wide PCM-FM telemetry. Each frame of telemetry is two seconds in length.

Most of the energy of this signal is at the edges of the signal bandwidth, indicating a high modulation index. The modulating signal is probably an amplitude-modulated pulse train (PAM).

There is also a coherent CW signal being broadcast by these satellites on a frequency of 400.800 MHz. If you are hearing 150.3 MHz, then 400.8 should also be audible.

Another confirmation aid for the second generation geodetic satellites is the orbital period--in the area of 116 minutes for each orbit.

MT readers should be able to hear signals from these satellites on any of the newer scanners that have a wide FM mode selection feature. These satellites are quite audible here in Orange Park even on indoor antennas.

As more analysis on breaking the telemetry becomes available, I will pass it along.

Kosmos No.	Apogee	Perigee	Incl	Rocket	L.Site	Intl Designation
K1312	1499 km	1490 km	82.6	F-2	Plesetsk	1981-098A
K1410	1502 km	1494 km	82.6	F-2	Plesetsk	1982-096A
K1510	1525 km	1480 km	73.6	F-2	Plesetsk	1983-115A
K1589	1502 km	1494 km	82.6	F-2	Plesetsk	1984-084A
K1660	1525 km	1482 km	73.6	F-2	Plesetsk	1985-047A

TABLE I

ODDS AND ENDS

➧ According to the September issue of *73* magazine's "QRX" column, Dr. Ralph Taggart, noted weather satellite enthusiast and author of The Weather Satellite Handbook, will now write a monthly column in *73*.

Taggart's new edition (3rd) of his handbook was reviewed in last month's (October) *MT*. Ralph's books include a lot of how-to and homebrew projects for WEFAX reception.

Many thanks to Bill Black in D.C. for the above information.

➧ Michigan *MT* reader Mike Rooksberry has provided the following frequencies in the UHF military aircraft band from his area. Any help with the unidentifieds would be appreciated.

288.00	Voice, quite active. Pilot said he had Prescott AFB in sight (??-LVH)
307.80	Voice, agency unknown
292.00	Voice
327.10	Pellston, ATC activity
269.85	FLTSATCOM activity
261.70	FLTSATCOM activity

➧ David Nugent in Indiana has been monitored some FLTSATCOM activity recently. He heard some Air Force activity on 262.550 MHz relating to "Exercise Sagebrush." David also would like to know what the term "switchoff to alpha-bravo" means. He had heard that in connection with Presidential aircraft activity. If you know drop me a line and I'll pass it on to him.

David also notes that 260.200 MHz is a primary refueling frequency in his area for military aircraft. Thanks, David.

➧ GRH publications has announced the release of a new book, The Soviet Cosmonaut Team by Gordon R. Hooper, FBIS. This comprehensive guide to the men and women of the Soviet manned space program contains over 330 pages of detailed biographies of every Soviet and Interkosmos cosmonaut, complete with more than 80 photographs.

The book contains no fewer than 30 background sections which analyze the Soviet manned space program in depth. These include: ➧

A Simple Satellite Tracking Program

Joe Smith, Jr.
P.O. Box B-36085
Florence, AZ 85232-9998

This program is designed to keep track of satellite locations during the course of a day. It is useful for Hams, T.V. DXers or anyone with a satellite antenna.

While the program is for the Timex/Sinclair computers, it should operate on most computers, using the BASIC language, with little if any modifications.

```
5   REM "SATELLITES"
10  PRINT "SATELLITE PROGRAM REQUIRES THE FOLLOWING INPUTS:"
20  PRINT "    DATE"
30  PRINT "    SATELLITE NAME"
40  PRINT "    SATELLITE NO."
50  PRINT "    HOUR OF EQUATOR CROSSING"
60  PRINT "    MINUTE OF EQUATOR CROSSING"
70  PRINT "    LONGITUDE OF EQUATOR CROSSING"
80  PAUSE 300
90  CLS
100 PRINT "DATE:",
110 INPUT D$
120 PRINT D$
130 PRINT "SATELLITE NAME:",
140 INPUT S$
150 PRINT S$
160 PRINT "SATELLITE NO.:",
170 INPUT N
180 PRINT N
190 PRINT "HOUR:",
200 INPUT H
210 PRINT H
220 PRINT "MINUTE:",
230 INPUT M
240 PRINT M
250 PRINT "LONGITUDE:",
260 INPUT L
270 PRINT L
280 PRINT
290 PRINT "TIME", "LONGITUDE"
300 IF S$="RS" THEN GOSUB 500
310 PRINT H;TAB 3;M,L
320 LET H=H+1
330 LET M=M+43
340 IF M>59 THEN LET H=H+1
350 IF M>59 THEN LET M=M-60
360 IF H<24 THEN GOTO 400
370 IF H>23 THEN PRINT "PRESS C TO CONTINUE"
380 INPUT C$
390 IF C$="C" THEN GOTO 90
400 LET L=L+26
410 IF L>360 THEN LET L=L-360
420 GOTO 310
500 PRINT H;TAB 3;M,L
510 LET H=H+1
520 LET M=M+59
530 IF M>59 THEN LET H=H+1
540 IF M>59 THEN LET M=M-60
550 IF H<24 THEN GOTO 590
560 IF H>23 THEN PRINT "PRESS C TO CONTINUE"
570 INPUT C$
580 IF C$="C" THEN GOTO 90
590 LET L=L+30
600 IF L>360 THEN LET L=L-360
610 GOTO 500
```

Navy Abandons Underwater Search

Mystery Remains

Just a little more than a year ago the U.S. Geological Survey ship, the S. P. Lee, was trapped while towing underwater acoustical equipment in the Gorda Ridge area 150 miles off the coast of northern California. $30,000 worth of survey equipment dropped to the bottom when the winch wire snagged something, stopped the ship and broke.

Scientists say that the wire was snagged by a "buoyant package of considerable size" according to a *Washington Post* report. The package package was reportedly tethered some 9200 feet below the surface, 1500 feet above an anchor on the ocean floor.

Scientists openly speculated that the package was possibly a secret listening device. The U. S. Navy would only confirm that it did not belong to the United States.

High seas have prevented the Navy from returning to the site and a spokesperson from the San Francisco office said that there was no longer any intention to return to the location by Navy divers. It was suggested, however, that the USGS had tentative plans to return.

Time in Space, Manned Spaceflight Log, Crew Assignments and Selection Groups, The Zond Program, Callsigns and CapCom Assignments, Cosmonaut EVA's, Military & Civilian Salyut Programs, Soyuz 1 and 2 Crewing, and Information on Tyuratam Launch Site.

The book was time to mark the 25th anniversary of Yuri Gagarin's epic flight and was published in June 1986. It is only available via mail-order direct from GRH Publications. The mailing address for more information and pricing data is: GRH Publications, 36, Bury Hill, Melton, Woodbridge, Suffolk IP12 1LF, England. Be sure to tell them that *MT*'s "Signals from Space" sent you.

Next month I will have more Soviet frequency surprises including some new frequencies never before in print that hobbyists can hear with scanners and shortwave radios. Be sure to send your letters with questions, frequencies, satellite intercepts, and mil aircraft frequencies to the address in the masthead. If you desire a personal reply please enclose a business size SASE. ■

Teletype Machines on Way to Junkpile

For decades, the sound of the "click-click-click-ding" teleprinter on radio and TV news programs has been synonymous with excitement, with late-breaking news stories. Now, the Associated Press has decided to give way to the computer age.

In a series of interoffice memos, the decision has been made to scrap the entire AP inventory of the old electromechanical machines, making room for the newer electronic printers with their efficient silence.

Sadly, there is virtually no market for the used behemoths; some have been donated to schools for the deaf, but the vast majority will take one more trip--to the dump. (Courtesy Langlitz Leathers, Portland, OR)

DON'T MISS A SINGLE ISSUE OF MT!

Have you renewed?

Check the subscription date on your mailing label!

MONITORING POST

Proud of your monitoring post or ham shack? Then this is your column--Send your photo and a brief description to Monitoring Post c/o Bob Grove or Larry Miller and see yourself in print!

Nicholas Chedville (shown on his dad's lap) of Port Sulphur, Louisiana, has been an SWL for three months now according to Dad. His "spectrum shack" consists of an ICOM R7000 connected to a Grove Power Ant 3 and Grove OMNI antenna; a Kenwood R2000 with the Grove Skywire; a Radio Shack DX-160 and Panasonic shortwave portable; Bearcat BC800XLT scanner; Commodore C64 home computer with disk drive and a Microlog SWL package; a President Washington CB; and a Johnson Miniscan hand-held. His Hallicrafters S38 is not shown.

Nicholas occasionally lets his dad use the equipment as well.

E.L. Berryman of Lincoln, Nebraska, has a receiver for every occasion. Three scanners, an NRD515 and Yaesu FRG7700 receiver with accessories, AM and FM receivers, and a host of active and indoor loop antennas complement the neat installation.

HAM RADIO

Mike Mitchell, Jr, W7WHT
P.O. Box 20279
Seattle, WA 98102-1279

On the Ham Bands

Last month I discussed the early days of radio when SWL's and hams were essentially the same. This situation continued until the Radio Act of 1912, at which time hams became official and non-ham enthusiasts became SWL's by definition.

It wasn't until the war that they finally became SWL's; in fact, as many unlicensed operators continued to operate outside the law until the war (we are referring to WW I in case you missed it!).

Some hams with vision, and no doubt with the idea of making a buck, started commercial broadcasting in 1910 by relaying a prize fight via radio to those with receivers. Even then hams were starting to specialize to some extent. Most were either into it in order to communicate (traffic handling), socialize (chat and make new friends of like interests), or to experiment.

There was plenty of room for all types as well as the new commercial operators and the government. But not all on the same frequency at the same time!

While the frequencies in use ran from about 30 to 1000 meters (300 kHz-10 MHz), spark gap transmitters were rather wide banded! Fortunately, even with 1 to 3 kW outputs, most of them didn't get out much further than 5 to 150 miles. But the majority of them were concentrated in the larger cities, and bedlam resulted.

Two important events occurred in 1912. The U.S.'s first general radio law was passed and 22 year old Edwin Armstrong (an amateur experimenter who later invented both the superheterodyne circuit and frequency modulation!) invented the regenerative circuit in the attic workshop of his home in Yonkers, New York.

The law really "stuck it" to the hams, forcing them to transmit only in that "useless" spectrum below 200 meters (above 1.5 MHz). The regenerative circuit multiplied the usefulness of that brilliant invention, the audion (triode tube), by a factor of three or four quantum leaps, both figuratively and literally! It changed the whole direction in which receiver design was heading and set the stage for a new era in wireless.

From the earliest days, the Navy had been the big guns of government radio. While the wire telegraph systems supported most government and Army needs, the Navy ships couldn't very well cruise the seven seas with reels of wire trailing behind them.

Both Navy and commercial ships were early users of radio and the first radio law of any type in the U.S., passed in 1910, required certain ships to carry radio equipment for safety. It wasn't until after the Titanic disaster that they were required to man those radios 24 hours a day.

Long before the Radio Act of 1912 required licensing, the Navy had issued certificates of skill to operators in an effort to upgrade their skills and also to have a list of operators and stations. Many amateur operators, with and without skill, caused interference to government and commercial stations, often because the amateurs had newer and better equipment.

Just as personal computers today are way behind the state of the art if they are merely a few years old, so too, then, was radio growing and changing at such a rapid pace that it left the government (with no budget for new equipment) and commercial operators (with little profit) far behind the inventive amateurs.

Remember that until after World War II, most transmitters were home- or custom-made and so were most receivers, except those used by broadcast listeners in their homes.

The chaotic interference which resulted caused the government and some officers in the Navy to try to get rid of the amateurs by making their operations illegal. But the radio clubs, especially a few big eastern clubs, provided enough pressure on, and input to, Congress to insure that the amateur service would survive...as long as it stayed below 200 meters!

It is important to note that radio was all the rage during the 1910 to 1912 era when the radio law fights were at

their zenith. And the arguments about the status of amateurs was of major interest to, and well covered by, the press during that period.

Even in those early days, amateurs were performing valuable services during disasters (remember that everything was powered by batteries, so they had emergency power!). Even with all that amateurs have accomplished since, we haven't been widely covered in the national press until Owen Garriott talked to us from space!

The technological and operational changes being made by amateurs really came into their own thanks to Armstrong's regenerative circuit and Maximum's idea for a national organization of relay stations.

The pendulum of amateur radio's major emphasis was swinging steadily toward the communications and social side of the scale and away from experimentation. Technical developments by amateurs were still very significant, but more and more operators got into traffic handling and operations.

The Birth of the ARRL

Amateurs still built their own rigs, but from well-laid-out designs in the magazines with a lot of manufactured (instead of home-made) parts. Into this situation stepped Hiram Percy Maxim with his idea for a national traffic network and a truly national organization which he called the American Radio Relay League (ARRL).

The ARRL was an outgrowth of the Hartford Radio Club and, during its initial period of existence, it basically consisted of Maxim and your (18 years old) Clarence D. Tuska sending out letters and membership forms and signing up amateur radio operators as relay stations.

They did rather well and, by the end of 1915, had even printed a list of stations and started a small printed bulletin called "QST"! Most of this was paid for from their own pockets and a little financial help from the Hartford Club which was eventually paid back to the club by Maxim. During 1915 they separated from the Hartford Club and incorporated as an independent organization. But in April of 1917, the government closed down all amateur communications. The World War had finally arrived in the USA!

Next month we'll take a look at the equipment the hams built and used prior to World War I, then in January we'll continue with the chronological history of ham radio.

Following the Trends

During the past several years, SWLing within the amateur ranks has received a boost in the form of general coverage receivers in most transceivers. Previously amateur transceivers only covered the ham bands. The arrival of silicon chips and microprocessors, coupled with a national resurgence in SWLing generally, has developed a vigorous market for such receiver sections.

Magazines such as *Monitoring Times* and *Popular Communications* have started up and enjoyed success. Major consumer electronic equipment manufacturers such as Sony and Panasonic have been producing relatively inexpensive and high quality receivers in increasing quantities, leaving the famous (and lonely) Zenith "Transoceanic" in their dust. There were always a few hardy souls in the business (Gilfer Associates has been around for 33 years), but much of the industry is relatively new.

A lot of this interest has probably been enhanced by the development, in 1967, of the scanning receiver which has continually gained in popularity and a general interest in radio communications caused by the CB boom. There have been ups and downs, but SWLing has been a growth industry, albeit a bumpy one, during the past ten years. A lot of the really good (cost effective) equipment that has fed this growth has come from Japan, but with the change in the value of the yen, we may well see an increase in U.S. manufacturer involvement during the next few years.

If you are a ham who is not into shortwave listening, do yourself a favor and tune around the commercial bands. You'll be amazed at what you'll find out there. Hamming is great, but it's only half of the fun waiting for you through your receiver!

The digital modes and equipment, especially packet and RTTY, are also growing rapidly. And with hams getting more into shortwave broadcast and utility listening, and with SWL's getting more into digital monitoring, I believe our mutual hobbies are going to continue to grow.

As more and more computer hobbyists discover that the real world "games" of SWLing and hamming are as much or more fun than the games many of them play, they too will add to our ranks. But for that to happen, we have to reach out to them! How about ads for *MT* and *PopCom* in the home computer magazines like *Computer Gazette, Run, Apple*, etc.?!

Volunteer Exams

The Volunteer Examination Program will be two years old next month and, while it's still growing and evolving, it is an unqualified success. There is still a need for more VE groups to test on a <u>regular</u> schedule (quarterly, bi-monthly or monthly). Those groups who have done that and advertised widely their scheduled dates (well in advance) have seen their average number of attendees double and triple.

It seems that hams (and would-be hams) like to set goals for themselves. They pick a date a few weeks or months ahead and then study the code and theory like mad until test day. They show up for the test all hyped up and nervous as a fly in a spider web and, even in this condition, six or seven out of ten pass!

But the main point is that even with the startup problems and a huge proliferation of VECs (three to five should be enough to provide options for testing methods, rules or paperwork and to prevent a monopoly in testing by one VEC, so 76 of them is confusing at best, and a dilution of effort and coast at worst!), the idea has shown itself to be practical, controllable and workable. Even though many more Extra Class and other volunteers are needed, the volunteer response thus far has been excellent. Keep up the good work VEs--you are appreciated! (Now if we could only do something about the @#$%#& paperwork!)

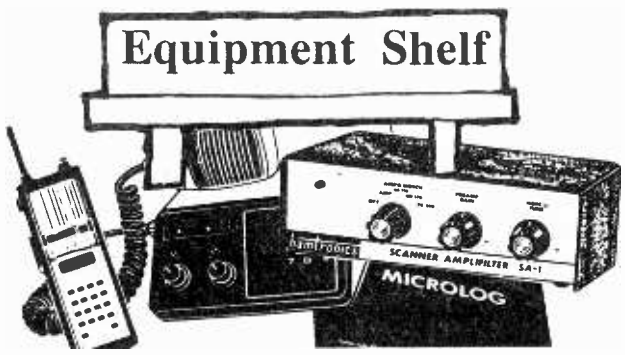
Remember, this is national "Be Kind to Turkeys Month," so take one to dinner on Thanksgiving! See you next month--and keep those cards and letters coming. ■

A New Club in Baltimore

A new amateur radio club has been formed in the Baltimore Metropolitan area, the **Freestate Amateur Radio Association, Inc.** The club has a repeater on 223.080/224.680, a RTTY MSO on 147.57 MHz, and supports a free telephone BBS.

The repeater, MSO and BBS are open to everyone, even non-members. For information and a free copy of their newsletter, please write to the Freestate A.R.A., P.O. Box 341, Randallstown, MD 21133.

WHAT'S NEW?



Regency R806 Crystal Scanner

Not everyone needs a programmable scanner to keep on top of the action in the public service bands.

For volunteer firemen, paramedics, policemen and individuals who live in rural areas - where only a handful of active frequencies are in use - a crystal scanner such as the new Regency R806 may be all the scanner they need.

Intended for home or mobile use, the scanner measures just 1-1/2"H x 5-2/10"W x 6-1/10"D, so it is small enough to fit under the dash or even in the glove box of the tiniest subcompact car.

Despite its tiny size, the scanner covers eight channels in the most popular bands: VHF-Low (30-50 MHz), VHF-High (144-174 MHz) and UHF (440-512 MHz). Another version of the scanner substitutes the government land mobile band (406-420 MHz) for UHF.

The scanner includes programmable priority, dual scan speeds, channel lockout, and a manual control for stepping through channels.

A top-mounted speaker delivers a full 1.5 watts of crisp, clear audio.

The Regency R806 crystal mobile scanner comes with a mobile mounting bracket, AC power cord, DC power cord, and a telescoping antenna.

Additional details are available from Regency scanner suppliers or by writing directly to Regency Electronics Inc., 7707 Records Street, Indianapolis, IN 46226.

Regency R806 Crystal Mobile Scanner

TEN-TEC RX325 IN PRODUCTION

The recently-announced RX325 general coverage receiver from Ten-Tec of Sevierville, Ten-nessee, is now in production. An informed source told *MT* that an initial production run of 200 units is now in distribution.

MT will present an in-depth review of the little receiver in an upcoming issue.

ICOM Improves Warranty Period

Effective immediately, ICOM now offers a one-year warranty on all HF receivers and transceivers. The warranty will be honored on the popular R71A general coverage receiver and R7000 continuous coverage VHF/UHF receiver.

Energy Engineering Cabinets

A new line of custom cabinets for the homebrew assembler has been introduced by Energy Engineering (Rt. 4, Fayetteville, AR 72701). The EDEK-R series of enclosures feature stained hardwood ends and heavy-gauge, bright, wraparound aluminum cabinet covers.

The aluminum may be left bright, sanded for a brushed look or painted (as may be the smooth-finished, dark-walnut-stained ends). A galvanized steel bottom will accept soldering and may be used to hold heavy components; it also holds the cabinet together with four wood screws in place. Self-adhering rubber feet provide no-slip, no-scratch placement of the finished cabinet.

A virtually infinite variety of sizes is available with no tooling charges. Prices are typically in the five to seven dollar range in small quantities.

"2600": A hacker's dream. In the beginning there was TAP, a phone phreak, anti-establishment publication by "yippie" Abbie Hoffman. Now there is "2600," an information-packed inside peek into the vulnerabilities of high tech communications.

Did you know your telephone has the built-in capability to participate in the Department of Defense's AUTOVON (automatic voice network) telephone network? All it takes is a little rewiring to engage one unused column of buttons which produce the necessary 1633 hertz tone.

AT&T refers to the four-button set as A, B, C, and D; the Defense Department calls them "Flash, Override, Flash," "Immediate," and "Priority." Calls unpreceded by these precedence tones are considered routine.

These and other fascinating facts are contained in each issue of

Panasonic Receives Emmy Award

The Panasonic Company, a consumer products division of Matshushita Electric Corporation of America (MECA), has received an Emmy Award from the National Academy of Television Arts and Sciences for "outstanding achievement in (television) engineering development."

The Emmy Award cites Matsushita/Panasonic for its role in "the manufacturing and marketing of a consumer video tape recorder making it possible for the consumer to time shift recording and viewing."

Panasonic introduced its first VHS video cassette recorders in the United States in 1977.

Seen accepting the award from Mr. John Cannon, President of the National Academy of Television Arts and Sciences (left) are Mr. Kiyoshi Seki, President and Chief Executive Officer of Matshushita Electric Corporation of America and President of the Panasonic Company (right) and Mr. Tsuzo Murase, a Director and Member of the Board of Matshushita Electric Industrial Company, Ltd. (center).

"2600." For more information write: "2600", P.O. Box 752, Middle Island, NY 11953.

C64 SWL FILE - We received an excellent program on disc for the Commodore 64 from Gene Mills (134 Sandra Dr., Theodore, AL 36582). Shortwave listeners who enjoy QSL'ing would find the program especially useful.

Gene has built in forms for reception reports, contents of transmissions, remarks, signal reports, and even a separate cover letter. The program will save and retrieve data and print out at 66 lines per page on a Gemini printer.

Listeners who desire additional information including cost of a copy disc may wish to write to Gene directly at the address above.

DX'ERS DIRECTORY by Fred Osterman (96 pages, 6" x 9"; $4.95 plus $1.25 shipping U.S. from Universal Shortwave, 1280 Aida Drive, Reynoldsburg, OH 43068)

Are you a "sociable DX'er"? Then this is the handy handbook for you. Containing some 1200 names, addresses, phone numbers, club memberships, and listening preferences of respondents to Fred's poll several months ago, the Directory is a "Who's Who" of the shortwave hobby.

A convenient appendix lists major and minor listening clubs throughout the world along with their addresses.

RADIO DATABASE INTERNATIONAL by Larry Magne and Tony Jones (352 pages, 6" x 9"; $12.95 plus $1.50 shipping in U.S. from Grove and other dealers)

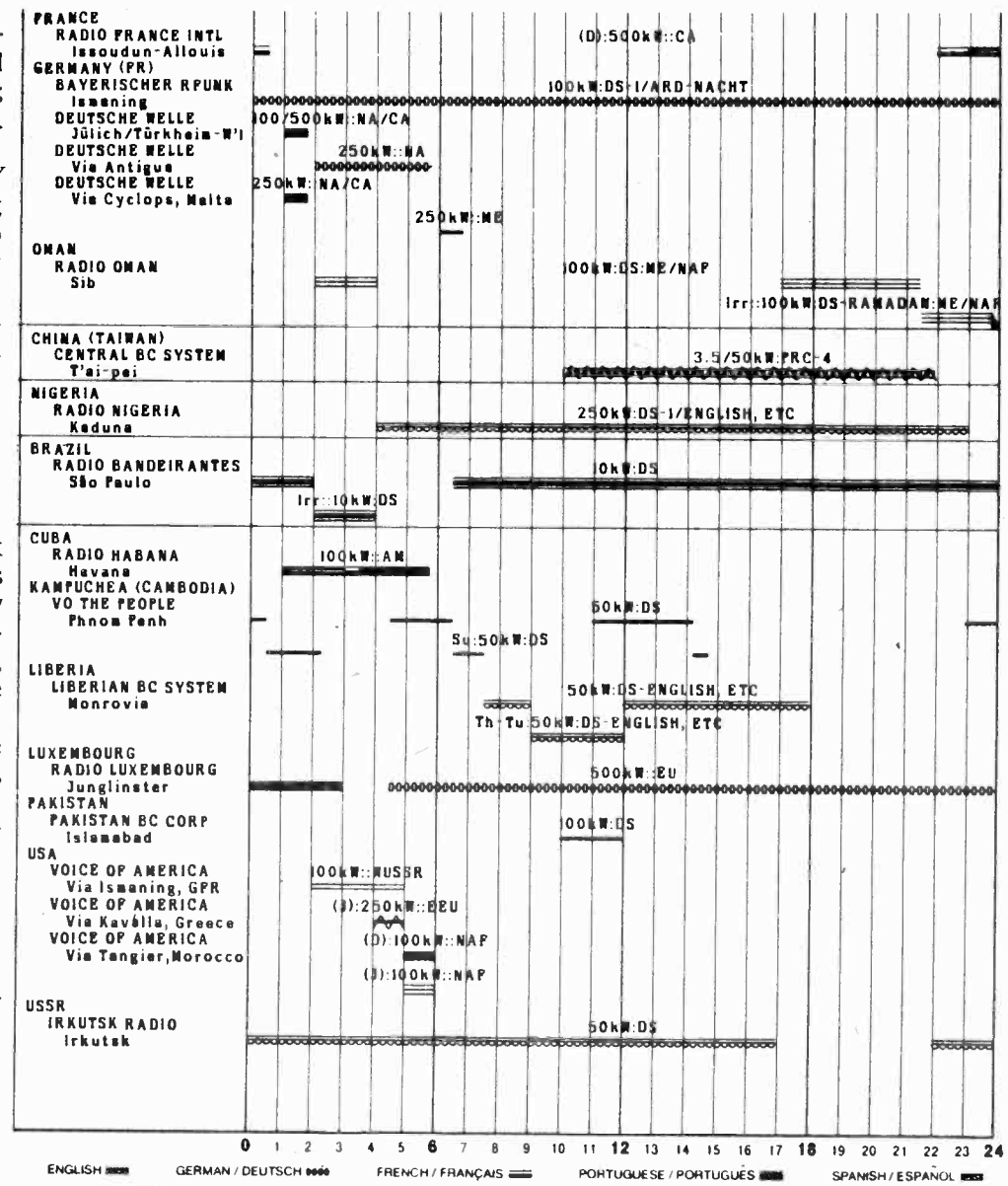
While the *World Radio TV Handbook* is still the broadcasting reference standard worldwide, up and coming is this excellent shortwave listeners' frequency guide.

The format of the *RDI* is unique and eminently useful. Shown here (without the left-hand frequency column) is a sample page portion indicating broadcaster, time slot, power, language, and target area--a considerable amount of data in such an easy-to-read fashion.

Included in this excellent book is a section of receiver reviews as reported by renowned expert Larry Magne. All of the popular brands--Yaesu, Kenwood, Sony, Panasonic, ICOM, JRC, Ten Tec, Sangean--are listed and authoritatively critiqued.

A by-country list--"Worldwide Broadcasts"--provides instant access to the most likely frequencies to tune in order to catch a particular broadcaster.

If you need encyclopedic information on every longwave, mediumwave and shortwave broadcasting service in the world, the *WRTH* is worth the extra money. If you are like the majority of listeners who want to know where to tune on the shortwave bands to pick up which services--and you want your information up to date and accurate--choose the *Radio Database International*.



Receiver Review

PANASONIC'S NEW RF-B20 TRAVEL PORTABLE

RADIO DATABASE INTERNATIONAL Rating of Performance: (F)

by Larry Magne

From the late Seventies until the early Eighties, the name Panasonic meant leadership in shortwave radios. Their model RF-2800 portable was a pacesetter that provided digital frequency readout, along with generally good performance and unusually enjoyable audio quality. The '2800 was followed by the RF-2900, then the RF-2600, all of which are now discontinued. However, the RF-2600 still exists in improved form as the General Electric World Monitor, which is reviewed, along with 56 other world-band radios, in the just-released 1987 edition of *Radio Database International.*

The engineering team at Panasonic that developed these early digital radios relied not only on good engineering design, but also on feedback from listeners. They had Japanese and Western shortwave hobbyists as consultants, and pored over published equipment reviews to find what aspects of performance could be improved upon. In the U.S., they had a sales manager who carried this further by carefully probing and aggressively promoting to the U.S. world radio market, as well as actively soliciting feedback from active listeners and reviewers alike. Sales, according to Panasonic at the time, grew nicely.

Alas, the two-continent effort was done in by its own success. In Japan, the team that had developed the successful early digital models was rewarded by being promoted to computer hardware development. And, in the U.S., Panasonic's excellent sales manager -- in a move worthy of the movie, "Gung Ho" -- resigned so he could spend more time in the U.S. watching his kids grow up, rather than toiling away night and day in hotels and offices in Japan.

Since then, the record of Panasonic world radio products -- their performance, as well as their promotion -- has slipped, sometimes dramatically. Some of the new team's engineering efforts were awful. Compounding matters was a new tendency to gather their wagons in a circle. Panasonic withdrew from its formerly open attitude towards consumers and reviewers; tending, instead, to become inward-looking and suspicious of outside input that was not enthusiastic.

But throughout these peculiar ups and downs, Panasonic's reputation for producing a product of above-average quality has remained intact. Whereas Sony ICF-2001's have tended to conk out over the passage of time, Panasonic portables made during the same period usually continue to provide pleasant, reliable performance. This reliability is one of the reasons we recommended the GE World Monitor, manufactured by Panasonic, in the 1987 edition of *Radio Database International.*

In recent years, Panasonic has tended to come up with less problemsome offerings, but they have long since lost the initiative to Sony, which has become an unusually innovative and market-sensitive Japanese manufacturer of world-band radios. Unfortunately, Panasonic's new RF-B20 does nothing to improve upon this.

Promising Beginnings

The Panasonic RF-B20 is a small (6 1/2 x 3 1/2 x 1 1/8"), lightweight (14 oz. with batteries) travel portable covering the "Western" FM band (87.5-108 MHz), longwave, the AM band, plus the 49/41/31/25/19/16 meter shortwave bands. No digital frequency readout is included. Rather, an analog "bandspread" is used to stretch out each shortwave band so as to make tuning easier. Although this arrangement provides less accurate frequency readings than does a digital readout, for ordinary shortwave listening use it is quite adequate.

The 'B20's most obvious plus is double conversion, which helps keep "images" and other noisome false signals from making shortwave listening unpleasant. Too, a continuous tone control is included -- a rarity in such a small radio -- plus there is a travel power safety switch to keep the radio from being accidentally switched on when it's packed away.

Otherwise, features are not the 'B20's strong point. There are no programmable channel memories, keypad tuning, 24-hour clocks, dial lights, signal-strength meters, BFO's or any of the other "bells and whistles" found in more sophisticated portables. But, then, you don't expect a radio to stir the soup and burp baby for $99.95, which is the 'B20's list price.

Performance is mixed. On one hand, the reduction of false signals brought about by double conversion is a real step forward over Panasonic's earlier RF-9 -- a tiny, now-discontinued abomination all but guaranteed to turn human eardrums to leather. On the other hand, the 'B20's IF rejection is mediocre, allowing some false signals to creep in anyway. Withal, the 'B20's double conversion circuitry is successful.

Audio quality is also surprisingly good for such a small set. Another welcome plus: the 'B20 uses real knobs, rather than cumbersome slider controls, for the tuning, volume and tone controls.

Shortwave sensitivity is quite good for a small portable, with FM being in the Panasonic tradition of superior performance. The set's built-in antenna rotates fully, as well, plus the set comes with a nice little travel case.

On the Other Hand...

Unfortunately, this silver cloud has a dark lining. Selectivity, one of the most important aspects of shortwave performance, is mediocre. Unlike the discontinued RF-B50, the RF-B20 has only one selectivity position, and it's too wide for interference-free reception of many shortwave broadcast signals. As a result, squeals and slopover from nearby signals combine to make listening something less than an aural treat.

Less important, but an indication that Panasonic is still out of contact with the existing reality of world radio, the important new 21 meter (13 MHz) band is omitted in its entirety. By 1989, with the 21 meter band filled and the sunspot count rising, this omission will be even more painfully apparent during both nighttime and daytime listening.

Various other shortwave broadcasting bands -- 120, 90, 75, 60, 13 and 11 meters -- are also omitted in their entirety, and a bit of 31 meter band coverage is truncated (e.g., the BBC's key frequency of 9410 kHz is just missed on our set, which only tunes down to 9420 kHz).

How, then, does Panasonic's RF-B20 compare with Sony's miniscule ICF-4910/ICF-4900 travel portable? Overall, the Panasonic comes out on top except for selectivity, IF rejection and compactness. But without appropriate selectivity you simply don't have much of a shortwave set, and the 'B20 is hardly selective.

So my tired ears cast an unenthusiastic vote for the identically priced Sony ICF-4910/ICF-4900. Were the 'B20 to have tighter selectivity -- or at least a 5 kHz "whistle" notch filter to keep out the cacaphonous howls and squeals of shortwave -- it would be the model of choice in a low-cost flyweight travel portable. But that's not the way it turned out. ■

Radio Database International Scale of Overall SWL/DX Performance

*****	Superb
****	Excellent
***	Very Good
**	Good
*	Fairly Good

No stars - Fair (F), Poor (P), or Unacceptable (U)

The American Dream

Did you know that the Apple I's inventors, **Steve Wozniak** and **Steve Jobs** started their careers as manufacturers of underground telephone "blue boxes?" Wozniak, a confirmed phone phreaker, designed the gadget to crash AT&T's long distance system. The box emitted tones so accurate it fooled AT&T's switching system and opened up long distance telephone circuits free of charge. Jobs later became a programmer for Atari and Wozniak an engineer for Hewlett-Packard. They built their first computer together with parts from Atari and Hewlett-Packard.

Apple's first manufacturing facility was a spare bedroom in the Jobs' home where they assembled 50 machines for sale to the Byte Shop. In 1980, Jobs and Wozniak "went public" with Apple Computer and were immediately worth $400 million. Their initial capitalization was $1,300 raised by the sale of a Volkswagen van and a programmable calculator! *(from the W5YI Report)*

BEHIND THE DIALS

800 MHz Scanning Receivers...
A Perspective by Larry Wiland

With all the controversy over the "Electronic Communications Privacy Act," the "new breed" scanners which can receive the 800-906 MHz bands are receiving both praise and criticism.

The Icom R-7000 seems to be getting "flak" in the radio-related magazines and newsletters because of its comparatively high price. This is like comparing apples to oranges--sure, you can buy an FRG-9600 Yaesu scanning receiver, or a Regency MX-7000 scanner, or a Bearcat 800XLT, but are these *affordable* scanners *better* than paying a few extra bucks for something that is superior to all of them combined? Having been fortunate enough to have access to the R-7000's competitors, it didn't take much to convince me.

Granted, our hobby is expensive enough when the average cost of any scanner which receives frequencies above 512 MHz is $400.00 or more, but it all boils down to how *much* you want to hear.

The Regency MX-7000 is an outstanding scanner for most purposes, but think of its *size* and then look at the R-7000. That extra "area" within the interior of the latter contains a tremendous amount of electronic apparatus, a convincing argument that the R-7000 should therefore work better in comparison.

Almost everyone I know in the hobby of scanner monitoring has more than one scanner, so the cost of multiple scanners could certainly offset one large expenditure for a scanner of professional quality.

I am not advocating that everyone should own an R-7000, or that it is the best scanner on the market. What I am saying in effect is that you should make your scanner purchases carefully--"think it out" before you buy a scanner with 800 MHz capabilities.

A SIDE-BY-SIDE LOOK AT 800 MHz SCANNERS

Model	Limitations
Bearcat 800XLT	Incomplete coverage (806-916 MHz only); Step increments off frequency on cellular "splinter" channels; Moderate intermod
Regency MX-7000	Slow scan speed (correctable w/modification); Internal noise; Poor search capability
Yaesu FRG-9600	No "scan stop" (unit continues to scan sequence whether carrier drops out or not); Non-standard programming; Annoying flashing digits on receive; Can only scan ten channels at a time; Slow scan speed
Icom R-7000	No true scan delay (timed 5/15/infinite settings; scanning resumes whether carrier drops out or not); No whip antenna included; No individual channel lockouts; Highest cost

Model	Advantages
Bearcat 800XLT	Fair price; Flexible, friendly features of BC scanners; Very good sensitivity; Instant weather feature; Separate antenna for 800 MHz
Regency MX-7000	25-550 and 800-1300 MHz coverage; Good sensitivity; Good audio; Fair price; Compact size
Yaesu FRG-9600	Excellent sensitivity; Ten banks of ten channels; Can receive video (with optional converter); Good audio; Will interface with computers
Icom R-7000	Outstanding selectivity & sensitivity; Professional features of an amateur radio unit; Good scan speed & easy operation; Tuning knob or direct frequency entry

Outer-Space Life May Use the Radio

Beings from other planets may be watching *I Love Lucy*, and earthlings likely will get their first hint of life on other planets from similar transmissions, says an expert in the search for intelligent life in the galaxy.

Dr. Frank Drake, dean of natural sciences at the University of California at Santa Cruz, says scientists hope radio signals will direct them to intelligent beings on other planets in the galaxy.

He recently told the Astronomical Society of the Pacific's annual meeting that scientists have detected radio signals originating from beyond the solar system with supercomputers that scan millions of radio frequencies at once.

But so far, the only so-called intelligent signals have come from a man-made satellite launched 12 years ago and now traveling 3.3 billion miles away from Earth. *(Seattle Post-Intelligencer)*

(TECHNICAL TOPICS, from P. 48)

comes with the rod). Connect a piece of coax, such as Radio Shack RG8/M, between the rod and the ground connection of the radio with a .001 μF, 500 V. disc capacitor soldered between the center conductor and the shield braid at each end as shown in figure 5. Waterproof the outside connection with silicone rubber compound. Without going into heavy theory, this makes your ground lead only about 4 inches long, even if you're on the sixth floor of an apartment building, and completes the path between the radio station and your location - an improvement of perhaps two to four S units!

If your radio doesn't have a ground connection, use a "case screw"--as long as it doesn't go into plastic!

This is all you can reasonably do, for minimal expense, to obtain a 50-200% improvement in your reception capability. Believe me when I tell you it's worth the effort! ■

Can I "Soup It Up?"

Yes -- No -- Maybe!

As a consumer society, we're aware of fierce competition in everything from washing machines to automobiles. This is a mixed blessing as, while a manufacturer wants to be just a little better than the others, the increased cost of a simple $1.00 component over 100,000 units is $100,000 dollars--a decision that cannot be made lightly!

The slight cost differential between nearly identical units can and does often mean the life or death of a company - in shortwave radio, for example, National, Hallicrafters and Hammarlund were locked in a struggle for survival between themselves and the Japanese. The Japanese won on lower labor costs and, frankly, had better engineering. This doesn't ensure the best, however, as Yaesu, Kenwood, Icom, Sony, Panasonic, and a few others are replaying the same scenario.

I'm all for competition - it's said that a camel is a horse designed by committee. We sure don't want a "people's radio" using the lowest common denominator! So in every cloud there is a silver lining; there are a few inexpensive things you can do to really make your radio stand up and dance, no matter what the original price was or how old it is!

This article is intended for those with no technical knowledge and the advanced electronic experimenter alike. You can pick and choose what you're most comfortable with, or refer the specific job to a friend or "ham" repair shop.

The RF Amplifier

The first RF (radio frequency amplifier) stage establishes the noise figure and gain for the entire radio. Eighty-five percent of all tube-type receivers use a 6BA6; it works well and is a direct plug-in replacement for the best tube available at one-third the price.

The best tube is the 6AH6 which costs about $20.00; it has less than half the noise and better than three times the gain. No retuning is necessary--just plug it in. It's usually designated "V1" in the radio.

For those with a solid state RF stage like the 3SK40, the 3N211 is what you want. NOTE: Do NOT use a GE, RCA, Motorola, or Sylvania "substitute" per the "cross reference book" at your electronic supply house. They're NOT the same thing!! They merely work in a general fashion for replacement purposes. Always keep this in mind during a repair!

The base connections on all dual gate MOSFETS are the same so, as with the tube replacement outlined above, whether solder or socket, wire-for-wire is the proper way to go.

Detector and Noise Limiter

In the last few years 1N34, 1N60, 1S1007, and other germanium diodes have become economically sound to replace with Schottky silicon diodes. Radio Shack carried the HP5082-2835 (RS#276-1124) for two years at two for $.99 but discontinued them. These units feature extremely low distortion, almost no loss and great uniformity.

You can obtain them from any jobber that carries Hewlett-Packard products or a Radio Shack franchise store that has old stock.

Schottky MESH diodes which are "state of the art" can be obtained from Fox Tango Corp., P.O. Box 15944, W. Palm Beach, FL 33406 for about $4.50 each. Believe me when I tell you the results hit you in the face! You're so used to minimal performance that a real miracle is just waiting in the wings!

Selectivity

You are either dependent upon your IF (intermediate frequency) "cans" (IF transformers) or an el-cheapo ceramic filter that costs about $1.75, made like an aspirin tablet, to keep stations from slopping into each other (see fig. 1). I don't need to tell you they just don't cut it! This is expensive, but probably the most important thing you can do to make your listening easier.

A multi-pole crystal filter can be "patched" in to take the place of the ceramic unit (see fig. 2) or, in the case of NO filter, to give you the bandwidth of a doorway. These can run from $50-$150 depending on your needs and the supplier.

American Crystal and Fox Tango are among the better sources, but there are others such as KVG that are reputable. Don't disregard this step as it's the most important of all. See figure 3 as to how they can be installed.

Audio

All voice and most shortwave music audio frequencies are below 3.5 kHz; the rest you hear is internal and external "hiss" which carries no information and is fatiguing to the brain. A Radio Shack #272-999 (10µF non-polarized) capacitor across your speaker will "roll off" a substantial portion of this annoyance inexpensively.

You can make one yourself by soldering two 20 electrolytics in series, + to + or - to - at the center junction, and the outside wires to the speaker (see fig. 4). The voltage rating is unimportant because it is so low at the speaker.

Figure 1
Ceramic Filter

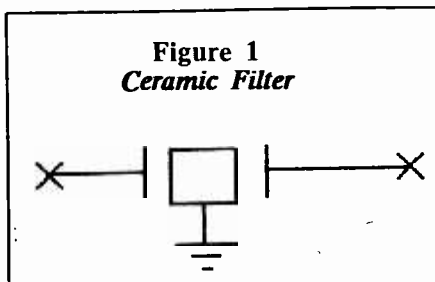
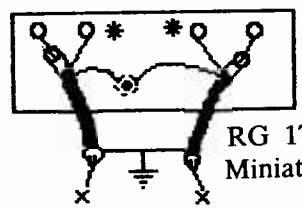
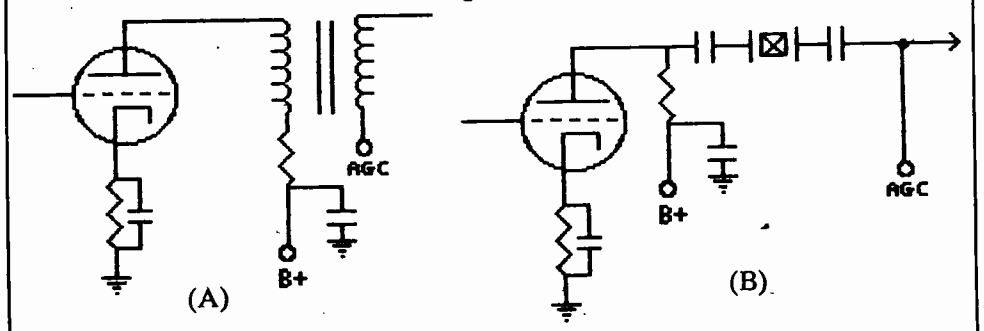


Figure 2
Crystal Filter



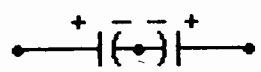
**=Fox Tango connections. Affix with "double sticky back" tape to convenient chassis point.*

Figure 3



Replacing "IF" transformer (A) with crystal filter (B); use same scheme for transistorized circuit

Figure 4



Cheap Radios

While you may dread hearing it, I'm going to give it to you straight! If you have a Hallicrafters S-38, a National SW-54 or one of the current Radio Shack or other plastic-case multi-band units that cost under $100, there's really nothing you can do except to use a good antenna and ground. An external preselector will help.

If the bug really bites you, moves up to a more sophisticated model - not just one step, but as high as you can reasonably afford.

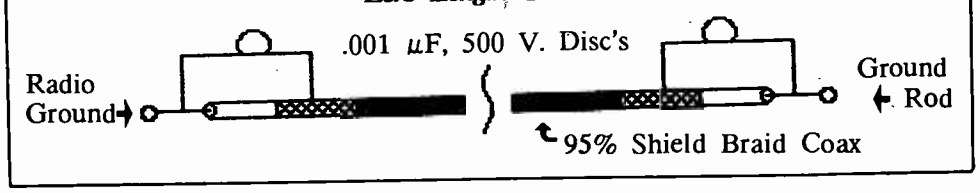
There are usually some good used units at the dealers that, if guaranteed, will give you a lot of "bang" for your hard-earned buck! These admittedly are usually rather large, but a desk is much larger (They haven't changed in size since the 1600's--desks, that is, not radios!).

Ground

A ground wire longer than 1/8th wavelength at the frequency of interest doesn't work; this is about 8 feet on 19 meters. You have to drive a 6'-8' ground rod next to the foundation of your building where moisture is retained, using a stainless steel, universal, fuel-hose clamp from an auto supply store as the connector (don't use the "saddle clamp" that

(Please turn to p.47)

Figure 5
Zero Length Ground



ANTENNA TALK

W. Clem Small, KR6A

Choosing and Using a Vertical Antenna

The low angle of signal radiation obtained with certain vertical antennas is legendary among radio operators from Chicago to Shanghai and back. One reason for the legend is that the low-angle signal radiation (and reception) from these antennas produces excellent DX communications via ionospheric skip on the high frequency bands.

Another reason for the popularity of these antennas is that the ground wave which they can produce is useful for medium frequency work in applications such as maritime short-haul CW, AM broadcasting and 80 meter amateur local or statewide traffic nets.

However, ground waves tend to dissipate more quickly as frequency increases. Thus, above 5 MHz or so, ground waves are of limited usefulness. It is the low-angle ionospheric-skip sky waves, rather than ground waves, which constitute the basis of the vertical's claim to being a great DX antenna.

But as we go even higher in frequency to the VHF and UHF bands, there is essentially no sky wave reflecting off the ionosphere to give that long-haul DX found on the HF bands. And so on these higher frequencies, with no ground wave and no ionospheric-skip waves, signal propagation is limited to what is called "line of sight" communication.

With line-of-sight propagation, the higher we locate the antenna site, the greater the range. Therefore we often find VHF and microwave antennas mounted on tall buildings, towers or hilltops. Such elevated sites increase the range of these antennas considerably.

Such elevated-site vertical antennas produce an omnidirectional (all-around coverage) propagation with a pattern which is useful in local coverage applications such as utility company fleet communication needs, police and fire department communications, FM and TV broadcast work, and amateur radio repeater systems.

Electrical Length vs Physical Length

While the foregoing facts are generally understood among the radio operators and monitoring buffs at large, what is sometimes not so well understood is that the electrical length of the vertical antenna which you utilize is very important in determining its characteristic operation. The electrical length is measured in wavelengths at the operating frequency; thus, an antenna 10 meters in physical length would be one wavelength (1λ)long in electrical length at 10 meters, one-half wavelength in electrical length (1/2λ) long at 20 meters and so forth.

Various electrical lengths of vertical antenna elements have been found to function well in both theory and practice (common are quarter-wave, .25λ; half-wave, .5λ; and five-eighths, .625λ).

Guglielmo Marconi, the man responsible more than any other single person for the invention of wireless telegraphy, was the person who discovered the concept of the .25λ wavelength grounded vertical antenna. That's why today we know that antenna as the "Marconi antenna."

Electrical Length Affects Radiation Pattern

Let's take a comparative look now at the vertical radiation patterns of these antennas (fig. 1). Note that the shorter the antenna, the greater the portion of an antenna's signal which is radiated at higher angles. thus, the .25λ antenna has a more rounded top portion to its pattern, indicating a fair portion of high-angle radiation for this length of antenna as compared to the .5λ or the .625λ antenna. These latter two antennas, with their flatter patterns, have their radiation more emphasized at lower angles than is true for the .25λ antenna.

After you identify the general shape of each antenna's pattern in fig. 1, look at figure 2, where these patterns are drawn "one atop the other" in overlay fashion, so that they may be more precisely compared. In figure 2 it becomes obvious that the .625λ length excels in producing a concentration of signal at the lower radiation angles.

This patterning is ideal for supporting ground wave coverage,

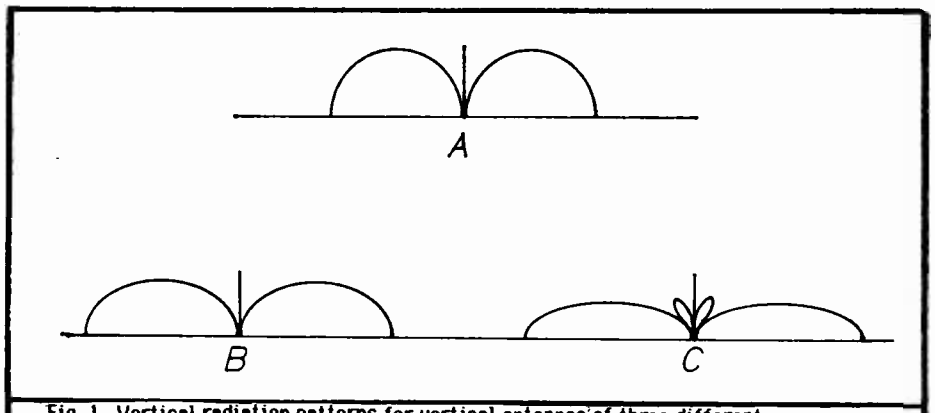


Fig. 1. Vertical radiation patterns for vertical antennas of three different electrical lengths: .25 wavelength, (A); .5 wavelength, (B); and .625 wavelength, (C).

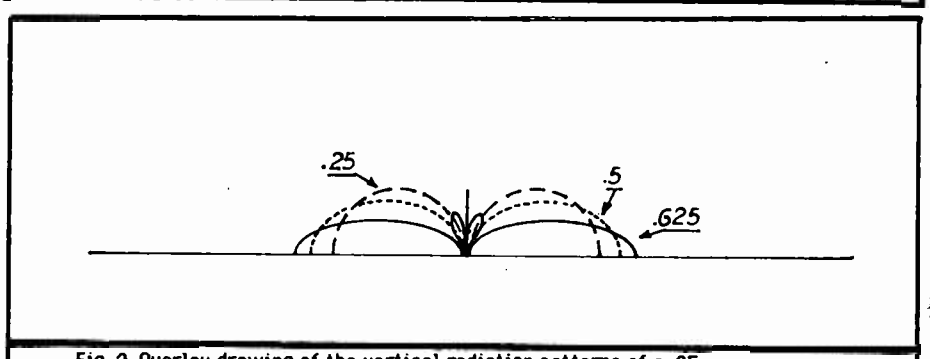


Fig. 2. Overlay drawing of the vertical radiation patterns of a .25 wavelength vertical antenna (dashed lines), a .5 wavelength vertical antenna (dotted lines), and a .625 wavelength vertical antenna (solid lines).

line-of-sight communications for elevated antennas, and low-angle radiation for ionospheric DX skip work. And remember, the rule of reciprocity tells us that this is true for these antennas whether used for transmitting or receiving.

Practical Considerations

If you want a maximum of low angle, omnidirectional radiation, as in, for instance, a two-meter amateur communication system, then you'd probably pick the .625λ or the .5λ. There are other practical factors; For instance, a .5λ or .625λ antenna on your 2-meter HT or hand-held scanner will hit the ceiling of many rooms or are so long that they catch on things you would rather avoid.

Faced with such a situation, we often retreat very quickly to the .25λ, or even worse, to the rubber duckie with its notoriously low gain! The point here is that some desirable aspects of an antenna's functioning (like gain) can reasonably be sacrificed for the practical necessities of operating convenience, as long as the end result still does a good job of getting the communication through.

On the Lower Bands

Of course the vertical antennas we're discussing are physically longer when constructed for the lower frequencies, such as 40, 80 or 160 meters, than they are for the higher frequency bands. But ironically we don't have to worry about an awkwardly long antenna on our HT on the lower bands because we seldom use HTs on those bands!

Mobile rigs, which can mount much larger antennas than can HTs, often exhibit the time-honored .25λ whip on these bands. Even for vehicle mounting, however, the vertical whips are shortened through the use of inductive loading.

On these lower frequency bands, skywires which do not utilize some form of loading are quite large. For instance, the .25λ is 20 meters in physical height on the 80 meter band. The .5 and .625λ lengths are 40 meters and 50 meters in physical length respectively. Most people just don't have the resources to erect such an antenna.

Trap-Loaded Verticals

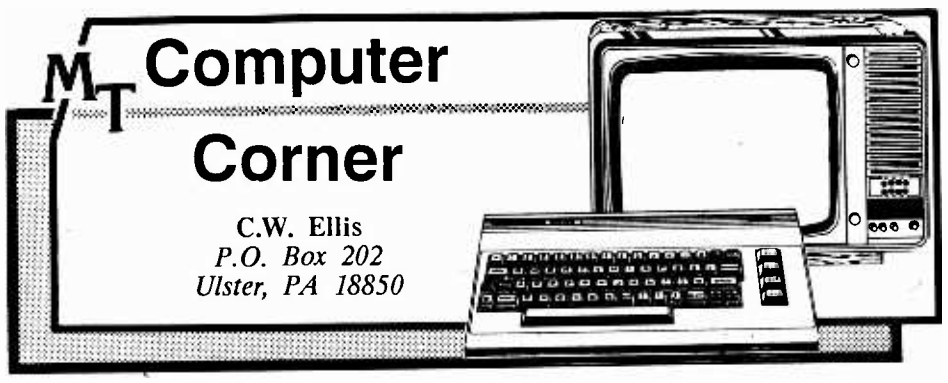
At this point you may say, "No wonder those shorter trap-loaded verticals are so popular." Well, those trap-loaded antennas are popular and they are reasonably good antennas. Most of them use loading coils, however, and they do have losses in the coils. They therefore put out less signal than a full-length .25λ vertical antenna. Their real advantages are the ease of erection as just mentioned (they are shortened by having traps), multi-band capability and the ease of feeding them merely by connecting a coaxial cable at the base.

This contrasts to the feeding requirements for a .5λ or .625λ antenna which usually involves some matching network to couple the coaxial cable to the high impedance base of these antennas. On the other hand, the longer antennas often do not need a radial system as is necessary for the .25λ antennas.

In Summary

Well, we've considered a number of factors to consider in working with vertical antennas. Vertical antennas deserve their good reputation in applications such as DX, repeater, local coverage, and groundwave application situations. With a bit of insight into the effect of electrical length on vertical radiation patterns, you can pick the best type for your own use. Actual physical length, losses in coils in shortened antennas, and the need for radial wires are all considerations in choosing a vertical antenna.

If you'd like to learn more about uses and abuses of vertical antennas, the references given below are good sources to check.



C.W. Ellis
P.O. Box 202
Ulster, PA 18850

COMPUTERS FOR COMMUNICATIONS

Part I

After the glamour and excitement of obtaining your own personal computer has trailed off, the realization suddenly occurs that if you own it, you should use it.

Many owners had a real good idea why they bought their machine, but there are those individuals who get caught up in the excitement and find themselves looking into a monitor that almost magically appeared on the desk. This can be the result of joining a microcomputer club, or perhaps a friend has one and you like it.

At any rate, you either have one or are contemplating getting one, and now comes the question, "What can I really do with a computer?" Since this question comes up regularly, I decided to take one column and run through some of the more useful jobs one can do on a computer.

I am going to skip over the more obvious ones such as game playing, mailing lists and checkbook balancing. After skipping the obvious general interest uses, what remains for the radio, communications, and electronic hobbyist?

One immediate use that comes to mind is drawing schematics and having the printer print out nice, neat professional-looking drawings of the special project that took all winter to get working just right.

There are two ways to get your printer to do its thing; one is to use the standard keyboard characters as symbols and do a text type of drawing. The results are in most cases rather crude (see figure 1).

All in all the output in figure one is rather unsatisfactory and very difficult to do. About the only redeeming feature is that you can compose it all on the display before committing it to paper. Given that crude approach, it may occur to someone to take advantage of the "extended ASCII" character set that many computers provide.

On an IBM or compatible, each of these characters is formed by holding the ALT key and typing the three digit number corresponding to the ASCII character wanted. This is a definite improvement and allows more finesse in the line formation and character generation, but the typing is still a real bear and it takes time to memorize the appropriate symbols.

Enter the Better Way

Somewhere some enterprising soul got tired of all the typing and threw together a little program that allowed automatic symbol selection. This was an immediate improvement, but still left the symbols needed for schematic drawing unrealized.

Typically, these programs will work using a simple monochrome display, and are ideal where you only have need to do block diagrams and such straight line drawings. The main limitation is the inability to do circles, diagonal lines, etc., on a non-graphics display.

Up Goes the Cost

OK, so we now want to go for the fancy stuff. Bring on the circles, triangles, transistor symbols, etc. Now we bite the bullet, go back to the computer store and come home lugging a new "color graphics" display and adapter card to drive it--unless, of course, budget constraints say otherwise.

There are cards on the market (Hercules, and its compatibles, to name one of the better-known) which allow graphics on a monochrome display in shades of green or amber.

If your graphics needs are limited to lines, curves and circles and multicolor displays are not needed, there is a cost benefit to going monochrome graphics. Selecting a color/graphics display in itself could fill a column, so I'll leave it as a reader exercise for now.

Once a graphics capability has been installed, the world becomes your oyster - there are literally hundreds of programs out there in all price ranges. One of the most popular graphics programs for the IBM/compatible market is AUTO-CAD which is a true CAD (Computer Aided Design) program. The only drawback is that it is in the $2000 price range!

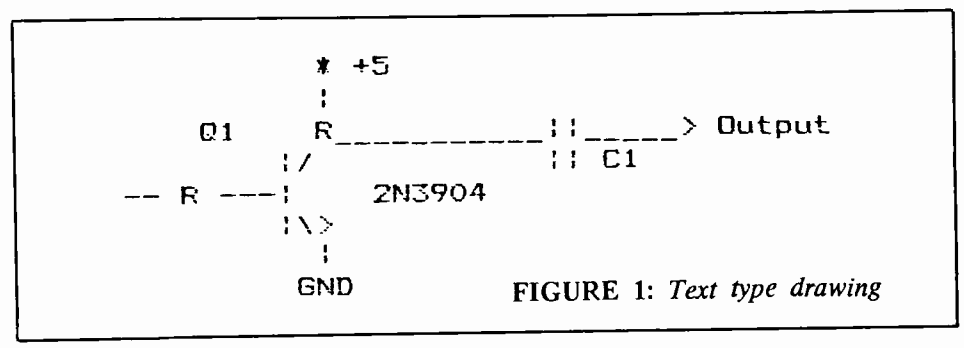


FIGURE 1: *Text type drawing*

RADIO RIDDLES

Last Month's Riddle: Last month we promised to tell you what "cosmic noise," or "cosmic static" is and how it was discovered. In 1931 Karl Jansky began studying sources of noise which interfered with radio communications. By use of a highly directional antenna, he found that a small portion of the interference came from the direction of the center of our galaxy!

This was the noise of extra-terrestrial origin; thus, "cosmic noise" or "cosmic static." Its discovery marks the beginning of radio astronomy and makes Jansky the first radio astronomer. In honor of his work the unit by which the density of electromagnetic radiation (radio waves) is measured is now called the "Jansky."

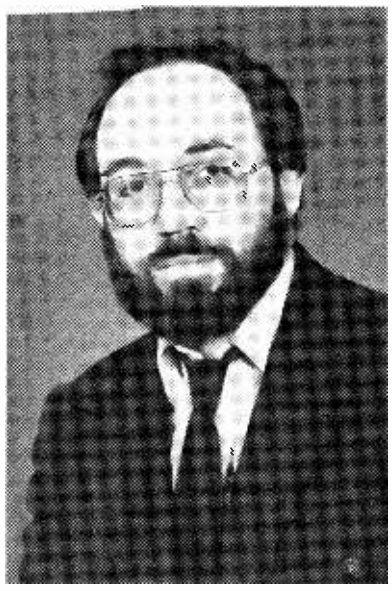
This Month's Radio Riddle: One type of vertical transmitting antenna is called an "anti-fade antenna." What is this antenna, and how does it reduce fading?

REFERENCES

1. The ARRL Antenna Book. American Radio Relay League, Newington, Connecticut, any edition.
2. Caron, Wilfred N., Antennas for Receiving. Brasstown, N.C., Grove Enterprises, 1985.
3. Lee, Paul H., The Amateur Radio Vertical Antenna Handbook. Port Washington, Cowan Publishing Co., 1974 (revised edition also available).
4. Moxon, L.A., High Frequency Antennas for All Locations. Radio Society of Great Britain, 1982.
5. Orr, William I. and Cowan, Stuart D., The Radio Amateur Antenna Handbook. Wilton, Ct., Radio Publications Incorporated, 1978.

MT'S FAMILY OF WRITERS

Meet Clay Ellis



C. W. (Clay) Ellis comes to us with an extensive background in electronics and mechanics, having served for four years in the Air Force, as well as completing courses of study in college-level work.

Clay's previous experience with Link Aviation (now General Dynamics), Bendix, and Charmin (Procter and Gamble) paved the way for his present position to the System Technology Division of IBM, his present employer.

Test assignments with IBM have involved both the 4341 and 4381 mainframe computers and he is currently assigned control systems design for new products.

Clay is married and he and his wife are presently raising 8 children with a ninth on the way! In spite of family activities, Clay finds time for his hobbies which include computers (surprise!), reading and, of course, electronics.

We all have our personal heroes; Clay is eager to share his list: Albert Einstein, Robert Goddard (father of modern rocketry in America) and Werner von Braun.

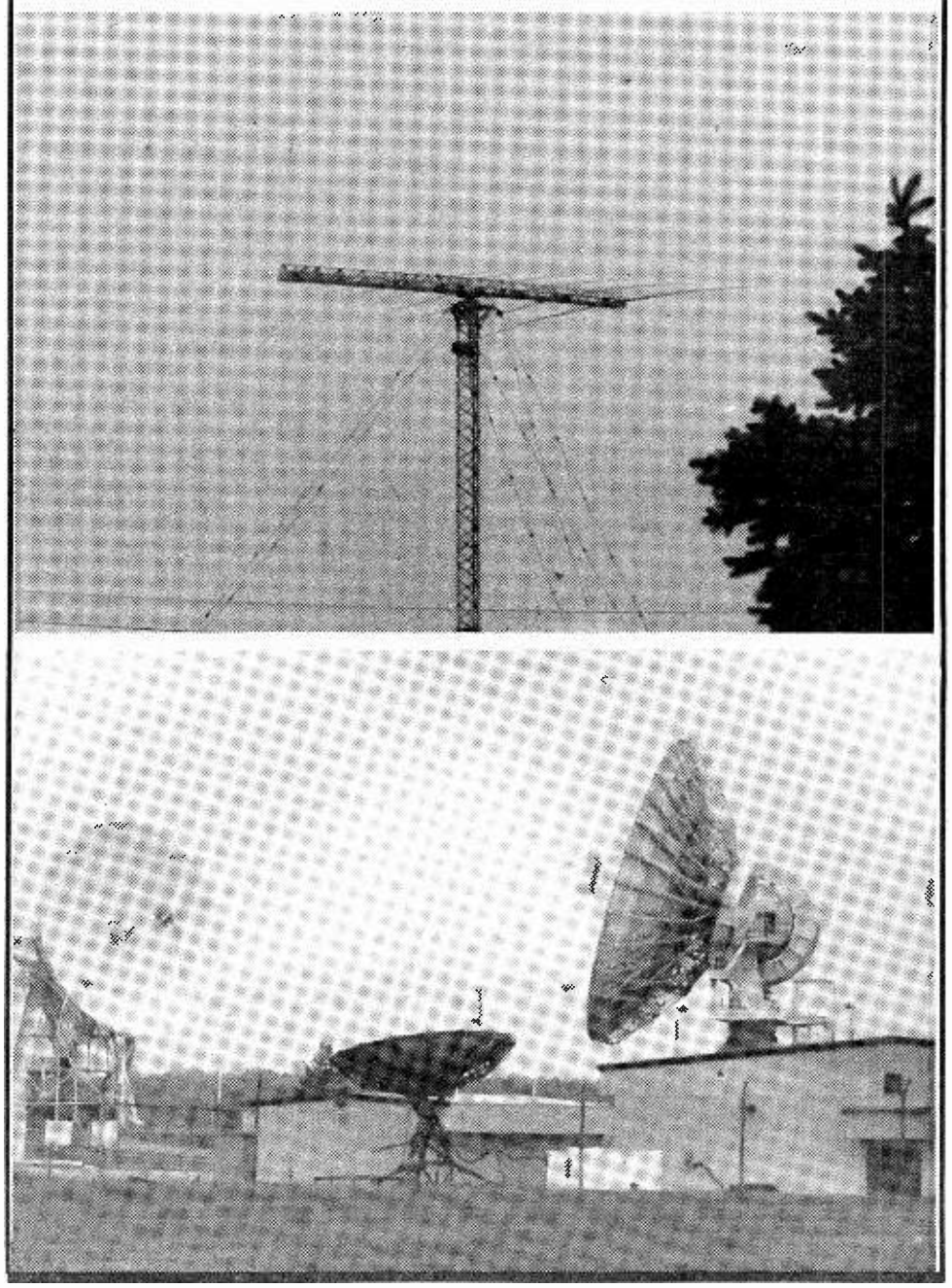
The Ft. Detrick Communications Installations

by Daniel Simmons

Ft. Detrick, located on the northern edge of Frederick, MD (NW of Washington, DC), sports several HF antennas, including log periodics (see photo).

Frequencies are not known; it is possible that this is a receive-only or standby facility.

Ft. Detrick also has several impressive satellite dishes and is the U.S. end of the U.S.-USSR hotline (which now uses satellites).



Fear not, though; there are many others out there--so many, in fact, that I could probably fill a column just listing them. I would like to mention two at this time, which I have personally used and liked.

Several years ago, I was the lucky recipient of PC-DRAW, developed by MICROGRAFX, Inc., of Richardson, Texas. At that time the program sold for approximately $300, but it was an order of magnitude faster and more capable than any of the "line editors," as the early draw programs were called.

PC-DRAW allowed multi-page, multi-color plotted drawings, and the neat printed schematics we were looking for. A circle was made as fast as positioning the cursor and hitting a couple of PF keys. A typical 10-module schematic, complete with all the discrete components, could be done in an hour or two, including printing or plotting.

PC-DRAW has been replaced with improved versions over the years, and I can only assume that the newer versions are faster and easier to use, with more features, etc.

Another program which is inexpensive, but very capable, is GENERIC CADD from Generic Software. At $99.95, it does a very respectable job of whipping out schematics in less time than any of the above methods. In a sense, it rivals many of the mainframe CAD programs of just a few years ago. Note that while both of these programs do a nice job of electrical drawings, the real intent of a CAD program is mechanical drawing.

Impressive -

GENERIC CADD could easily do a complete set of drawings for building a house, for example. Another column could be filled to overflowing with just a discussion of the various operations that a good CAD program should support--things like layering, zoom, aspect ratios, hidden lines, and dimensioning to name only a few.

The actual commands for the GENERIC CADD program are in excess of 100. Not bad for a $100 program! Impressed? Well, I just ran across an ad from the same company for a program called 1ST CAD, which is being billed as a "beginner's cad program," and supporting many of the GENERIC CADD features. The real shocker is that it sells for a mere $50!

Even more impressive is the fact that we haven't really gotten to the real "schematic capture" programs yet. These programs sell for anywhere from $100 to $3000, but do the high priced programs do anything more than the less expensive software?

How about a program that lets you enter your schematic by device part number? Or one that double-checks that the same module pin isn't used twice in two different circuits? Perhaps you left a logic input floating; some programs will flag the error and call your attention to it.

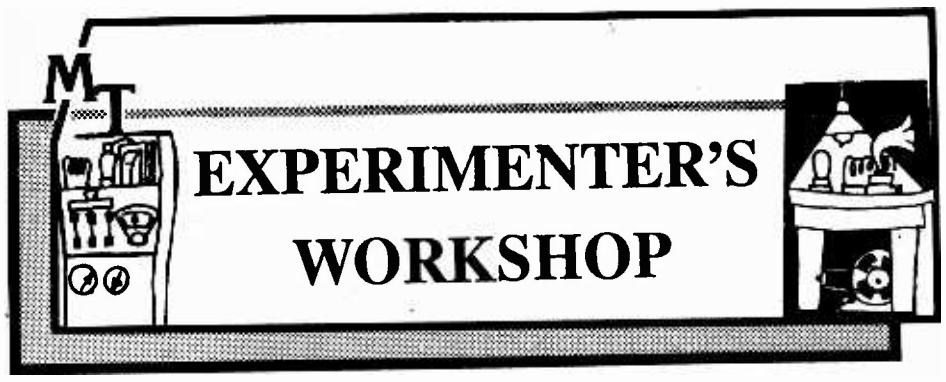
Believe it or not, there are some programs that will "run" your circuit in a simulation mode to catch timing problems, logic inversion errors, etc! Sure is something, knowing your circuit will work BEFORE you wire it!

There are several schematic capture programs currently available in the $100-200 price range and I am looking forward to trying one or two in the near future. If anyone has a favorite program and wants to drop me a line or two about it, I'll be glad to pass such comments on in a future column. The world of computers is large. For those who have an itch to build, winter is coming and I have lined up a couple of construction projects for IBM and compatibles. Can't spill the beans yet, but I think they will be interesting. See you next month! ■

Headline in Knight-Ridder Newspapers:

"NEW COMPUTER CONTINUES ITS REIGN OF ERROR"

Ain't it the truth!



RDF: A Simple Radio Direction Finding Antenna for Shortwave

PART TWO

by Chris Williams

Last month we discussed the design of a simple, effective resonant loopstick RDF antenna for use at HF. This month, we're going to cover considerably more detail regarding its many capabilities and limitations.

Let me begin by quoting some performance figures I've obtained with my own RDF loopstick. Generally, under what I'll categorize as "good conditions," I've been able to achieve accuracies on the order of one to five degrees.

For RDF applications, "good conditions" describe ionospheric conditions that propagate signals so that they arrive with both good strength and in a manner which is not directionally deceptive.

Directionally deceptive propagation is propagation which exhibits effects such as side scatter or tilted layer, both of which are detrimental to RDF bearing accuracy. These effects are so frequent that much of what has to be done to achieve accuracy in HF RDF involves special procedures designed to counter them.

The Peculiarities of Sky Waves

Signals that arrive at the receiving antenna via the ionosphere are called sky wave signals. Recent issues of *MT* carried a fine series by Bert Hùneault describing ionospheric propagation; I would like to discuss a few details of sky waves and their relevance to RDF.

Radio signals generally have both vertical and horizontal components. The RDF antenna presented last month responds best to vertically polarized signals, which is fortunate since it is the vertical component that provides the best bearing information.

As it turns out, sky waves have vertical and horizontal polarization component amplitudes (strengths) that vary greatly with respect to each other. This is due primarily to an effect called Faraday rotation which takes place as the signal bounces off the ionosphere.

The consequence of this component amplitude variance is the signal characteristic known as fading, a serious problem for loopstick RDF capability at HF since identifying the null in the vertical component is so difficult.

A Cute Trick

Since the antenna itself responds best to vertically polarized signals, signal fading is indicative of the vertical component's absence and a signal peak indicates its presence. Therefore, you can ensure you are nulling the vertical component by taking the bearing at the peaks.

You may have only a second or two to do so before the vertical component fades, but I've found that to be long enough. Do this several times to be sure you've established the exact bearing, and then record the value.

Procedures and Techniques

As we described last month, when taking a bearing, rotate the antenna to null the signal when its fade sequence is at a peak. This is done with the sensing antenna switched out and using the sharper loopstick null having initially eliminated the loopstick's bi-directional ambiguity and having mapped the skew of your particular pattern.

Table 1 is a collection of 11 bearings I've taken on consecutive days from my home in Utah to WWV in Forth Collins, Colorado, and to Radio Havana in Cuba. Notice that on different days the bearings to these transmitters are not the same.

This phenomenon is common. Bearings to stations will change--sometimes almost hourly. I've found the best way to counter this is by taking a number of measurements and compiling them into a table like Table 1.

WWV-5 MHz (Ft. Collins, CO)

	April										
	17	18	19	20	21	22	23	24	25	26	27
(degrees)	87	87	87	84	80	87	87	88	80	75	87

Ft. Collins Lat. 40.35 N Long. 105.05 W — Ogden Lat. 41.00 Long. 111.94

Radio Havana, Cuba

	April										
	17	18	19	20	21	22	23	24	25	26	27
(degrees)	102	102	102	100	98	102	102	102	98	92	102

Havana Lat. 23.00 N Long. 82.50 W — Ogden Lat. 41.00 Long. 111.94

TABLE 1. Sample Bearings

WWV

Bearings	Frequency of Measurement	Product
75	1	75
80	2	160
84	1	84
87	6	522
88	1	88
		-----
		929 /11 is 84.4

The 87 degree value is the most frequently occurring bearing. The weighted average of 84.4 degrees represents a 2.5 degree error from the calculated (from lat-long) bearing of 87 degrees.

Radio Havana

Bearings	Frequency of Measurement	Product
92	1	92
95	1	95
98	1	98
100	1	100
102	7	714

		1099 /11 is 99.9

The 102 degree value occurs most frequently. The weighted average of 99.9 degrees represents a 2.1 degree error from the calculated (from lat-long) bearing of 102.2 degrees.

TABLE 2. Bearing Histogram

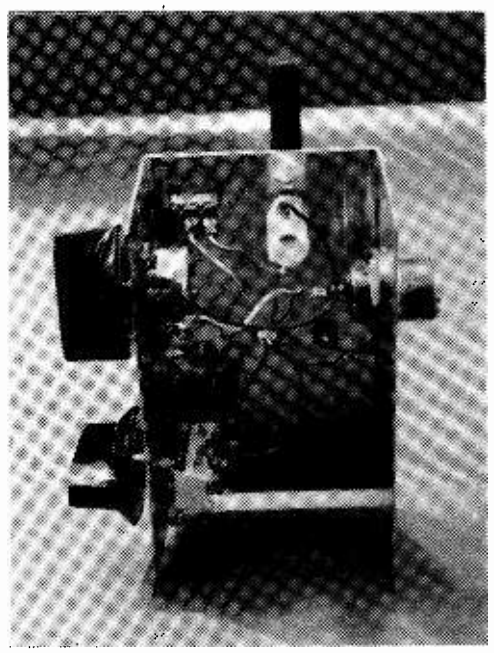
Once this is done, I construct a numeric histogram of the data like the one in Table 2. Do **not** try to average the results; simply select the bearing that appears most often.

If you averaged the results--even a weighted average like the one shown in Table 2--you would introduce an error. The measurements that were due to deceptive propagation are invalid.

While it is possible for the histogram to deceive you into picking the wrong bearing, I've found it not to happen with sample sizes of ten or greater. Perhaps the ionosphere reflects "honestly" more often than not!

Easy Bearing Calibration

As you gain experience, you will build up a list of bearings to many stations at all points of the compass.



Simple, internal wiring of the RDF antenna. Lead lengths are not critical at 6 MHz.

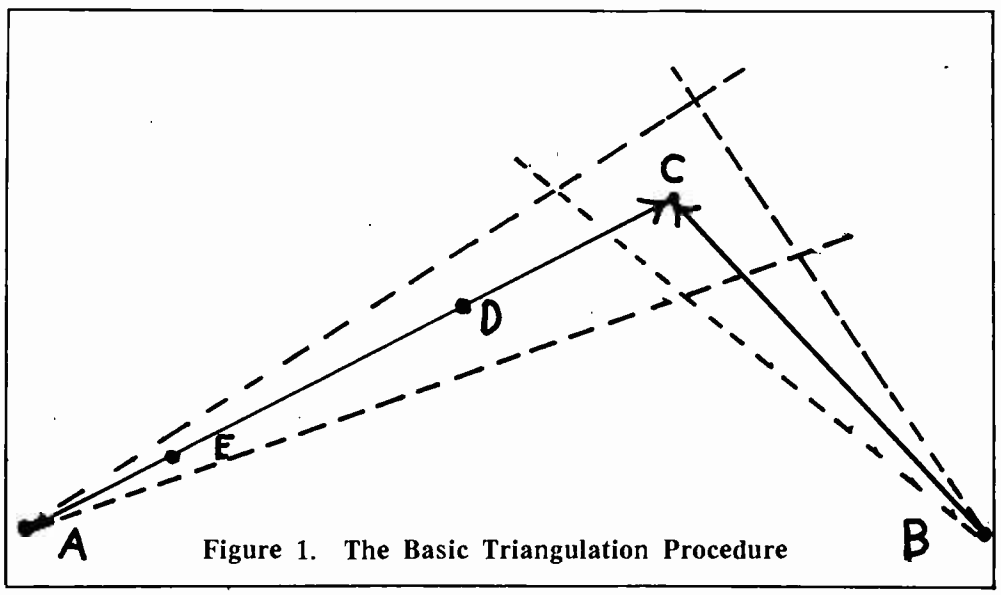
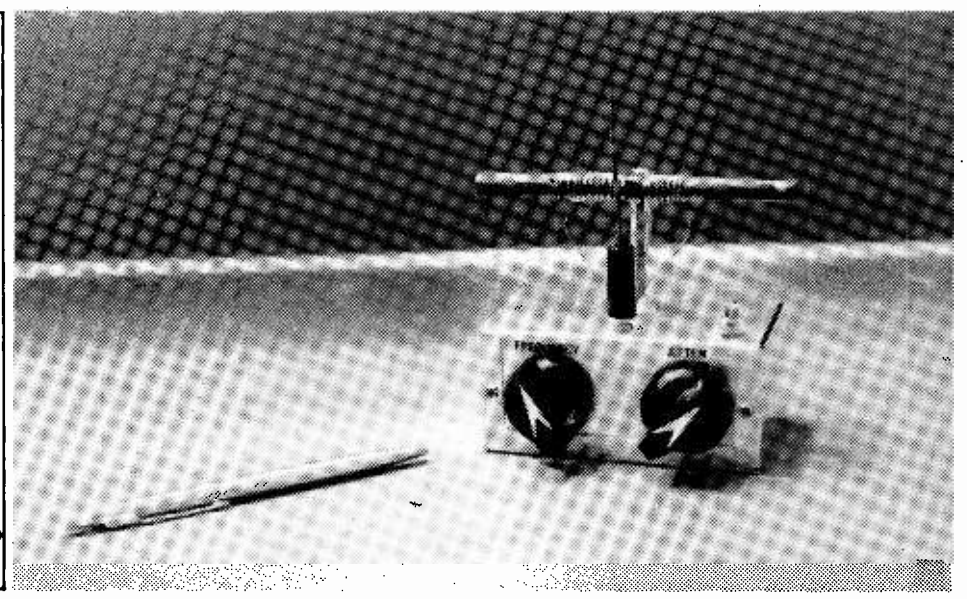


Figure 1. The Basic Triangulation Procedure



The complete RDF antenna. A coax jack on the back provides connection to the receiver.

The more of these you have, the better.

After you take a bearing to the target station, consult your list of known stations at a similar bearing. Check these stations again immediately. If their bearings at that point in time measure correctly, and provided you check several of them at varying distances, then it is probable that there is no side scatter present at that particular bearing and your measurement to the target transmitter is accurate.

Triangulation

Triangulation allows one to resolve the uncertainty about the range to a station along a given bearing. This is done by correlating data from two or more measurements taken at locations a considerable distance apart--but not on the same bearing line!

Examine figure 1. The transmitter is at point C; the two RDF receiver locations are at points A and B. Notice how points D and E are positioned along the line connecting points A and C. Had either of these locations been chosen for point B, we would have gained absolutely no additional information about the location of point C.

As can be seen, one simply draws lines on a map using bearings from point A and point B. The third point of what forms a triangle is point C.

Accuracy

You'll notice that the bearings from A and B are enclosed by dashed lines which represent the accuracy limitations of RDF antennas; i.e., the width of the null. The result is an area enclosed by the possible errors from both A and B. Point C is somewhere within it.

To get a feel for the size of this area, consider percentage of accuracy I quoted earlier. One to five degrees of error in measurement isn't bad, but it's not too impressive either. Five degrees at a distance of one thousand miles creates a lateral error potential of 87 miles. At a distance of ten thousand miles, it's 870 miles!

On the low side, one degree at ten thousand miles produces an error of 174 miles.

My intention in pointing all this out is to make clear to you what to expect from HF RDF. You are not going to pinpoint which mountaintop supports the antenna of a clandestine querrilla transmitter on the other side of the world. But there is a good chance you can identify which country it's in.

The use of additional bearings from other RDF sites can sharpen the target zone considerably. Perhaps you might need help in identifying a foreign language broadcast station. Sometimes an accurate bearing to an area of several hundred square miles is enough to furnish a vital clue about which station it is.

There are also other mysteries RDF can help solve at this level of accuracy. Those listeners who are "numbers" enthusiasts might very well be able to add a few pieces to their particular puzzle by finding bearings to transmissions. Then, through the help of some friends and the process of triangulation, they might begin identifying sources.

Great Circles and Straight Lines

It is important to understand that the straight lines shown on Figure 1 do not apply to sky waves when using a standard map (the Lambert Azimuthal Equal Area Projection type). This is the kind you encounter in a typical world atlas. Any lines drawn would have to be curved to accommodate the great circle paths sky waves use.

If the target transmitter is more or less local, a standard U.S. highway map is usable. This is because highway maps are generally constructed as a form of conical projection which has the effect of straightening the curved latitude and longitude lines. Over the limited area such a map covers, accuracy is sufficient to plot linear great circle paths.

The method of handling greater distances is mentioned in the Radio Amateur's Handbook. A special type of map which has the great circle paths pressed flat (called an azimuthal-equidistant projection) works nicely with straight lines, even when applied to worldwide distances.

They're not hard to obtain, either. Bill Johnston, N5KR, 1808 Pomona Drive, Las Cruces, New Mexico 88001, can provide them for a nominal fee. His maps are customized for a specific location and, with them, you can use straight, easy-to-plot triangulation lines.

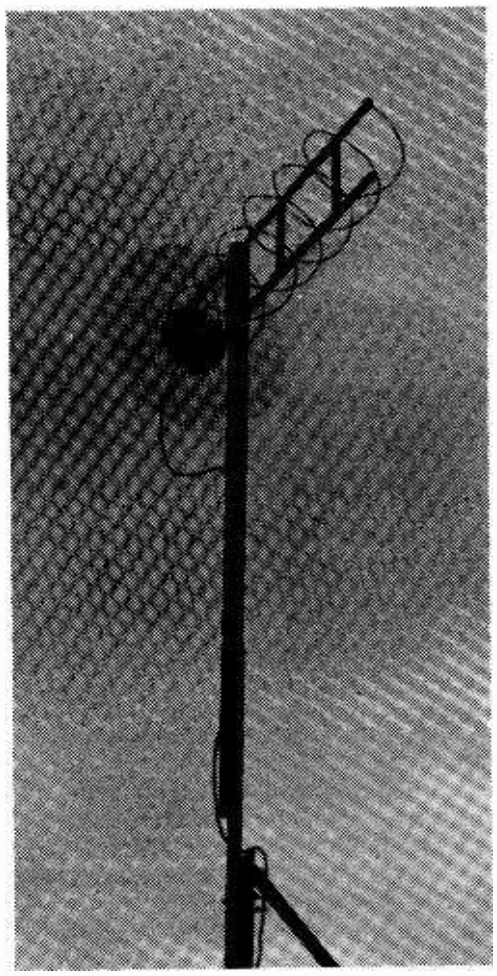
A Word About Accuracy

Use a good compass! It is useless to strive for one degree accuracy on a compass that is accurately marked in ten degree increments. And when you are taking measurements, be sure the compass is pointing at the north magnetic pole, and not your nearby TV with its magnetic deflection yokes! Corruptive magnetic influences can cause more frustration and wasted time than you would believe; take steps to remove them before spending a lot of time taking precision bearings.

HF RDF is a field rich in opportunities for fascinating experimentation. Let us know your findings, improvements and suggestions. ■

Experiments with a Helix

A recent letter from Earl Purkey of Morristown, Tennessee, was most interesting. Earl related the results of his experiments with a helical beam antenna which he built from reference books.



Some details regarding the construction of a helical antenna are given in *Antennas for Receiving* by Wilfred Caron, available from Grove Enterprises and Grove dealers.

Earl estimates the impedance of his antenna to be about 140 ohms, thus he brought the first 1/4 turn close to the screen to lower the impedance to a more useful value for coax.

An estimate of the low frequency cutoff would be about 435 MHz. A Grove Scanner Beam was used as the reference antenna and signal measurements were subjective--audible differences heard on a Radio Shack PRO-30 hand-held scanner when switching between antennas.

Earl estimates that the high-gain helical antenna provides 4-5 dB improvement over the Scanner Beam on UHF; a signal on 460.175 MHz at 55 miles distance came in clearly and some signals he could hear on the helical were not readable on the Scanner Beam.

On lower frequencies, though, the helical gives a different story. Its narrow bandwidth makes it a poor choice for VHF, while the Scanner Beam's continuous coverage keeps pumping right along.

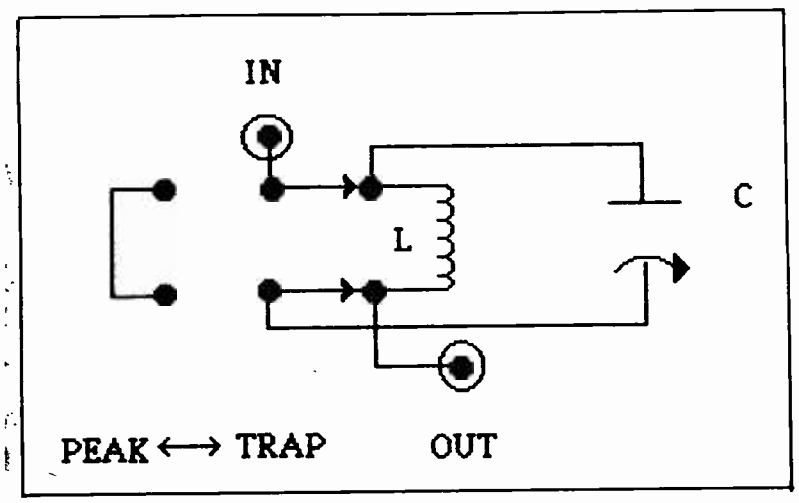
Notch/Peak Filter for Shortwave

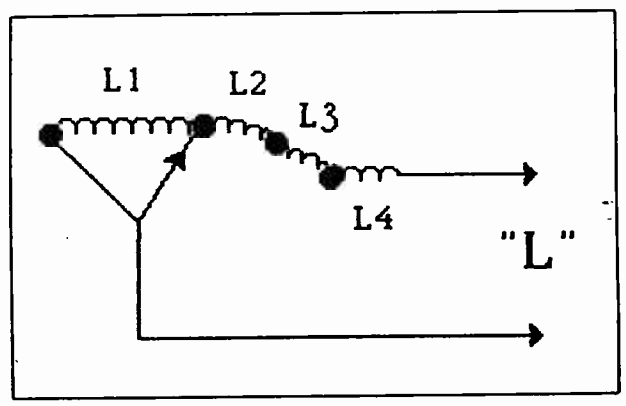
Bill Richards of Ft. Davis, Texas, shares with us this month a clever tunable circuit which can be used to notch out an interfering frequency or peak to maximum a desired signal, just by switching the DPDT switch and tuning the variable capacitor.

A 3:1 tuning range may be expected if the tuning capacitor is a standard 265 pF variable; coil L is selected to provide the frequency band of interest.

A wide range of frequencies may be selected among if coil L is replaced by the gang of coils shown in the accompanying diagram, switched by a three- (if one coil is always in the circuit) or four- (if it is desirable to have the tuning capacitance only in one position) position rotary switch.

As shown in the first circuit, signals are peaked with the switch thrown to the left, and nulled to the right.





" ASK BOB "

Bob Grove answers questions of general interest

Q. *Are computer noise suppressors effective for shortwave receivers? (Riley Kinney, Tallahassee, FL)*

A. Virtually without exception, noise must be reduced at its source, not at the receiver, for efforts to be effective. Since a computer may radiate RFI (radio frequency interference) from its AC cord, printer or other peripheral cord, or even from its cabinet, that is where you have to start.

Sadly, FCC incidental noise radiation restrictions for computers were developed after the fact and enormous numbers of electrically-noisy computers have flooded the marketplace.

Shielded cabinets, filtered and shielded cables, and grounding of the computer will all help to varying degrees depending upon makes and models. In my experience, plug-in line filters are only partially successful in reducing RFI.

▯ ▯ ▯ ▯ ▯

Q. *What is "New York Radio" that I hear transmitting on single sideband broadcasting aviation weather on shortwave? (Jason, Heindel, Kaukauna, WI)*

A. Operating on an alternating basis over several frequencies, VOLMET (an acronym for a French term meaning "flying weather") broadcasts emanate from major airports worldwide. As you surmised, they are intended to update international air flights with the latest high altitude weather conditions.

MT will be presenting a more complete article on VOLMET in a few months but, in the meantime, the Grove Shortwave Directory contains a comprehensive, up-to-date list.

▯ ▯ ▯ ▯ ▯

Q. *My scanner is overloaded with signals; how can I reduce their strengths? (Jeffrey Redlus, Freehold, NJ)*

A. It is unusual to hear from someone who wants **worse** scanner reception! One way of reducing reception strength is to reduce the length of your antenna. A second possibility is to install an in-line TV attenuator, a small metal tube with an internal resistor and an F connector on each end. Thirdly, you could replace your omnidirectional antenna with a directional antenna which can be rotated to favor wanted signals and null out unwanted off the sides. Finally, it is possible to install two identical omnidirectional antennas in parallel, using equal lengths of coax to connect them into a TV-type VHF/UHF splitter (used here as a combiner), feeding the signal via one coax cable to your scanner; the two antennas are rotated on a common horizontal boom until they are broadside to the offending signal which should cancel by a good bit.

▯ ▯ ▯ ▯ ▯

Q. *Where can I get a converter to hear the 800 MHz cellular band on my programmable scanner? (D. Mencke, Cleveland, OH)*

A. Two companies at this time manufacture such a device; you may wish to write them directly: Critique Electronics, 21 4th St., Downer's Grove, IL 60515 (ph.312-963-4841), a *Monitoring Times* advertiser; and Hamtronics, 65 Moul Rd., Hilton, NY 04468 (ph. 716-392-9430).

▯ ▯ ▯ ▯ ▯

Q. *My old model ANT-5 Grove OMNI has two elements, each 48" long. Now I see that the new model ANT-5B has only 18" for the bottom section. How come? (John E. Hopkins, Monroe, MI)*

A. Continued experimentation with the OMNI revealed that shortening the 48" bottom element to 18" would increase performance somewhat on high band and UHF. If those bands are of primary interest to scanner listeners, we would recommend that owners of the original OMNI perform that modification.

Simply measure down 18" from the center insulator, crease the element, and bend the remaining length back and forth until it snaps off.

▯ ▯ ▯ ▯ ▯

Q. *Can you recommend an indoor, rotatable loop antenna with built-in preamplifier? (H. I. Shiever, San Francisco, CA)*

A. Two sources come immediately to mind: Radio West, 3417 Purer Rd., Escondido, California; and Palomar Engineers, Box 455, Escondido, CA 92025.

▯ ▯ ▯ ▯ ▯

Q. *I recently saw an ad for a shortwave antenna that requires no connection to the radio, operating on "the mutual inductive coupling" method. Can you explain? (Nick Risser, Hamilton, IL)*

A. Yes. The technique was developed decades ago, making use of the built-in coil antennas that all table-model radios had then and have now. The accessory has a coil of its own built in and, when brought in the proximity of a radio, couples its energy to the radio's antenna coil.

Such a device may work well if a larger antenna is hooked to it; some even provide frequency-selective tuning, but the lower priced units are broadband.

▯ ▯ ▯ ▯ ▯

Q. *Is it possible to receive Mexico City on 6155 kHz here in Chicago? (Charles Nila)*

A. Depending upon band conditions, it should be quite possible to receive a signal on that frequency from that distance. Variables include co-channel interference from other broadcasters, power of the transmitter and directivity of the signal from the Mexican antennas.

▯ ▯ ▯ ▯ ▯

Q. *What is the difference between an antenna tuner and a preselector? (Jim Cook, Vancouver, BC)*

A. An antenna tuner adjusts the impedance match between the radio receiver (or a transmitter) and the transmission line to the antenna. It assures maximum efficiency for signal transfer with minimum standing waves.

A preselector assumes a nominal impedance has already been established (usually 50-75 ohms) and is adjusted to peak a certain frequency, attenuating all other frequencies to prevent their coming through, thus avoiding interference from images and intermodulation caused by extremely strong off-frequency signals.

▯ ▯ ▯ ▯ ▯

Q *When I have both of my programmable scanners operating at the same time, one will often cause the other to stop scanning. How can I avoid this? (Jim Clark, Bayside, NY)*

A. Scanner lockup is very common is such a situation since the oscillator radiates from one scanner and is "heard" by the other scanner. One trick which may work is to enter the offending frequency minus five kilohertz in one scanner, and the other channel being affected five kilohertz higher in the second scanner.

If the signals are quite strong to begin with, the slight off-tuning should not hinder your reception. Another possibility is to exchange the frequencies between the two scanners; this may be particularly helpful if you use two different makes of radios.

▯ ▯ ▯ ▯ ▯

Q. *I recently attended an NFL football game. What frequencies are used for the wireless headsets? (Roger Hanson, Littleton, CO)*

A. NFL officials typically use 151.625 MHz, an itinerant frequency for their field communications. Other frequencies available for that service include 154.57 and 154.60 MHz and may be used by other sports officials.

The inexpensive headset microphones commonly sold in stores use five frequencies: 49.83, 49.845, 49.86, 49.875, and 49.89 MHz. ■

Mailbag

Shortwave

Larry Miller, MT Broadcast Editor, P.O. Box 691, Thorndale, PA 19372

About two hours ago, my plane touched down in Beijing. I've been in the air for some two days; frankly with all of the time changes and places I've passed through, I'm not sure exactly what day or time it is. I do know that I'm sitting here on a small bench on Tian'anmen Square, looking across a vast open space toward a pagoda-style building and that I've got a pile of your letters on my lap. As expected, there's a huge portrait of Chairman Mao; unexpected is the nearly-as-large picture of the *always popular* Joseph Stalin.

Supposedly, dawn breaks with a yellow tint here. I am told that sand from the Gobi desert, swept across the mountains to the north, fill the air with a gritty, eerie color. At certain times of the year, the air-born desert finds its way into the tiniest holes of every inch of Beijing. To be so close to a place -- the Gobi Desert -- that, as a budding young schoolboy paleontologist, I had only dreamed of, is incredible.

Mongolia is only 500 miles to the north; the Soviet Union perhaps no more than a thousand -- a shorter distance than from Philadelphia to Florida and a mere one-day car ride back in the States. To the northeast lies the two Koreas; to the south, the dread Vietnam. To the non-traveler like myself, the very thought is unnerving yet exciting, similar in feeling to taking the car out on the highway late at night and cranking it up to 125 miles an hour.

In an effort to get some first-hand knowledge of Radio Beijing, I requested permission to spend a couple of days working in the English Department. The last thing I heard -- before I left -- was that the Chinese equivalent of the U.S. State Department had requested my passport number and was reviewing my request. I hope to find out what the verdict is shortly. As a former broadcaster, I'm really looking forward to that.

Anyhow, it's too soon to report in further detail on the trip. In addition to Radio Beijing, I do have some Chinese regional shortwave outlets on the itinerary, so that should be interesting. Aside from that, however, I've not had a chance to do anything except unpack, wobble weak-kneed out of the hotel and get to work on this column. So, before I either fall down or pass out, let's take a look at some of your letters. More on China in December and/or January issue of *Monitoring Times*, the magazine that will go *anywhere* to get you the shortwave news!

Brochures

A gentleman from Finland, Reijo Siivonen (my, we are *internationale* this month, aren't we?) write to ask for a favor. "I am an expert in electronics," he writes, "and am interested in U.S. models of [shortwave radios] because of their frequency bands which include East European VHF-FM band (66-73 MHz) TV." The problem is, says Reijo, that the manufacturer's representatives in the U.S. won't send him brochures because they have their own reps in his home country, Finland.

Reijo is specifically looking for brochures on the "so-called TV sound receivers. These can be either without video possibility or having sound-only for TV or including also the video output jacks (these ones are competent TV, you see). The equipment can be either one standard (NTSC) or multi-standard."

If we have any readers who can help Reijo by sending him some brochures, I'm sure he'd really appreciate it. His address is, Reijo Siivonen, P.O. Box 160, SF-26101 Rauma, Finland.

#@$%! Apartment Antennas!*

Arthur Graham of Springfield, Virginia writes to say that after a 15 year sabbatical from DXing, he's back in action with an ICOM IC-R70. "In the old days," says Arthur, "I had lots of room for antennas. Now, however, I live in a townhouse with rules that do not allow outside antennas. So the best I can do now is a 38 foot long wire in the attic."

"What's the scoop with active antennas?" he queries. "Depending on what one's read and who one talks to, you either need one or should not buy one, as a long wire performs at least as well."

Our old buddy Ruth "The Radio" Hesch lobs a similar question. "Apartment dwellers like myself have a problem with landlords not allowing outside wire. Mine to the roof is surreptitious." (Not now, it isn't.) "But once in a while, I forget to attach it and find that I usually get rather good reception with only the ground to the cold water pipe in the kitchen and the connection to the wall plug. So, all is not lost when an outside antenna is not possible."

First, in order to get the real nitty-gritty on the topic, I'm going to pass the requests for information on active antennas on to both Terry Staudt (*Technical Topics* -- now a monthly column, I hear) and our resident equipment reviewer. From the strictly non-technical side, my personal experience has been mixed. I've never been really impressed with an active antenna -- and I've had a few -- but I also have to say that given that it's not a long wire, I really don't know what I should expect from one. I can say that I've had excellent results from more unconventional antennas.

A favorite (true) story is that after fighting a similar situation in an apartment, I gave up in despair and attached the antenna lead to the metal frame of the bed. The results were superb. Another friend had similar results from attaching the antenna lead to the metal window frame. Finally, I'd like to refer people interested in antennas to the 1987 *Radio Database International*. There are two antenna articles in this book, one entitled, "External Antennas: Do They Help?" and the other a step-by-step guide to building your own long-wire antenna. In the latter article, author Larry Magne writes that "The truth is that the majority of world radio listeners need no antenna at all other than their radio's own built-in telescopic 'whip.' This sort of antenna works fine so long as your set is reasonably sensitive and you are not into listening to flea-powered stations... If you're using a simple portable in a high-rise apartment, the best accessory antenna is an ordinary inexpensive automobile 'whip' (there's no need to get anything fancier) available at auto supply stores." Just stick the antenna straight out, horizontally.

Transmitter Sites

John Tuchscherer, one of the Wisconsin Radio Mafia (along with Kevin Klein, Gerry Dexter and a handful of other excellent DXers), writes with a few suggestions about the frequency section. "Show the [transmitter] sites for the BBC and other international broadcasters (except the USSR, which has too many sites in their world service). To be completely accurate," continues John, "such broadcasts as the Voice of Free China on 5985 at 0200 should be listed as via WYFR. As you know, one station relaying another station's programs is on the increase and I expect there will be much confusion. In summary, the more transmitter sites you can show, the more valuable the [frequency] column will be."

It's an interesting point and one which I've given a lot of thought. My current thinking is that there is no real reason to list transmitter sites. The reasoning is that, unless you are a hard-core Dxer, who say, wants to get reception reports from each transmitter that a station is broadcasting on, the information won't help you *hear* the station any better. You tune around until you find the best frequency and that's that.

The fact that a transmitter swap between stations has been arranged may have interesting political implications and as such would be reported in the *World Radio News* column, but I just don't see why it's important to include the information in the frequency column or how it would help you hear a station better -- especially since it's the major, generally already easy-to-hear stations that are doing the swaps (the late Radio France/Radio Beijing relay, Canada and Japan, etc).

Perhaps I'm coming from the position of a listener as opposed to a DXer. I have the information available (both transmitter sites and target areas) but I feel it's it unnecessarily complicates things. Comments? And thanks for the note, John.

Program Details

Finally, the debate over the now-missing advance program details continues to be a stalemate. About fifty percent of the letters say "keep them" and the other fifty percent say, "I didn't like them anyhow. Drop it." The bottom line is this: *Monitoring Times* as a substantially larger publication both in terms of physical size and numbers printed, has a deadline somewhat earlier than the old *International Radio*. I placed a few phone calls overseas and was told that most of the shortwave broadcasters can't provide us with the advance program details early enough to make our deadline. Thus, the question really becomes moot.

We will, wherever possible, include whatever advance program details we receive (they've been going in the *World Radio News* section). For those who really want this information, we're including them in the new *World Radio Report* magazine, which, as a small circulation magazine, can make the deadlines.

A neighbor to the north in Philadelphia writes and says, "I'm a new subscriber to *Monitoring Times* but an old listener to WWDB in Philadelphia. Back in 1980, there was a newsman there named Larry Miller. Are you by any chance one and the same?" Yes. I spent a few years at "The Talk Station," leaving there after getting into a fist fight with another newsman who stole one of my stories. After that, I closed out a ten-year career in radio as manager of WEEZ in the suburbs. That experience was enough to send me back to the safety of academia and then into the bizarre world of shortwave. And here I am. In China, expecting to spend the next two weeks eating seal slugs and sheep

Mailbag

Utilities

Bob Grove, Utilities Editor, P.O. Box 98, Brasstown, NC 28902

Bulletin Board

I just wanted to pass a note telling you about my Bulletin Board System after reading about others in the latest edition of *MT*.

I run a BBS called THE EXCHANGE! which has local information, statewide police complete with CTCSS tones, and will have an EMS list in the near future. I've added some federal listings as well.

I also plan to run listings from across the country that people upload since they are more accurate than listings in national books. THE EXCHANGE! runs 24 hours at 300/1200/2400 baud and the telephone number is (904) 878-4413.

Doug Ferrell, KFL4CR
Tallahassee, FL

We like....

Thank you for including an aircraft column. Just about the only monitoring I do is on the VHF aircraft band with my Bearcat 300. Since I'm over 22 miles from the nearest commercial airport, I appreciate all the help and information needed to pick up aircraft in this area.

The new *MT* is great. Keep up the good work. I am not technically inclined, and enjoy straightforward articles on scanners and SW radio.

Bob Hartmann
Mayville, NY

I have just finished reading a copy of the premiere issue of the new *Monitoring Times*. CONGRATULATIONS! I found the publication to be most interesting and informative. I especially enjoyed the fact that you chose to include some articles about amateur radio related subjects. In sincerely hope you will continue to include ham radio topics [*We now have a regular ham column...ed*] since many hams, like myself, also enjoy listening to scanners.

Tony L. Chancey
Freestate A.R.A.
Randallstown, MD

One Less Birdie--thanks to MT!

Thanks for the information on the "wandering birdie" problem with the HX-1200's in the last *MT*. As soon as I read the article I immediately called Regency and was told that amodification would be made free of charge to correct the problem. I have not noticed the birdie problem since it was returned. All that is needed is to request a "birdie modification," and to be sure to keep a copy of the serial number of the scanner.

Again thanks for the info. It's reporting such as this that makes *MT* valuable to all of us.

Joe Thornton
Cary, NC

A skunk by any other name...

ANARC Government Affairs Liaison Robert Horvitz calls the Senate version of the Electronic Communications Privacy bill with Paul Simon's amendments "the lesser of 2 evils" and he regards the adoption of that senator's amendments as an important victory. But to me, the lesser of 2 evils **is still evil!**

Legislation such as S.2575 with its new amendments is a subtle use of evergrowing public opinion and a bribe to attract votes in the knowledge that little or no concrete action need result therefrom. Governments smugly ignore even the most limited provisions of their own laws, which is exactly what we radio-hobbyists should do with this one.

Izak Luchinsky, Chairman
The League of Non-Voters
Baltimore, MD

Last Month's Forum

I can't understand people complaining as one gentleman did in the current issue that you were partial to your products.

I was set to order the Regency 1500 from you until I read your write-up on the Radio Shack PRO-32. I waited until it was released and bought one. The new unit is all I could want and the 200 ch. capability is just what I needed.

Gus Berg
San Diego, CA

Chewing the ANARCON Rag

Regarding Larry's review of ANARCON-86, I must agree with him 100%. I note that most every review of the convention was on the same wavelength, except that of the ODXA. Some parochialism showing there for sure. Come next summer it's going to be a tough decision whether to spend the "radio trip" dollars on ANARC or to go to the NU/FT affair in Minneapolis.

John M. Kapinos
Shrewsbury, MA
NASWA Awards Mgr.

(Although all letters so far received have been in agreement with Larry, not surprisingly, we have heard discontent from the ANARCON '86 sponsors. Next month MT will reprint a strong editorial by Harold Sellers which was published in the October 1986 issue of DX Ontario along with Larry's reply.)

---

eyes (no kidding, a regional Chinese favorite.)

And there you are, sitting at home, reading *Monitoring Times*. Why not drop us a note and we'll try to answer it as best we can, or we'll palm it off on someone else who can. The most interesting will be printed in *Mailbag*, some others receive personal replies and still others (quite unintentionally, I assure you) seem to sit on the desk back home waiting for the Second Coming. But they do all eventually get answered.

Our address is P.O. Box 691, Thorndale, PA 19372 USA. By the way, does anyone know if there's a MacDonald's in Beijing? See you next month. Chop Suey. ■

FORUM

GOVERNMENT SECRECY

Although this letter addresses Grove Enterprises specifically, it is the sort of question which frequently arises, therefore deserving both a forum and an answer.

Your new 1986 Grove catalog arrived today and I am, to say the least, a bit upset and irate after reading your advertisement on bottom of page 29. Namely, *The Top Secret Registry of U.S. Government Radio Frequencies* 5th Edition by Tom Kneitel (price $14.95).

I am a retired communications engineer who served a large portion of my life in the Intelligence Community from FCC Radio Intelligence Division in WWII, later with Central Intelligence Agency when it was formed in late 1946 through 1972.

I always took security very conscientiously and for the life of me I cannot see how they can openly sell a publication like this. This borders on being unpatriotic and ridiculous in my opinion. What with the rash of American servicemen and engineers who have turned traitor and sold secrets to the Soviets in recent years I am disappointed with the American justice system the way they let these people plea bargain for a crime such as treason against the United States. For my part it should be the death penalty for selling classified secrets to a foreign government.

Reading the above-mentioned ad for the publication on page 29 I can just see Soviet agents rushing out to buy a copy of this book. I realize that this material is obtainable through the much misused "Freedom of Information Act" but U.N. personnel and Soviet agents at their embassy have been known to obtain literally tons of publications otherwise classified secret through this dubious act in the name of freedom of information. All I can say is Damn! That bill should be amended - rewritten or even scrapped as far as I am concerned.

I like your monthly publication *Monitoring Times* very much. I would appreciate your views on the subject of this letter.

Norval Pagenhardt
Scotland, Maryland

GROVE/MT's RESPONSE

I appreciate your concern and understand your apprehension regarding the prospect of wholesale dissemination of classified information; fortunately, in the case of hobby frequency directories, this is not the case.

While frequency lists maintained by the federal government are now classified "confidential" by a Reagan presidential proclamation in 1982, those same lists were available to anyone--even without a Freedom of Information Act petition--for decades before that. Thus, the information is in wide circulation.

A frequency determined by a listener to be in use, regardless of by whom, is not classified; classification is a system in use within the government, not the private sector.

Kneitel's book is a distillation of frequencies collected from various public and private sources over the years and violates no law.

A listener may not divulge the contents of a message which he intercepts without paying a legal penalty, and any information sent on common radio circuits may be encrypted for privacy. Radio in this day is used for its convenience, but no longer for its security.

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.

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.

For Sale: ICOM R70 receiver, and GROVE TUN-3 MiniTuner. Both in excellent condition, with manuals. Sell as one unit for $475 firm. Bill Moore (319)396-2317.

For Sale: HX-1200 scanner. NEW! case, NICADs/charger -$180. REALISTIC PRO-22 (handheld) six-channel crystal scanner. With 155.34 and local NYC crystals. Receives aircraft. $50, Excellent condition! MIDLAND 3-channel (14, 9 and 10) CB walkie-talkie. $20. Harold Ort, Army PAO, 133 E. 58 St., NYC, NY 10022.

REALISTIC DX-400, digital LW/MW/SW/FM receiver, one of the best solid-state portables according to WRTH, excellent condition, $195 including UPS shipping. Gary Kinsman, 10401 Nevada Avenue, Chatsworth, CA 91311, 818/341-4300 evenings/ weekends.

For Sale R390A, John Ayres, 7198 S. Quince St., Englewood, CO 80112, (303)779-8553.

HALLICRAFTERS manuals, send SASE for list and prices to P.O. Box 3203, Englewood, CO 80112.

PACIFIC N.W., BRITISH COLUMBIA DXers/SWLs: get "radioactive" with the Cascade Mountain DX Club! Twice monthly newsletter; activities, DXpeditions. Send SASE for info., sample newsletter: CMDXC, 3721 27th Pl. W. #301, Seattle, WA 98199.

HEATH SW-7800 receiver, built and aligned by licensed pro, mint, manual, $195.00. DRAKE UV-3 two-meter, 220, 440 transceiver, excellent, manual, $300.00. Carl Stahnke, WA1WYC, 451 Buckminster, Norwood, MA 02062. (617)769-6328.

WANTED: Manual and schematic for ACL (Astro Communication Laboratory), Model TR-119 telemetry receiver and TH-110P tuner. Mike Roberts, 3459 Observatory Avenue, Cincinnati, OH 45208. (513)871-2917.

For Sale: R-390A, $225; R-390, $150; R-388, $175; have spare parts and manuals also. Paul, 35 E. Pond Road, Narragansett, RI 02882; (401)783-7106.

SONY 2002 with AC adapter and pouch in like new condition. Replaced by 2010. $90. Clif Brown, 336 Ashland, Evanston, IL 60202.

AEA CP-1 DEMODULATOR ($165). AEA SWL-TEXT C-64 software for RTTY, CW, ASCII, and AMTOR ($65). COMMODORE SX-64 (portable version of C-64 with built-in CRT and disc-drive) perfect in combination with above or for DX database software ($300). OLIVETTI PR2300 ink-jet industrial printer, 67 char/sec w/extra ink cartridge, and interface for C-64/SC-64 ($180). All in new condition and in original boxes. I pay shipping. Bert (703)591-8065.

COMMUNICATIONS RECEIVER, Realistic DX-160, 5 Bands 150 kHz to 30 MHz, 12VDC/115VAC, w/manual, $65.00 plus $5.00 UPS. CW DECODER - Video Generator, Microlog AVR-2 (CW ONLY) Installs between output of receiver and monitor screen for visual readout of CW signals. No computer required. $65.00 plus $7.50 UPS. SCANNER, Regency "Monitoradio" 10-Channel VHF, (Hi-Low) and UHF, any mix. 12VDC or 115VAC, Crystals required w/instruction sheet. $50.00 plus $4.00 UPS. Bill Koczon, 1308 St. Francis Drive, Petaluma, California 94952, (707)763-5405.

YAESU YR-901 CW/RTTY reader with video output and Kanji translation capabilities with two manuals, excellent condition $150.00 plus shipping; Sony ICF 2001 Shortwave AM/FM with manual and foreign voltage converter excellent condition $100.00 plus shipping. Fred Nagle (212)744-9330.

The New Full-Spectrum 60-Page MT!

YES, I WOULD LIKE TO SUBSCRIBE TO MONITORING TIMES!

U.S., Canada and Mexico

☐ 1 Year for $14.00 (12 issues) ☐ 2 Years for $25.00 (24 issues) ☐ 3 Years for $36.00 (SAVE $6.00!) (36 issues)

Price effective through Dec.31, 1986.

Foreign Subscribers:

☐ 1 Year $20.00 ☐ 2 Years $38.00 ☐ 3 Years $55.00

All foreign subscriptions must be paid by International Money Order in U.S. funds drawn on a U.S. bank with federal transit numbers imprinted on check.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Subscribe for a friend!

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

☐ Please send a gift card signed from _____

PAYMENT MUST ACCOMPANY ORDER!

Make checks payable to: MONITORING TIMES
140 Dog Branch Road
P.O. Box 98
Brasstown, N.C. 28902

Boston PD

Frequency Correction

We erroneously reported a frequency switch for the Boston city police in our September issue (p.39), The item actually referred to the "Metro Police," a different agency.

A spokesman for the Boston PD informed us that they had recently met to consider an extended 911 system, but that they would remain on their present channels for at least five more years.

INDEX OF ADVERTISERS

Great Christmas Gift Selection

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.

Order SCN 6

Suggested Retail ~~$369.95~~

Grove's discount price
ONLY **$239.00**

Free UPS,
$10 US Mail Parcel Post

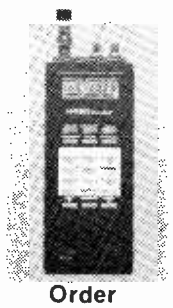
From Bearcat—The BC 100XL!

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 ~~$319.95~~
Now Only
$199.00

Bearcat's Best—

RETAIL ~~$499.95~~
Now ONLY
$319.00
Free UPS
$10 U.S. Mail Parcel Post

SCN-11

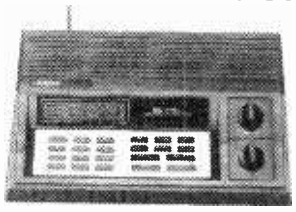
The BC800XLT With Cellular!

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.

Retail ~~$249.95~~
Order SCN 12
ONLY $179.00

FREE UPS $10 U.S. Mail Parcel Post

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
ONLY $12.95 plus $1.50 shipping

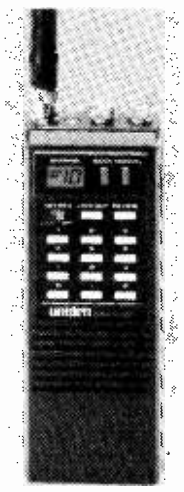
Bearcat BC-50XL

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~~

ONLY **$129.00**
FREE UPS
$10 U.S. Mail Parcel Post

GROVE ENTERPRISES

140 Dog Branch Road Brasstown, N.C. 28902

MC and Visa Orders
Call Toll-Free
1-800-438-8155

ICOM HF Receiver

IC-R71A

The World Class World Receiver

ICOM introduces the IC-R71A 100KHz to 30MHz superior-grade general coverage HF receiver with innovative features including keyboard frequency entry and wireless remote control (optional).

This easy-to-use and versatile receiver is ideal for anyone wanting to listen in to worldwide communications! With 32 programmable memory channels, SSB/AM/RTTY/CW/FM (opt.), dual VFO's, scanning, selectable AGC and noise blanker, the IC-R71A's versatility is unmatched by any other commercial grade unit in its price range.

Keyboard Entry. ICOM introduces a unique feature to shortwave receivers...direct keyboard entry for simplified operation. Precise frequencies can be easily selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control.

Superior Receiver Performance. Passband tuning, wide dynamic range (100dB), a deep IF notch filter, adjustable AGC (Automatic Gain Control) and a noise blanker provide easy-to-adjust clear reception even in the presence of strong interference or high noise levels. A preamplifier allows improved reception of weak signals.

32 Tunable Memories. Thirty-two tunable memories, more than any other general coverage receiver on the market, offer instant recall of your favorite frequencies. Each memory stores frequency, VFO and operating mode, and is backed by an internal lithium memory battery.

Options. FM, RC-11 wireless remote controller, synthesized voice frequency readout, IC-CK70 DC adapter for 12 volt operation, MB-12 mobile mounting bracket, two CW filters, FL32-500Hz and FL63-250Hz, and high-grade 455KHz crystal filter, FL44A.

ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234