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MONITORING TIMES

Inside this issue:

It's Hamfest Time!
by Dave Jones

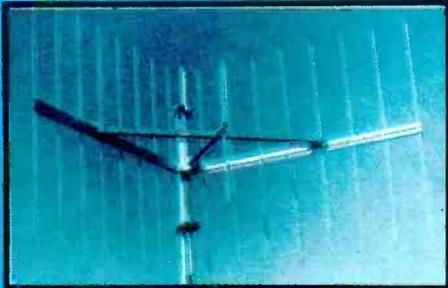
DXing South Africa

1987 Survey Results

MT Reviews the Lowe HF-125
by Larry Magne

FRG-9600: Consumer Review

DXing with an Expert
by Larry Miller



ANTENNAMANIA

Antenna articles and projects to help feed the "bug"! (starts p. 54)



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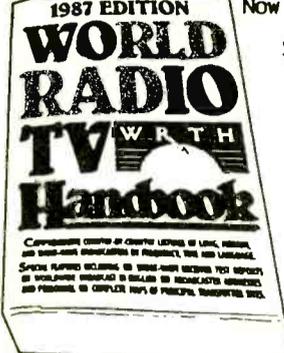
Up It GOES

The Delta 179 Rocket Boosts
the GOES-H weather satellite
into orbit—and MT is there!

—by Larry Miller, p. 8

8 MOST WANTED

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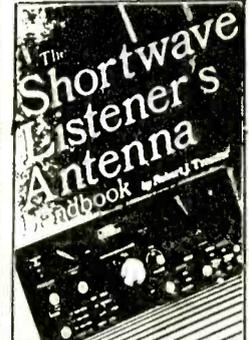
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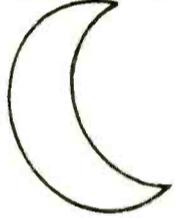


Even the most sophisticated receiver can pick up only hum-drum signals if the right antenna is not in place. And a relatively inexpensive radio can bring in some pretty impressive signals when it's attached to the right antenna. Just in time for spring! An invaluable guide to understanding, designing, building and installing all sorts of antennas. 191 pp. \$11.95

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We first came across this book while doing a senior research paper in school -- and fell in love with it. In fact, were so impressed with it that we're now decided to offer it for sale to shortwave listeners everywhere. Written in 1982, it is the product of some 25 years of research by one of the leading scholars in the field. For the serious shortwave listener who wants a fuller, more complete understanding of the fascinating medium of shortwave, this book is an absolute must. Easy reading, too! Hardback 36.90

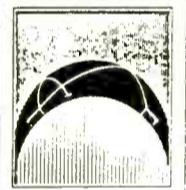
Havana Moon is Back!



Uno, Dos, Cuatro: A Guide to the Numbers Stations

Just about everyone who's ever listened to shortwave has heard them -- somber-voiced men and women reading out seemingly meaningless groups of numbers in any one of a variety of languages. But what are they? And who's responsible for them? Former MT columnist Havana Moon attempts to shed some light on this decades-long mystery in a new, 73 page report. Excellent reading! \$13.95

SHORTWAVE LISTENING HANDBOOK Perfect for Beginners!



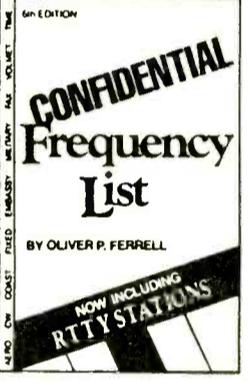
We've had a lot of requests over the years for a good, solid, beginner's book on shortwave -- something that starts with the basics and can explain them in easy-to-understand terms. And we finally found one. Former Popular Communications columnist Harry Helms covers shortwave from A-Z in a way that's easy to understand for anyone who's just getting started. \$14.95

RDI



Radio Database International is the ultimate frequency guide to the shortwave bands. And with its easy-to-use computer-generated graphics, high accuracy and reliability, it's become our best selling book for two years in a row! Also includes Larry Magne's highly-acclaimed receiver reviews -- no longer found in the World Radio TV Handbook. Shortwave has a new "bible!" Get your copy today and be an instant expert on the shortwave bands! Just \$12.95.

CONFIDENTIAL Frequency List BY OLIVER P. FERRELL



Compliment your Radio Database International -- with its coverage of the shortwave broadcast bands -- with a copy of Confidential Frequency List. Covers the non-broadcast bands from 4000 to 27999 kHz including everything from ships at sea to embassies to Press Agencies like Tass to INTERPOL and weather stations. \$15.95.

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The Eavesdropper Antenna We don't usually sell anything but books. But when the Eavesdropper came along, we couldn't resist. Says equipment reviewer Larry Magne, "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 receiver) and can be installed outdoors 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 the United States. For optional UPS shipping, please add \$3.50. \$59.95 and just in time for spring!

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"...constant fundraising exacts a toll on candidates as well as ordinary citizens, whose views frankly have come to be secondary to the pursuit of campaign dollars." ---Senator Charles Matthias, a principal sponsor of the Electronic Communication Privacy Act of 1986.

The Best Congress That Money Can Buy or, Capital at the Capitol

The 100th Congress of the United States is now in session. Sadly, this group of American representatives has come into office more indebted to special interest groups than any other in history, having paved their way into office through the financial support of PACs-political action committees.

Just how substantial is this buying of Congress? Well over \$100 million was received by 1986 House and Senate general election candidates, resulting in 7-to-1 re-election success ratio for favored incumbents over their challengers in the House of representatives.

We saw the result of one effort by the self-interest groups in the passage of the Electronic Communications Privacy Act of 1986 (ECPA). Totally unenforceable and ill-conceived, this restrictive new law is a mockery of the legislative process, yet powerful PAC money from the

cellular telephone industry assured its success.

News media and public consciousness groups alike are becoming increasingly alarmed at the manipulation of our elected officials by special interests and large corporate investors. One grassroots group in particular, Common Cause (2030 M Street, NW, Washington, DC 20036), has earned a well-deserved reputation as a fighter for the restoration of control of Congress by the American people.

Like a cancer, influence peddlers are successfully wooing a growing number of legislators who are empowered to grant them concessions at our expense. But there is hope; assert your rights by consolidating with and supporting a powerful citizens' lobby like Common Cause. They have clout in Washington and you will be heard!

FORUM

Principle or Profit? Radio Shack Defends Its PRO-2004



Most readers are well aware of Radio Shack's marketing decision to censor the cellular telephone coverage on their otherwise excellent PRO-2004 programmable scanner. Printed below is a letter from Ed Juge, Director of Market Planning at Radio Shack, stating the official rationale for the deletion followed by a response from Dave Beauvais, a frequent contributor to MT.

Point

Tandy has, and will continue to take a strong stand in favor of unrestricted airwaves...except in the case of cellular service. A Tandy vice president testified before and filed our written comment with Congress last January. Our position is that users of most radio frequency services are aware that their conversations are going over the air, and are easily intercepted. They have no illusion or expectation of privacy.

Cellular operation, however, so closely resembles wire line service, that most users assume it's just like using their home or office phone. So, on the record, we supported ECPA, specifically provided restrictions related only to cellular or encrypted transmissions, and would not extend to other services.

We understand that the law does not prohibit the manufacture or sale of cellular monitoring equipment, only interception of transmissions. Yes, it may be difficult to enforce as written. However, if prosecuted, a listener could make a pretty good case against the vendor for providing him the means to engage in an activity he didn't even know was illegal. The vendor could be exposed to a high degree of liability, even if the law doesn't prohibit manufacture or sale. However, the point is academic.

Cellular phones have the potential of becoming one of the greatest business and personal, safety and convenience products technology has yet provided. Knowing full well that cellular-capable receivers exist, and that even some older TV sets can receive those frequencies, we remain firm in our conviction that those transmissions should be protected. Our decision to disable cellular frequencies in the PRO-2004 was a matter of principle, not one of legality. We hope other scanner providers will follow suit, and we will closely monitor actions in this very competitive area.

Ed Juge, W5TOO
Director, Market Planning
Tandy Corporation

Counterpoint

Mr. Juge argues that "A listener could make a pretty good case against the vendor for providing him the means to engage in an activity (monitoring 'forbidden' radio transmissions) he didn't even know was illegal. The vendor could be exposed to a high degree of liability, even if the law doesn't prohibit manufacture or sale."

In point of fact, the legislative report which accompanied the final draft of the ECPA did include ANARC's (Association of North American Radio Clubs) suggestion that **Mutual Warning Labels** be placed both on scanner products and on cellular telephone products. The labels would inform scanner users that there are legal liabilities involved in deliberate misuse, and would also inform cellular telephone users that there is **No Guarantee of Privacy** in their telephone calls! This call for mutual labeling is being reviewed for possible implementation by the FCC at this time.

The labels mandated in the legislative reports certainly would relieve Mr. Juge of his apprehension that Tandy could be held liable for criminal actions (listening to a radio in the privacy of one's home!!) that the user did not understand to be criminal.

Instead of expressing his "hope [that] other scanner providers will follow suit" and destroy the complete frequency coverage of their units, it would seem more helpful for Mr. Juge to lobby conscientiously with the FCC for implementation of the mutual labeling proposal. Perhaps the "matter of principle" to which he refers in justifying Tandy's "decision to disable" the new radio is less a concern for adequate legal protection of the consumer, and more a concern for the effect that the "scare" of mutual labeling would have on the sales of both types of products!

In any event, your readers who are Radio Shack customers may wish to contact Mr. Ed Juge (W5TOO), Director of Market Planning, Tandy Corporation, 1700 One Tandy Center, Fort Worth, Texas 76102, and express their opinion on his justification for the company's decision to lobotomize the new PRO-2004, while at the same time inviting other scanner manufacturers to perform *the same* operation on *their own* products! I'm sure Radio Shack would enjoy hearing from you.

Dave Beauvais
Magic Media, P.O. 695
Amherst, MA 01004

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Communications Report

Oregon Ogre: Part 2

...a false alarm

Last month we ran a short story which implied that there is new legislation pending in the state of Oregon which would make monitoring of virtually any non-broadcast transmission illegal. We have now learned that the law has been in effect for many years! Like the ECPA '86, however, it is unenforceable.

The confusion arose from a reprint of the existing law in which some minor proposed amendments appeared in italics; it was incorrectly assumed that the entire document was the proposed legislation. We regret the error.

Art Collins Dies;

The End of an Era

Art Collins, W0CXX, was a true pioneer in radio. Collins Radio Corporation, now a division of Rockwell, was founded by this industrial genius who died in Cedar Rapids, Iowa, February 25, 1987, at the age of 77.

Collins will be long remembered for his contributions of quality to amateur, commercial and military equipment as reflected in such venerable equipment as the KW1, 32V3, 75A4, 75S3, KWM2, 51S1, R388 and R390. (Item from Terry L. Swift WISWL, Falmouth, ME)

Accident Injures Autek Owner

For years, Autek Research produced a high performance active audio filter (model QF1A) for shortwave receivers. Recent inquiries from readers reported unanswered correspondence and a story in the ANARC Marketplace newsletter led to a short item in the December, 1986, MT that the business had closed its doors.

A letter just received from the owner and President, William Onesky (N6WO/4), informs us that a serious auto accident in November nearly took his life and recovery has been painfully slow. Plans are to continue the business and attempt to catch up with orders, repairs and unanswered correspondence as quickly as possible.

We are pleased to learn of Bill's recovery and are encouraged that Autek will continue to offer their

fine filter factory-direct. The correct address and telephone number for Autek Research are: 16552 Hutchinson Road, Box 302, Odessa, Florida 33556; (813) 920-4349.

Cellular Non-Privacy Precedents Being Set

In spite of the impending ECPA "cellular telephone bill", a court decision by Louisiana Judge John Parker in U.S. District Court last November reasoned that cellular telephone users had no reasonable expectation of privacy.

The decision invalidated a claim by Marion Edwards, brother of Governor Edwin Edwards, that a conversation Edwards had with his attorney should not have been monitored, recorded and reported to federal authorities, even though the interceptor thought he was listening in on a criminal act.

Judge Parker ruled that Edwards "broadcast his conversation for all to hear," and that "disclosure of a public conversation cannot, under the law, amount to an invasion of privacy." Parker had commented earlier that "citizens in this country are encouraged to cooperate with and assist law enforcement officers in the detection and prevention of crime."

Shortly thereafter, Edwards requested that a bill be introduced into the Louisiana state legislature restricting interception of such calls. The state legislature passed a law which prohibits recording telephone calls without the consent of all parties involved. (Contributed by James Edmunds, New Iberia, LA)

Navy's "Project Bullseye"

Zooming in on Distant Signals

The U.S. Navy is installing several HF direction finding installations throughout the United States; one is currently under construction in San Diego, California. Code named "Project Bullseye", each installation will be equipped with a giant Wullenweber array for sharp directional resolution.

There is a feature story here for anyone who would like a writing assignment and has access to one of these new monitoring stations!

Privacy Act Report Available Free

A complete copy of the Electronic Communications Privacy Act of 1986, Senate Report 99-541, is available free of charge from the Senate Document Room, Hart Senate Office Building, Room B-04, Washington, DC 20510-7106. Additional copies are available at reasonable cost.

"Woodpecker" Report Available

For more than a decade now and officially condemned by the International Telecommunications Union (ITU), the infamous "Russian Woodpecker", so named for its irritating "rat-a-tat" pulse noise heard over wide swaths of the shortwave spectrum, has been plaguing worldwide radio communications.

Robert Horvitz, well known for his efforts to represent hobby radio monitors during the Electronic Communications Privacy Act hearings, has prepared a spiral bound, 63 page review for presentation to the World Administrative Radio Conference to be held in Geneva, Switzerland, this year.

Succinctly and authoritatively written, "The Woodpecker Project" is a consummate guide to the Russian over-the-horizon backscatter radar pulses which have battered legitimate users of the HF spectrum since 1976. A single copy is available for \$7 postpaid in the U.S. and air mailed elsewhere for an additional \$2.50 in U.S. funds.

Order your copy now while supplies last from The Woodpecker Project, 1634 15th St. NW, Washington, DC 20009.

Mystery Beacons

Day after day, year after year, the mysterious single-letter high frequency beacons (SLHFBs) continue to transmit their weak Morse messages across the earth in the 3-20 MHz spectrum.

Recognized by their repetitious pattern, one letter sent every few seconds, there seem to be several families of these beacons, all with one single common denominator: They appear to originate in the USSR.

A recent interview with noted expert Bill Orr, W6SAI, brought his

observations to light. Bill feels that the "K" and "U" beacons are near large Soviet naval shipyards, possibly providing failsafe indications--everything is all right so long as they are still transmitting! Listeners may hear the K beacon near 10570 and 10645 kHz; a more complete listing may be found in Bob Grove's *Shortwave Directory*.

An "S" beacon has been discovered transmitting every 17 seconds and a new group of teletype-sounding bursts has been heard at the low end of the amateur 20 meter band between 14070 and 14085 kHz, also coming in over the North Pole from Soviet territory.

Fuzzbuster Busters Raise Eyebrows

A recent addition to the growing arsenal of speed control measures has brought into question the legality of such a device. In question is a low power transmitter designed to fool radar detectors in motorists' vehicles.

Mounted permanently on the poles that support interstate signs, the transmitter is reportedly housed in a silver enclosure the size of a traffic signal box and has a green window.

Confirmed as in use on I-285 by the Georgia Department of Transportation, the "phony smokies" are designed to slow down speeders in areas which cannot be sufficiently patrolled by state troopers. (Contributed by Ray Buck, Atlanta, GA)

Grove to Speak at Dayton Hamvention

Again this year at Dayton, Ohio, home of the world's largest hamfest, Bob Grove will be a featured forum speaker. His presentation will touch on all aspects of monitoring throughout the spectrum and include insights into new products in the listening marketplace.

Bob has promised this year that he will open the floor to topics by request. Interested in sensitive military and federal government monitoring? Satellites? VLF? Spy numbers? Broadcasting? You name the subject!

Additional speakers will represent many specialty areas with concentration on scanners, radioteletype and facsimile. The forum is tentatively scheduled for Sunday, April 26. Registration details will be found on page 7.

1987 Survey Results

"Ladies and Gentlemen, the ballots are in! ... and you said..."

Black holes may be mysterious. Quantum physics may be mind boggling. But trying to find out what shortwave is all about puts them all to shame.

It's an odd thing to say about a medium that's nearly a century old, but to this day, no one knows exactly who listens to shortwave and why. And through those years, many a soul has tried -- and most have failed -- to exploit the medium, both by going on the air and by publishing about it. Simply put, it's not easy to satisfy the needs of market that you not only can't document but can't read once you find some of them.

There are a lot of theories on why people listen to shortwave broadcast stations. Those who do the actual broadcasting claim that listeners tune in shortwave to hear the vast selection of entertainment available on the world bands. But let's face it. You can count on one hand the number of stations that broadcast anything truly entertaining -- unless you have a fetish for institutionalized national bragging and endless programs about copper wire production in Bulgaria.

Those who enjoy fiddling with soldering irons and doodling with diodes claim it's the technical end of things that make shortwave so fascinating -- the endless modifications, new equipment and tinkering that can be done.

Still others feel that it's all psychological -- strictly a fast turnover novelty whereby innocents are drawn into shortwave by the promise of hearing foreign lands and exotic cultures and who quickly relegate the old shortwave radio to the uppermost shelf of the closet once they get over the initial thrill and find out that the vast majority of programming is about copper wire production in Bulgaria.

Of course, one can't forget the DXers, that odd breed that enjoy, for some reason unknown to science, tuning channels filled with blizzards of static only to hear -- perhaps hear -- the whisper of some tiny transmitter, broadcasting in a language they don't understand. Ahh... Now that's satisfying.

Perhaps too, it's a bit of all of those reasons. Maybe it's the thrill of hearing foreign lands and exotic places, the challenge of hearing them and, occasionally, stumbling onto something genuinely entertaining. But frankly, there's not a person who knows for sure.

Utilities DXers, those stalwart souls who burn the midnight oil trying to

hear Air Force One, rescue operations near a sinking vessel, drug interdiction, or any other two-way communication of interest, probably share a similar motivation with the broadcast DXer, just a different target. It is the thrill of the chase, the conquest of an elusive network, the vicarious actualization of sharing in the moment -- all in the comfort and security of the home monitoring post.

That's why, for the past several years, *Monitoring Times* has been conducting a survey of its readers. Started originally in *International Radio* (which merged with *MT* in June of 1986), the surveys are designed to shed light on just what people listen to and why.

This year's survey was the biggest yet. With some 22,500 thousand copies of the magazine containing survey cards being mailed during December, an impressive 2,300 were returned by the deadline of January 31.

We present for your consideration a preliminary tally of those survey results. A complete study of the results will be undertaken by Dr. John Santosuosso, under a grant from the Foundation for International Broadcasting, and those final results will be available later in the year. But for now, we present some initial insights provided by your responses.

TOP MAGAZINE PICKS

The first question in the survey was "What radio or electronic magazines do you subscribe to or read regularly?" The results were clear cut: there are two leaders in the field, *Monitoring Times* (which came in with 92%) and *Popular Communications* (with 66%). Certainly, the fact that the survey was sent to *MT* subscribers affected the results here. As Radio Netherlands' Jonathan Marks is fond of saying, "If you go to a bus stop and ask how many people take the bus, you're going to find that the bus comes out as people's favorite means of transportation."

Still, the *MT* survey was mailed to both subscribers and non-subscribers and it's well known that *MT* is growing by leaps and bounds. Other magazines lagged far behind: *QST*, the ham radio publication of the American Radio Relay League came in third with 22% and *CQ* (another ham magazine) with 18%. Interesting, too, is the fact that *World Radio Report*, which had only been published for two months when the survey was mailed, beat *Review of International Broadcasting*, which has been in existence for some eight years.

Surprising too, was the poor showing by the shortwave clubs. Only two clubs showed a membership among survey respondents of over 10% -- RCMA and SPEEDX, which last month ran a full page editorial indicating that falling membership was causing a cut back in the size of the publication. Apparently club membership is losing ground.

HAM RADIO GETS A BOOST

What was very surprising was the interest among survey respondents in ham radio. Over 58% indicated an interest in this area and twenty five percent said they were already licensed.

There's long been debate among industry watchers over the participation by hams in shortwave listening and vice versa. Many have pointed to the relatively new breed of general coverage transceivers among hams as the reason for this increased interest. And, of course, an interest in listening to shortwave communications goes hand-in-hand with a natural desire to expand into two-way communications.

Also surprising, when compared to previous survey results, was the diminished amount of time spent at the radio by shortwave broadcast listeners. This time, the average was only 10 hours a week. It's still not bad if you consider that that figure is an average and that, given a five day week, people are tuning in for two hours a night.

The listening habits of shortwave utilities types are nearly as persistent as those of the dedicated SWL, about eight hours per week. Scanner buffs log 15-20 hours, however, with some claiming to listen virtually non-stop!

DXing vs. SWLing

Another turn-around of an accepted fact of shortwave listening is the relationship between "listeners" and "DXers." The debate has had its hot moments and on more than one occasion have people nearly come to blows defending their favorite facet of listening. In the past, it was always said that "DXers" dominated the shortwave hobby, DXers being those who tune in difficult to hear stations with the sole purpose of obtaining enough program details to prove that they did indeed hear the station.

"Listeners" have always been perceived as those who tune in shortwave stations with the purpose of listening to the programs, perhaps setting aside a half hour to hear a classical music concert from the BBC or a discussion of copper wire production in Bulgaria. Listeners,

went the old line of thought, were few and far between. Real men don't listen. They DX. And they collect QSL cards.

Not so, according to the *MT* survey. Real men *do* listen -- to the tune of 54 percent (listening) to 23 percent (DXing). Twenty three percent said they enjoy both.

Clearly, the vast majority of *MT* subscribers are shortwave listeners, not utilities monitors or scanner buffs. This does not mean that there will be a de-emphasis on those areas, however; on the contrary, the utilities and scanner devotees are significant in number and adamant about their specialized areas of interest. Utilities shortwave and scanner monitoring will continue to be given strong representation.

Not surprisingly, voice modes are considerably more popular than non-voice (radioteletype, facsimile, Morse code) with Morse coming in a rather distant second. Military and federal government communications are the favorite target with ship-to-shore and air-to-ground close by.

POLLING FOR THE FAVORITES

A real favorite of many shortwave listeners and broadcasters alike is the "favorite station" and "favorite broadcaster" section. This year, as in past years, the field stayed basically the same in terms of rank order. In terms of percentiles (which are hard to compare because of a difference in the construction of this year's survey over past years), strong gaps have developed.

The BBC retained its lead in the ranking with a solid 28% of listeners voting it their favorite station. Second in line was Radio Canada International with 11%. But the gap between the two stations has widened and a possible explanation for the growing gap between #1 and #2 could well be the change in programming by Radio Canada from the locally produced weekday North American service programs and the new CBC relays now run in most weekday slots.

Up from previous surveys is Radio Australia. Australia has always held a special place in the ears of shortwave listeners but it's likewise been a kind of enigma why this is. Prime time reception of Radio Australia is limited and the station does not in fact even have a formal North American service. But, like all other things Australian, perhaps the pull of Crocodile Dundee also brought

(Please turn to page 14)



IT'S HAMFEST TIME!

by Dave Jones
All Ohio Scanner Club

Hamfest -- hamvention -- new words in your vocabulary? Or are they familiar terms you've heard before but don't really understand? Sit back and relax for an enjoyable guided tour of the world of hamfests.

First, let's dispel any preconceived notions that hamfests are events held strictly for radio amateurs or hams. I held that notion for years, assuming that hamfests had nothing to offer me, the SWL and scanning enthusiast. The first hamfest that I attended was an eye-opening and mind-clearing experience -- I could not have been more wrong than if I thought that the sun sets in the east!

A hamfest is a gathering of individuals to buy, sell and trade items and information related to electronic communications and computers. It is usually sponsored by an amateur radio club and may even offer radio amateur license testing and forums related to radio communications.

When I describe a hamfest to friends I picture it as an electronic flea market for radio and computer enthusiasts, a golden opportunity to meet other people interested in the same radio hobby as yourself and the potential for making new friends as well as exchanging ideas and information.

The larger, well-established hamfests realize that a typical attendee has a spouse or family and frequently offer alternate activities for them. The sponsoring club will promote this fact in their flyers or other advertisements.

The amateur radio club sponsoring the event will have a booth set up to promote their organization and amateur radio. Also represented may be amateur service organizations, SWL and scanner clubs. The majority of individuals staffing these booths are quite knowledgeable in their field and can offer invaluable information and insights to even the most experienced enthusiast.

As other flea markets vary in size, quality, organization, and offerings, so do hamfests. The largest hamfest is the Dayton Hamvention in Dayton, Ohio, which is held the last weekend of April each year. The Dayton Hamvention typically draws multinational crowds in excess of 20,000 over three days.

Local hamfests are also held on weekends and may draw from hundreds to several thousand hamventioners, with the early birds bustling by 8 AM!

Hamfests are held at various loca-

tions, from school buildings to camp grounds and from small amusement parks to halls and arenas. Commercial vendors are usually found inside the building at a particular event, while flea marketeers (you and I!) usually operate out of their car trunks or tailgates outdoors.

The costs are varied for admission, and flea market space goes for a few dollars at smaller events to twenty-three dollars for one flea market space at Dayton this year! Several hamfests even have family admissions--one ticket admits an entire carload.

Where does one find out about such events? *Monitoring Times* is one publication that lists hamfests and related events. Other publications include *Nuts & Volts*, a monthly classified advertisement magazine; *QST*, an ARRL publication; scanner and SWL club newsletters; even local papers will generally have hamfests listed, perhaps in the weekend section. When writing for more information to hamfest-sponsoring groups remember to include an SASE for a prompt response.

Some Tricks of the Trade

Dealer displays of new equipment with hands-on demonstrations are

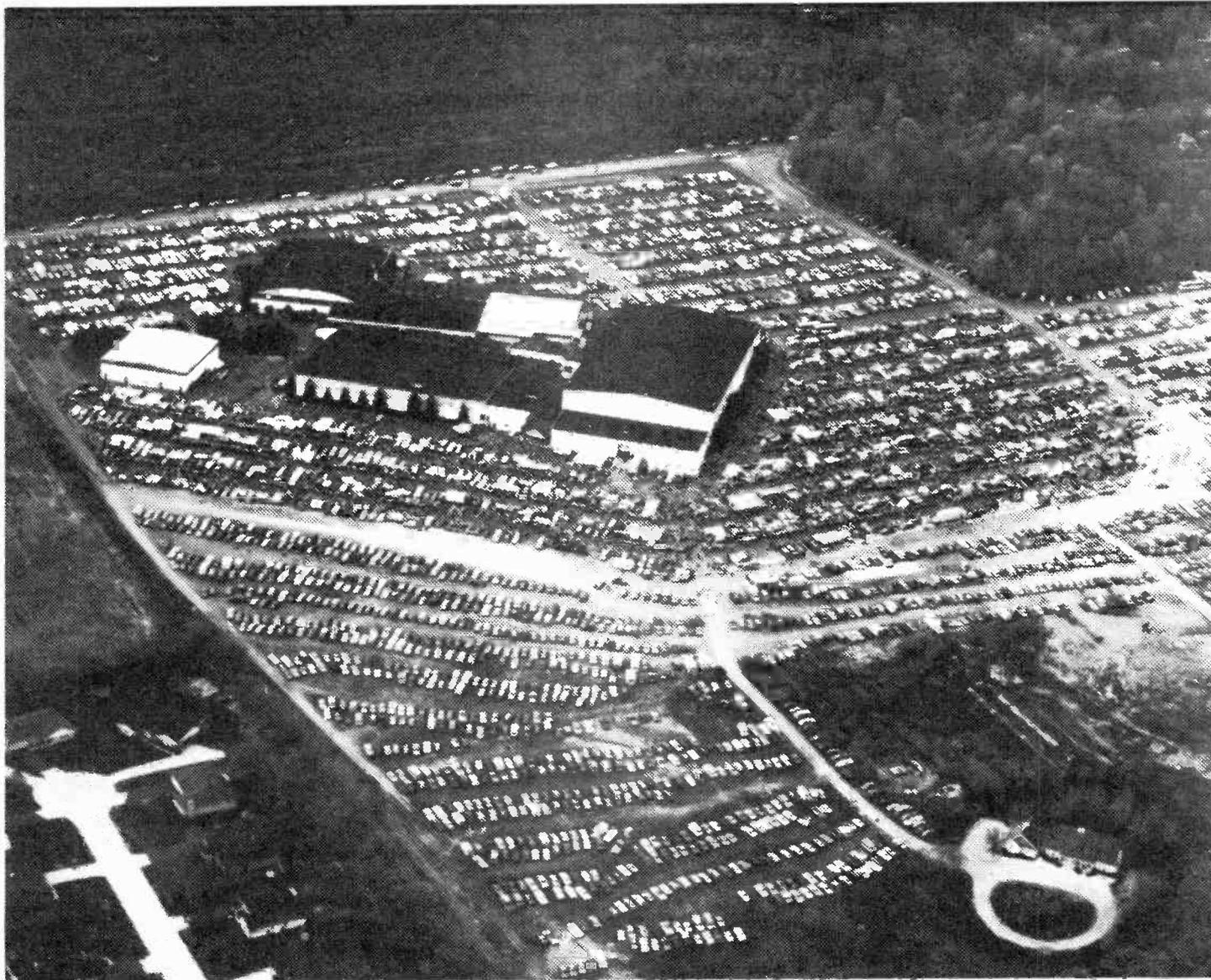
available to potential buyers; if you are considering a purchase of a new unit that friends or associates do not have any experience with, this is invaluable. Commercial dealers offer substantial discounts on some items and you can try them before you buy them!

One key to bargain shopping is an early arrival; don't wait 'til mid or late morning. Bring along a small travel bag that you can place flyers, literature and some purchases in; they are far easier to handle that way.

When a potential purchase is seen, ask questions of the seller concerning any problems that the item may have. If power is available, test the unit. Does it have the original box and owner's manual?

Ask the seller for his name, address and telephone number--if the seller hesitates or refuses pass up the item. I have never found a bargain that I did not see elsewhere at another hamfest.

Typical bargains that I have purchased over the last several years include a Bearcat CP-2100 Compu-scan computerized scanner for \$78 brand new, with interface and warranty; Bearcat 1-4 four-channel crystal scanners, brand new, for \$8; a



DAYTON Hamvention
 PO BOX 44 DAYTON, OHIO 45401

Attend the "greatest ham convention in the world"

The Dayton Hamvention

Sponsored by the Dayton Amateur Radio Association, Inc.

April 24, 25, 26, 1987

At the Dayton Hara Arena and Exhibition Center

Activities include:

- Door Prizes
- Technical Workshops
- Contests
- CW Proficiency Competition
- Forums
- Giant Three Day Flea Market
- Exhibits
- Grand Banquet and Women's Luncheon

Advance Registration:

\$8.00 for all three days sent to Box 2205, Dayton, OH 45401. Registration \$10 at the door.

General Information:

(513) 433-7720 or DARA, Box 44, Dayton, OH 45401. Lodging information: (513) 233-2612

Realistic DX-160 shortwave radio, like new, for \$35; brand new programmable scanners at \$90 (midline models); crystal scanners from \$5 that worked fine; and even brand new programmables for more than \$100 off the current best mail order price.

I have also found old frequency directories, new regional directories, club newsletters by the years (RCMA and WTVFM-DX Association), and much more.

Should the hamfest bug bite you, keep a log of those which you attend including such items as food and available facilities, organization, size, typical offerings, travel distance and time.

After attending several hamfests you will notice many familiar faces; I call these the "hamfest groupies"--both sellers and buyers.

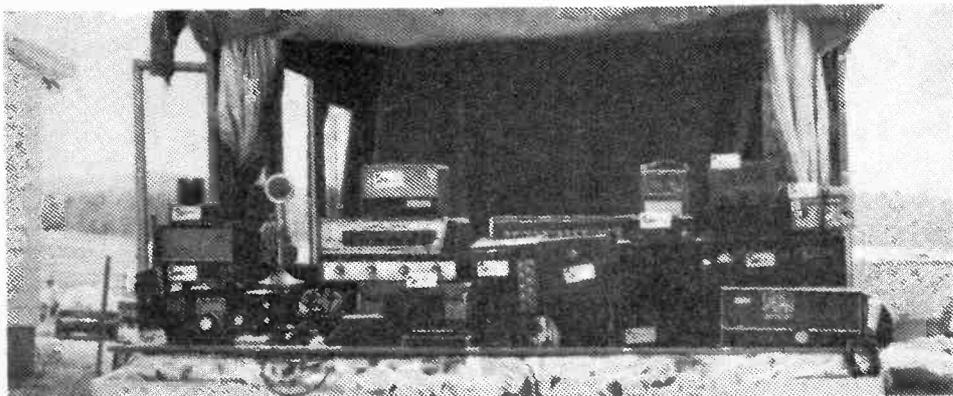
If large purchases are sought bring along a hand truck, wagon or a shopping cart. If you attend hamfests with a friend or your spouse bring along some form of communications gear - even 49 MHz license-free headsets. The communication gear can be utilized if you become separated or wish to split up and discuss bargains.

Many hamfests hand out maps and directories; use them as you walk around to mark space numbers or locations to items of interest for your later return. It is very easy to forget where an item was seen, even at smaller hamfests.

Hamfests are a great way to spend a weekend morning, meet new friends, invest in new equipment, or sell your old equipment. Hamfests can be inexpensive--if you can control yourself! Bob Grove and I will be looking for you at Dayton!



Typical offerings: Pictured above, Larry and Linda Wiland; below, Beth Jones. (Photos courtesy Dave Jones)



And Up It G.O.E.S.

by Larry Miller

Good news for NASA and the weather forecasters!

This is Delta Launch Control at T-minus 4 hours, fifteen minutes and counting. Tonight we have a launch of GOES-H, a weather satellite for the National Oceanic and Atmospheric Administration, aboard Delta 179, and this is the first expendable launch of the year for NASA. The launch window opens at 6:05 PM tonight and closes at 6:38 PM; a window of 33 minutes in duration. The countdown is progressing very smoothly; there are no problems at this time that would delay this evening's planned liftoff at 6:05.

It's February and you can always tell who are the tourists in Florida. While the natives are bundled up against the ravages of a frosty 65 degree cold front, the visitors from the north are conspicuous in their T-shirts, shorts and open car windows. "Snowbirds!" grumble the natives as they sneer at rental cars filled with kids in Mickey Mouse ears or teenage girls in bikinis on their way down to Ft. Lauderdale on Spring Break.

And so, on the eve of a 32 inch snow-fall in Thorndale, Pennsylvania, I braced myself to the disdain of native Floridians and joined the flood of mouse-eared and bikini-clad snowbirds pouring into central Florida and headed for Cape Canaveral Air Force base for the launch of a GOES satellite.

The drive between Orlando and the Cape takes about two hours and proceeds arrow-straight along route 50 through open prairies dotted with tiny towns, scroungy looking cattle and an occasional palm tree. It opens at the east coast on the village of Titusville. Titusville is, in a way, home base for NASA and it's proud of it. There's the Moon Shot Tavern, the Shuttle Hair Salon and Blast-off Billiards -- that sort of thing. And like the American space program, it shows signs of wear; tattered around the edges as it were and dominated by an abundance of Jiffy Marts, fast-food joints and small businesses.

Servicing of liquid oxygen has started at 4:40 and is scheduled to be completed at about 5:15 when topping will begin. There's a limit of 168 minutes during which launch can occur tonight after the initiation of liquid oxygen servicing. The temperature of the liquid oxygen is about minus 227 degrees, which means that it continuously boils away. So, for this reason, topping off is required to maintain a required mass of the fuel. At T-minus one hour, twenty five minutes, this is Delta Launch Control.

Titusville is gone in a flash as you reach the coast. Just across the Indian River is the place most people

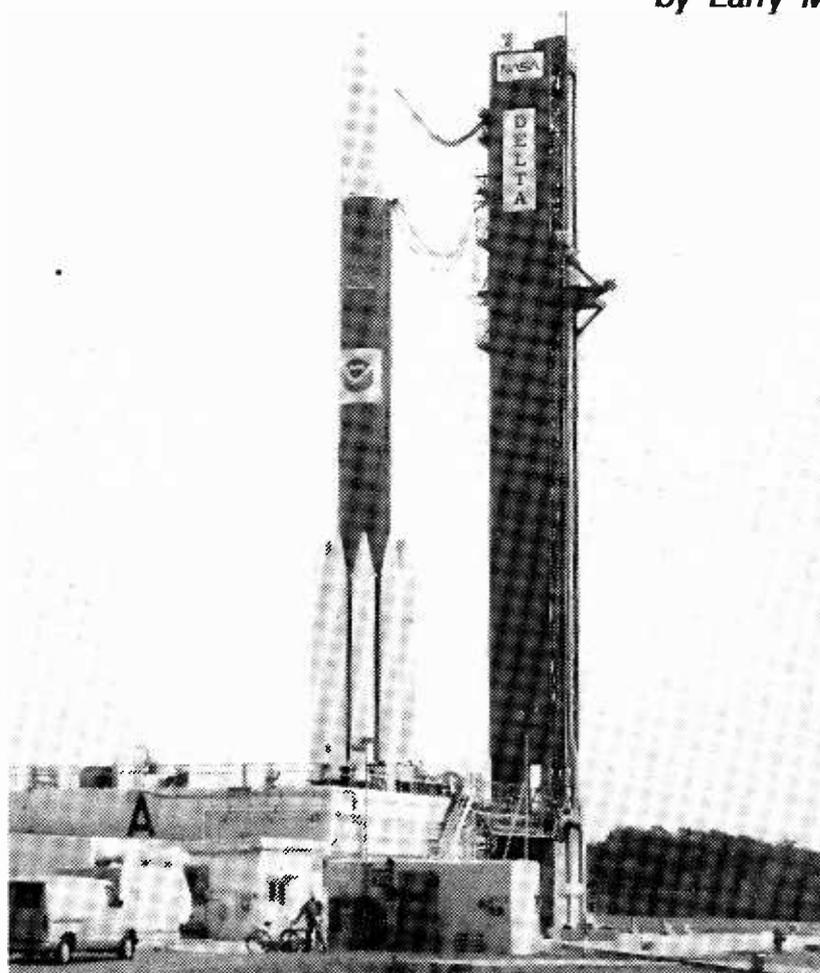
associate with the U.S. space program, Cape Kennedy (formally, the John F. Kennedy Space Center). Bright and clean, it boasts a courtyard full of life-size rockets for tourists to admire, several exhibits and even a five story high movie on the space program.

But go further east, through a maze of guard houses manned by armed members of Kennedy Center Security and across the Banana River, and you'll reach the real workhorse of the operation, Cape Canaveral Air Force Station. It's a place not many people see and there's good reason. It's been years since any "glamour" missions have been launched from here. At Kennedy, there is a modern media center, shaped like an amphitheatre and filled with row upon row of seats for the inevitable crush of reporters. ABC, NBC, CBS, the wire services and even the Voice of America all have their own permanent or semi-permanent buildings facing the launch pad. At the Air Force Base, there is only a teetering set of wooden bleachers, its grey paint peeling; a sign warning journalists, "unsafe for occupancy." Cape Canaveral Air Force Base is the "no frills" version of Kennedy.

T-minus 35 minutes. Mark. FSC verify elect package on. It's on. FSC hydraulic power unit on. On. TM-2 report second stage hydraulic return pressure. 62 decimal 2 PSIA. This is Lox Conductor. I'd like to do a Com-Check with personnel that were on the side nets. CMR? Ready. LCE? Ready. TM-2? Ready. FMA? Ready. Data Station Control? Ready. SSP? Ready. PLC? Ready. SSC? Ready. PSC? Ready. TM-3? Ready. Vehicle propulsion? Ready. QAM? Ready. LCE? Can you go to Net 5 for a minute? Roger.

It's from the Cape Air Force Base that more numerous and less visible but no less important payloads are sent into space. And it is from Launch Complex 17 that, in a few short minutes, a McDonnell-Douglas Delta 3924 rocket will lift the GOES (Geostationary Operational Environmental Satellite) weather satellite into a 22,237 mile high geostationary orbit. A geostationary orbit is one in which matches the spin of the earth, making it remain fixed in the sky over a particular point.

Five GOES satellites, located at roughly equal distances from one another, could provide overlapping views of the complete cloud cover of the earth (except the poles) every 30 minutes. But there aren't five GOES's currently in operation. In fact, instead of the normal two -- one



Delta 179 stands poised for liftoff (Photo courtesy NASA)

for the east coast and one for the west coast of North America -- there is only one.

Two years ago, when the optical encoder on GOES East (GOES-5) failed, the National Oceanic and Atmospheric Administration (NOAA) was forced to move its remaining bird, GOES West (GOES-6) over the center of the country to provide the widest possible coverage of the States. To make matters worse, a replacement for the failed GOES East, GOES-G, launched on May 3, 1986, had to be destroyed before it reached orbit. The latest version, GOES-H, currently sitting atop the Delta rocket at Launch Complex 17, will fill the hole. Then GOES West will be returned to its west coast position, 135 degrees west longitude. The need for a successful launch today is critical.

But the weather in Florida can change in an instant. It's a place where the hot rain of a late afternoon thunderstorm can come out of nowhere during the summer and in winter, sunny skies can give way to grey equally as quick. The forecast for lift off calls for a temperature of 63 degrees, a relative humidity of 75 percent, east-southeasterly winds eight to 12 knots and visibility of seven miles with a 30 percent chance of rain showers.

This is Delta Launch Control at T-minus 25 minutes and counting. The only concern today has been the weather. What we are watching at this time is the weather balloon sounding which is indicating that we do not

have favorable upper wind conditions at this time. An F-106 weather reconnaissance plane has been dispatched from Jacksonville Naval Air Station to fly in the launch area and provide further data and observations to assist the Cape Weather forecast personnel in making a recommendation to the Launch Director.

NASA's parameters for a launch are a cloud ceiling of no less than 2,000 feet, no thunderstorms within five nautical miles and no cloud decks greater than 6,000 feet of thickness containing temperatures below freezing.

At the moment, the Cape weather forecaster is announcing an area of rain showers offshore. They're mostly stationary and, he says, they won't be a factor. There's also an area of thunderstorms southwest of the Cape. But what concerns NASA is weather balloon soundings that are indicating wind-shear at the 17,000 to 18,000 foot range that is not acceptable for launch. Launch control asks for another weather balloon to be launched. The launch is held at T-minus four minutes, twenty four seconds, while meteorologists study the data. Meanwhile, launch preparations continue. The media stands on a grass mound in view of the rocket, smoking, talking and watching.

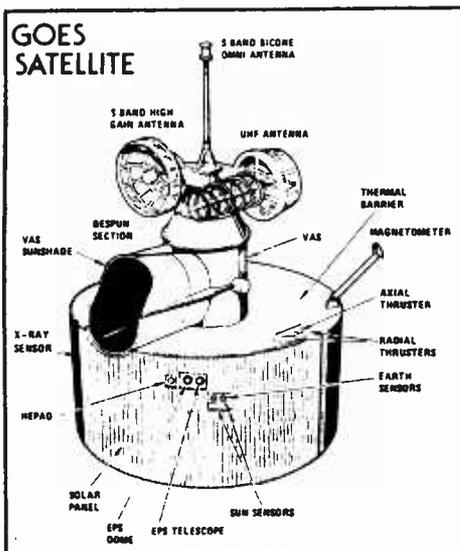
SSC report temp. 59 degrees. LCDR verify ferring temp meets mission requirements. Verified. SRO report vehicle beacon go on external power? Go. RFM report Command Receiver Sat on? On. Report engine section

temp? 68 degrees. SRO report preliminary clearance to launch? I don't have a preliminary clearance to launch. Roger.

It took NASA just four and a half months after the GOES-G was destroyed by mission control back in July of 1986 to get another Delta rocket on the launch pad. Liftoff was scheduled for November 20, 1986. But once again, problems arose and the launch had to be delayed until February 19 when NASA decided to replace a suspect switch which selects from a pair of transmitters on the satellite. Still other delays postponed the launch until February 25. But with the recent spate of problems, highlighted by the Shuttle disaster, NASA has been taking no chances.

At T-minus 4 minutes and holding. We have just had word from the Delta Project Manager and the Launch Director that we will scrub for tonight. The wind data that we have indicates that we are still 140 percent above acceptable levels and we will not be able to achieve a launch this evening. The launch team will now go into their turn around procedures, which will involve de-tanking the vehicle and planning for a twenty-four hour scrub, which will bring us back for a resumption at the same time tomorrow and a launch at 6:05 PM. Repeating, the launch has been scrubbed for tonight.

There is a collective groan from the press section. No one seems to understand why, with the oh-so-perfect weather on the ground, that the launch would be scrubbed. But scrubbed it is and within minutes, local radio and TV reporters have said their goodbyes and are gone. To those who cover the "space beat" in Florida, the attitude towards a launch is about the same as it is toward covering a Zoning Board meeting. Many of these people are hardened space vets. A number stay behind to talk to NASA officials in a language steeped in physics and peppered with jargon.



It is a new day and nowhere but in Florida does it dawn so gloriously. Elegant white cranes fly lazy circles around the launch pad, where the 116 foot blue and white Delta rocket sits, gleaming in the sunlight; stunning against a deep blue sky. And as the sun eventually begins to fade late in the afternoon, the site begins to take on an eerie, futuristic, sort of look. Enormous spotlights shroud the vehicle from all directions; the smoke of boiling liquid oxygen trails from its midsection. A sense of excitement begins to build.

Tonight, there are no problems with the weather. Launch proceeds as scheduled and once again that familiar sequence of numbers ring out through the PA system:

10. 9. 8. 7. 6. 5. 4.

Engines below the vehicle ignite in a burst of orange and smoke, sending enormous clouds blasting horizontally into the air. But the rocket remains, tenuously, for a second or two, on the pad.

3. 2. 1. Liftoff.

The Delta lifts from its base and slowly clears the tower -- in utter, complete silence.

And then it hits you. An incredible, furious sound, like an unleashing of the fires of hell. A numbing, roaring, ripping sound; something that can only be described as a million times louder than a sheet on a clothes line snapping in a hurricane. And as a hundred cameras click, recording the event for posterity, the vehicle quickly enters into the clouds and is gone. And then silence again.

The members of the media covering the event do not immediately begin to pack up. Even for people that see as many rocket launches as township meetings, there is cause for pause. No one is unaffected by the enormity of what they have seen. But slowly; no TV screen can do it justice. Finally, as the smoke from the rocket begins to drift the mile or so from the pad into the maze of cameras and TV trucks, they come to their senses and begin to leave.

The GOES-H (now designated GOES-7) was placed into an elliptical transfer orbit with an apogee of 41,644 kilometers and a perigee of 25,876 kilometers. Once released, it was placed into the control of NASA at the Goddard Space Flight Center in Greenbelt, Maryland where it remained for thirty days. During that time, it was placed in a circular orbit 22,237 miles

above the earth, traveling at a velocity of 6,878 miles and hour. GOES-7 was handed over to the National Oceanic and Atmospheric Administration on March 24th. On that date it began providing operational images like those seen on television.

GOES-7 is capable of distinguishing between clouds as small as 0.6 miles in visible light; 4.3 miles in infrared light.

In normal operation, the GOES also serves as a full-time monitor for dangerous storms. Cloud masses associated with typhoons, hurricanes, heavy rain storms, snow and blizzards, can be tracked by the hour,

providing immediate information on their location and probable path of travel.

GOES-7 can collect local environmental data -- rainfall, river levels, snow depths, and temperatures from up to 10,000 automated ground stations in six hours' time.

The GOES-7 also carries a search and rescue experiment for detecting emergency distress signals on the ground from orbit. It uses a 406 MHz system to determine if near-instantaneous alert of rescue forces might be achieved. Location of the signal would be done by polar orbiting satellites using a 12.5 MHz system.

Monitoring NASA

The following HF SSB frequencies are among the most commonly reported in use at the Cape. A comprehensive list is contained in Grove's *Shortwave Directory*.

2716	5810	8964	11205	14896
3187	6693	8981	11407**	15021
4855	6708	9006	12277	18009
4992	6723	9043	13227	19961**
5190 sec.	7461	9132*	13600*	20192*
5350	7715**	10310***	13742**	20272**
5710	7765	10780 pri.	14397	20390 alt.

* Cape to Ascension
** Ascension to Cape
*** Antigua to Ascension

NASA IDENTIFIERS

Tactical Callsign	Identification
0	Patrick AFB, FL
1	Merritt Island, FL (AFE 71-Malabar)
2	Jupiter, FL
3	Grand Bahama Is.
7	Grand Turk Is.
12	Ascension Is. (AFE 83)
13	Pretoria, S. Africa
89	Mahe, Seychelles
91	Antigua (AFE 86)
Abnormal One Zero	Vandenberg AFB, CA (AGD)
Abnormal Two Zero	Wheeler AFB, HI (AGD25)
Abnormal Four Zero	Kwajalein (ABK)
AGAR	EC-135 Advanced Range Instrumentation Aircraft, 4050th Test Wing, Wright Patterson AFB
Canaveral Control	Port Canaveral Harbor Control
Cape Leader	Contingency Emergency Base
Cape Radio	Cape Canaveral Communications (USAF)
Chase 1,2	T-38 Chase Aircraft
Dishpan	U.S. Navy P-3 Orion Aircraft
Eyesite	U.S. Navy P-3 Orion Aircraft
Fisher	Cape Radio to Ships
Freedom	Booster Recovery Vessel
Gull Photo	USAF WX-130 Aircraft
Independence	Booster recovery vehicle
Jolly	USAF/ARRS SH-3 Helicopters
King	USAF/ARRS Aircraft
Liberty	Booster Recovery Vessel
Peapod	USAF AC-130 aircraft
Thinker 1	Range operations, Senior Officer
Variety	Aircraft

SURVEILLANCE:

by Jerry V. Cody

Part II: Not Being Compromised

Electronic security devices play an important part in personal protection and security. In today's world a businessman or government official's livelihood and life can become extremely vulnerable if precautions are not taken. Only through proper equipment and technical know-how can a person avoid being compromised.

During the week of October 7, 1985, CBS News was informed that a short-wave listener in Chicago overheard a conversation between President Reagan on Air Force 1 and Defense Secretary Caspar Weinberger about a tactical situation involving the hijackers of the Italian cruise ship *Achille Lauro*.

Both voices were heard over an unsecured channel; time was of the essence because the terrorists were escaping in an Egyptian airliner over the Mediterranean Sea. The scrambling equipment on board Air Force 1 would have required time-consuming adjustments for compatibility with the Defense Secretary's plane.

In spite of the lack of radio security, the *Achille Lauro* hijackers were arrested after their Egyptian getaway plane was forced down by U.S. Navy F-14 Tomcats. It was fortunate that terrorist sympathizers with radio

capability were not monitoring Air Force 1 radio traffic at that time!

In the summer of 1985 it was revealed at a news conference by government officials that a drug smuggling bust in southern Florida had uncovered a radio frequency list detailing over 1000 channels assigned to local and federal authorities. Today officials in the U.S. Government and private industry are taking action to beef up communications security.

UNINVITED LISTENERS

A tactical voice security system (TVS-300) provided by Law Enforcement Associates (LEA) protects voice communications from being decoded. The TVS-300 is available as a briefcase portable or may be mounted on a desk top. It can be adapted to a wide variety of radio systems and can store up to eight distinct codes.

Scrambling is an effective way of thwarting bad guys from intercepting sensitive radio traffic. Digital scramblers are almost impossible to beat—voice syllables are shuffled in a pseudo-random fashion by computer.

Non-digital scrambling such as speech inversion is easily defeated by descramblers costing approximately

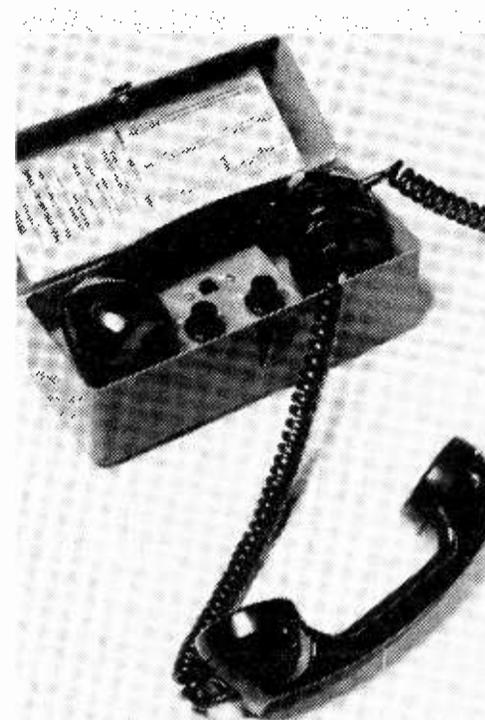
\$50. The technique simply reverses the low and high frequency portion of the voice spectrum so it sounds like improperly-tuned single side-band until the decoder is properly adjusted.

More than a bowl of soup can be ruined if not on the lookout for the wireless transmitter known as the "bug." Bugs can compromise corporate business by notifying competition of your next move. Bug detectors provide an effective fly swatter for wireless transmitters and can come in many forms.

Pen/pencil sets, attache cases and hand-held bug detectors are available. A walk-through bug detector that looks like an airport metal detector is on the market.

One of the best ways to defeat a bug is also the least expensive: your conversation. Not giving a surreptitious listening device something worthwhile to overhear can save dollars that would otherwise be lost to corporate espionage.

Only through good management of electronic communications can a person make the claim of not being compromised. ■



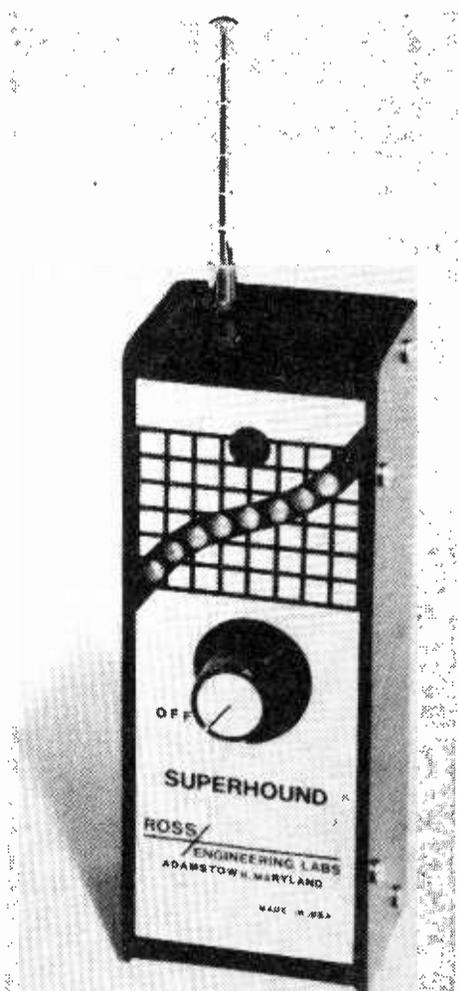
On the telephone, many scrambling options are available. Shown above is the Privacom system by MIECO which allows privacy even on a call-in.



A special DVP code-inserter programs a specially-equipped (MX-series) hand-held for voice security (Courtesy of Motorola)



Bug detectors come in many forms: The ACM-2 Countermeasures Instrument pictured above aids in the detection of hidden microphones, carrier current transmitters, hidden tape recorders, concealed video cameras, telephone taps and bugs, telephone eavesdropping modifications, visible and infrared light attacks, and RF subcarriers. Easier for the novice to operate is the "Superhound" by Ross Engineering, pictured on the right.



Classification and Security: The Inside Story

by Menlo DuPem

Part II - Physical Security and Controls

MARKING

Last month we explained Classification and Access, and the terms involved. This month we will look at the means used to physically protect and control classified information and material.

Documents in all their forms (books, letters, pamphlets, drawings, etc) must be conspicuously marked with the overall classification at the top and bottom on the outside of the front cover, on the title page, on the first page, and on the outside of the back cover.

Each interior page of classified documents must be conspicuously marked at the top and bottom with the highest classification of the information appearing thereon, or the designation "Unclassified" if all the portions on the page are unclassified.

The classification of portions are shown by the parenthetical symbols "(TS)" for Top Secret, "(S)" for Secret, "(C)" for Confidential, and "(U)" for Unclassified. When appropriate, the symbols "RD" for Restricted Data, "FRD" for Formerly Restricted Data, "N" for Critical Nuclear Weapon Design Information. There are others as well.

ACCOUNTABILITY AND CONTROL

Except for short-lived working papers and the like, all classified information and material must be accounted for at all times. This is accomplished by setting up Control Stations for classified material at each location within the government and its contractors that holds any classified material.

The control stations maintain an inventory and receipts for all classified information and material. Any movement in or out of the location must be documented with receipts, thereby leaving a paper trail for audit purposes.

TRANSMISSION

When classified information or material must be sent to someone or someplace outside the location of its control station, special handling procedures apply.

It is first wrapped in a secure manner which will break seals or tear the wrapping when opened and which is stamped with the highest level of classification of the contents with a receipt attached. All of this is wrapped a second time in an equivalent outside wrapper which much not indicate that the contents are classified.

Shipping is, whenever possible, by registered mail. Some carriers (Federal Express, Airborne, etc.) are

approved carriers who have procedures for "signature service" shipments which allow them to carry shipments the same as the Postal Service. Top Secret, all Crypto (regardless of classification) and some other special items, may only be shipped by courier.

Electronic transmission via encrypted circuits is the primary method by which most classified information is regularly transmitted. The Automatic Digital Network (AUTODIN) does this for printed matter and the Automatic Secure Voice Network (AUTOSEVO-COM) does it for telephone voice messages. The bulk of all message traffic worldwide flows through the AUTODIN circuits, totally computer controlled and totally encrypted.

DOES THE SYSTEM WORK?

Considering the hundreds of thousands of military personnel as well as government and contractor civilians who handle classified information and material, what is really amazing is not how much is obtained by enemy spies, but how much isn't! For every person who sells or gives away our secrets, there are tens of thousands of loyal American citizens who not only don't give away our secrets, but who would love to have a few minutes alone in a room with those who did! However, there are problems, mostly caused by stupidity, fear, ego, and misunderstanding

Overclassification

The biggest problem is overclassification, both too much ("I don't know for sure so let's classify it.") and too high ("I'm not sure, so let's mark this Secret instead of Confidential.") There is a tendency to say, "When in doubt, classify," under the philosophy that it is better to err on the side of being overzealous than careless.

Actually, the classification guides for technical subjects (weapon systems, war plans, operational orders, etc.) are rather precise and easily defined; but in the areas of planning, operations and general administration, things are a lot fuzzier.

Training in how to properly classify things is almost nonexistent. People are handed the regulations and guides and are told to go to it. They usually do not have the required background and the "big picture" view so, just to be sure, they overclassify.

It costs a lot of money to control and protect classified information and material, and the volume of it is staggering. A few, long-time security experts have determined that between 80 and 90

percent of all classified material should be unclassified! In addition to creating a lot of unnecessary work, it weakens the system because those who maintain it say, "Why am I doing this?"

Political Games

Up 'til now, we have been talking about defense-classified material, but what about all those political and foreign affairs "leaked" secrets we are always reading about in the press or seeing on the 5 o'clock TV news?

It has become common practice to leak information to the press to improve one's chances of changing things which one's bosses do not want changed, or to "see how it flies," or to try to discredit a rival person, agency, department, etc. It is equally common to classify documents or information which in any way differs from the government's, department's, agency's, or boss's point of view on any subject or system so the public won't know! And to do the same for any informa-

tion which might be embarrassing or expose errors or wrongdoing.

There are also those insecure souls who feel their boss won't read their reports, analyses, summaries, etc. unless they are classified Secret or Top Secret, so they include unneeded classified information in them or simply mark them as such regardless of contents.

All of these actions are wrong and most are illegal! But they continue because, except for the rare case that gets before the public, it's almost impossible to know what's happened or who's doing it unless you are on the inside. So obfuscation, confusion, coverups, and revelations continue, all at the expense of the system's credibility, the nation's security and the taxpayer's pocket-book.

An Example

We may have a piece of information which we know the Russians also have, but for various

(Please turn to page 31)



SCAN AMERICA presents their second edition of the TRAVELER'S FREQUENCY DIRECTORY. The TFD includes hundreds of updates from the first edition as well as additional data to assist the highway traveler. Information on state police, including all toll roads, turnpikes and state highway maintenance units are included for all fifty states. The data is presented state by state, including radio district maps and codes for most states.

The TFD, Second Edition is available for \$8.00, ppd. from:

SCAN AMERICA
430 GARNER DRIVE
SUFFIELD, OHIO 44260-1557

Also available: Midwest Federal Frequency Directory. Covers IL, IN, KY, MI, OH, PA & WV in detail, ALL agencies. \$8.00, ppd.

DXing South Africa

Ka-chunk goes the phone line as the DJ picks it up. "Good morning! Who do we have on the line?" [Hesitatingly] *Mary* "And where are you calling from, Mary?" *Port Elizabeth*. "And what can I play for you?" *I'd like to hear ... [giggling] something by ...*

For all intents and purposes, it sounds like any small-town radio station in the United States. The disc jockeys are likable, their patter amusing. The music is nice if not very progressive. You're likely to hear a lot of instrumental versions of pop music and some light hits from the 1960s. And all in all, it's can be an entertaining way to spend a night -- until you hear where they're broadcasting from: South Africa.

Then you realize there's something disturbingly incongruous about these cheerful little stations. For while these stations are happily chattering away on the shortwave bands, their sponsor has caused one of the most universal cases of moral outrage in recent history. Their host and sponsor is the government of the Republic of South Africa, a nation which has enforced racial segregation since 1948.

To fully understand the incongruity, one need only watch the U.S. evening news, with its South African-government censored reports of violence and then tune in to these stations, cheerfully taking phone calls from giggling listeners and making wise-cracks about the weather. These two faces presented by South Africa are worlds apart. Pictures of people being beaten by riot police and burning corpses don't fit together well with the "life as usual" portrait painted by the stations of the South African Broadcasting Service (SABC).

Despite the cosmopolitan image of wealth and success projected by the official government voice, the word "apartheid," continues to be the only word of Afrikaans spoken by most of the world. It is the official policy of the South African government, and means, quite literally, "apartness." It is government sanctioned racial segregation and it has affected the lives of millions of people in this, Africa's richest nation.

South Africa is a nation of over 471 thousand square miles. It produces most of the non-communist world's gold as well as asbestos, coal, diamonds, copper, zinc, iron ore, manganese, tin, uranium and zinc. Its per capita gross national product (GNP -- a measure of a country's wealth) US\$1720, towers above those of its neighbors: Botswana

(US\$720), Zimbabwe (US\$470) and Mozambique (US\$250). Its people are a mix of races and colors. Most are served by government radio, the South African Broadcasting Corporation (SABC).

There are a number of stations in the service of the SABC and they range from a system of internal shortwave stations to local AM and FM community services in Afrikaans and English to commercial black stations, all of which are confined to AM and FM.

Radio RSA

For shortwave listeners, the most familiar of the South Africans and certainly the easiest to hear is Radio RSA, the official external service. Although the statement is open to interpretation, its stated goal is "to present the nation in a positive and correct image" -- a position certainly no different than the other hundreds of government-sponsored stations on shortwave, but less than encouraging in terms of hope of full disclosure.

Based in Johannesburg, the nation's largest city, it reflects a sophistication and culture befitting its reputation as a financial and commercial center.

Radio RSA officially went on the air on May 1, 1966 and has since extended its programming to include 208 hours weekly in eleven languages. Programs showcase the current news of the day, the country's lifestyle, wealth, achievements and tourism. The style is somewhat dry but features continue to be both informative and professionally produced. At one time, Radio RSA was often mistaken by new shortwave listeners for the BBC, a station it once prided itself on replicating.

The identifying interval signal (the signature tune at the beginning of the broadcast) is the call of the native Bokmakierie bird, combined with an old South African folk song, "Ver in die Wereld Kittie."

Radio RSA broadcasts in English at the following times:

Time UTC	Freq kHz
0200-0256	6010, 6185, 9615
0300-0400	3230, 4990, 7270, 9585
0400-0425	3230, 4990, 7270, 9585
0630-0700	7270, 11900, 15270, 17780
1100-1156	11900, 15220, 17780
1300-1400	15220, 21535, 21590
1400-1500	21590
1500-1556	21590
2100-2156	4810, 7270, 9585, 11900



RSA — ENGLISH SERVICE

SABC

Also heard on the shortwave bands is the domestic service of the SABC. Programming includes news, program features, and several music styles though in a less stuffy and confining format than the external service, Radio RSA.

SABC-Johannesburg

0400-0555 UTC	on 3320 kHz
0400-0615 UTC	on 3955 kHz
0555-1535 UTC	on 6005 kHz
0615-1700 UTC	on 7285 kHz
1535-1930 UTC	on 3320 kHz
1515-1930 UTC	on 3955 kHz

All broadcasts are in English and Afrikaans, which sounds similar to Dutch.

However, by far the most interesting listening on the shortwave bands are the commercial shortwave stations of the SABC. Radio Five, from Jo'burg, is a nightly service presenting upbeat disc jockeys who obviously enjoy themselves. The lively local touch includes news and market reports, weather and sports and light pop or rock music. And there are the inevitable commercials for everything from cigarettes to cars.

Radio Five

0400-0545 UTC	on 4880 kHz
1600-2215 UTC	on 4880 kHz
0520-1530 UTC	on 7170 kHz

Radio Five is also in English and Afrikaans and is often easy to hear on 4880 kHz between 0400 and 0545 UTC.

Radio Orion and Radio Oranje, broadcasting from the Orange Free State, are also SABC stations. Orion, which has suddenly and without any real explanation become very easy to hear recently, can fool you. Orion, depending on the announcer, can sound like anything from Radio "Oron ya" to Radio "Rhine." It is far more subdued than its comparatively "raucous" cousin, Radio Five. Try for Radio Orion in the mid-evenings on

3320 kHz. Listen closely, though. The BBC also uses 3320 kHz and, if not careful, you may mistake the two.

Radio Orion

2130-0000 UTC	on 4880 kHz
1930-0000 UTC	on 3215 kHz
1930-0330 UTC	on 3320, 3955 kHz

Radio Oranje, which is less often reported by listeners, is also confused with Radio Orion because of its similar sounding name. Try for it on the following schedule:

Radio Oranje

0400-0615 UTC	on 3215 kHz
0540-1745 UTC	on 6105 kHz
1500-1930 UTC	on 3215 kHz

Often overlooked because of the fact that it's the only internal South African shortwave station to broadcast exclusively in Afrikaans is Radio Suid Afrika.

Radio Suid Afrika

0555-1510 UTC	on 6005 kHz*
0615-1535 UTC	on 7285 kHz
1505-0615 UTC	on 3955 kHz**
1535-0555 UTC	on 3320 kHz**

* alternate frequency is 9555 kHz
** Shares transmitter time with Radio Orion

Radio for the "Republics"

From this point, the geography of South African radio enters a grey area. Part of the policy of apartheid is that of separate development. That is, each ethnic group is supposed to develop separately and on its own. As a result, the government of South Africa set up ten African tribal "homelands" for the main black groups, including the Zulu (Kwa-zulu), Xhosa (Ciskei and Transkei), Tswana (Bophuthatswana), Sepedi (North Sotho) and Seshoeshoe/South Sotho (Basotho-Qwaqwa) plus Swazi, Kwazulu, Lebowa, and Venda. Although called independent "republics" by South Africa, few outside of South Africa accept their

DXing with an Expert! by Larry Miller

legitimacy as sovereign states. However, of these, four have their own radio services.

Bophuthatswana (pronounced "Boe Phoo that Swan a") is the home of **Bophuthatswana Broadcasting**. It's divided into two channels with one carrying Radio Mmabatho, the Voice of the Nation, in Setswana and the other carrying Radio Bophuthatswana (or "Radio Bop" as the locals call it) in English. Neither is carried on shortwave and in fact, Radio Bop's only connection with shortwave is that Radio Netherland Media Network "Southern Africa" correspondent and *WRTVH* "co-editor" Richard Ginbey has been employed there.

It's interesting to note that while the *World Radio TV Handbook* steadfastly refuses to list the homelands as independent nations and instead puts them under "South Africa," they do list Ginbey's home country as Bophuthatswana instead of South Africa.

Also from "Bop" is Bophuthatswana Commercial Radio's Magic 702 in AM stereo and Radio 540, a religious operation of unknown affiliation. Like Radio Mmabatho and "Bop" it is not on shortwave.

From Ciskei comes the **Ciskei Broadcasting Service** in Xhosa and English. It's transmissions are heard only on SABC-owned FM transmitters. Likewise, the Republic of Venda's **Radio Thohoyandou**, which broadcasts in LuVenda and English, is not offered on shortwave.

Fortunately there is one easily heard shortwave target among the "homelands." It is called **Capital Radio** and it broadcasts from the Xhosa "homeland" of Transkei.

Capital Radio is a modern, up-beat service in English found on 3930 and 7150 kHz from 0200 to 0530 UTC and again from 1530 to 2300 UTC. Its modern, on-air programming is in stark contrast to the lifestyle of the native people who inhabit Transkei or "Wild Coast", the Xhosa, and who live in the same cone-shaped huts as their ancestors.

At times, listeners can also hear Southern Sounds, a commercial Christian station that shares time on Capital Radio's transmitters. Originally intended for local reception in the areas of the Cape, Transkei, the Natal South Coast, East London and Mtandstane, shortwave brings its signal around the world, but primarily to Southern Africa below the equator. It is on the air in English from 1700 to 0400 UTC on 3930 kHz.

In the final chapter of South Africa's turbulent history is Namibia. Originally colonized by German settlers in the mid 19th century, the newcomers were welcomed to this dry, desert land by the native Damara and Bushmen people. But the friendship was short-lived. Soon the Germans annexed the land and named it Sud-West Afrika (South-West Africa).

Over the next fifteen years, numerous bloody revolts shook the area, leaving some 60,000 natives dead. In World War I, South African troops seized the land by defeating the Germans. Since then, the South Africans have governed the land as if it were their own but in 1968, the UN General Assembly granted the territory the name of Namibia, after the Namib desert and the struggle for independence goes on.

Shortwave broadcasting is active in the modern capital city of Windhoek, where the German influence is still very much a part of everyday life. Beerhalls line the main thoroughfare of Kaiser Street and remnants of the Nazi party are still rumored to exist here.

The region's radio, the **South-West Africa Broadcasting Corporation (SWABC)** is owned by the South African government and was established on May 1, 1979. The station's large staff keep the station on the air twenty-four hours a day in eleven languages. Programming is presented with a local flair that includes commercials, cultural features, dramas, music, sports, and news of national and international interest. Sunday's schedule includes religious programming.

To follow the struggles of Namibia and her people, and to hear a different side of South Africa, the following schedule is best heard in North America.

SWABC - Namibia

1630-0630 UTC on 3270 kHz
1630-0630 UTC on 3295 kHz
0600-1630 UTC on 4935 kHz
0630-1600 UTC on 4965 kHz
1100-1900 UTC on 4965 kHz

Given the decreased flow of government-censored news from explosive South Africa in our domestic media and the uncertainty of the information provided by the South African government itself, listening to the the RSA may leave you with mixed feelings. But as is often the case with the domestic shortwave outlets, you'll know that what you're hearing is the same thing that South Africans are hearing -- for better or worse. ■

Over the past three months, we've been trying to give you an idea of how to become a good DXer. We've tried to show that you don't have to be an "eck-spurt," and you don't have to have a lot of high-priced equipment. You do have to have patience and a willingness to learn.

This month, we conclude our series with a talk with a man who is probably one of the top two or three DXers in the world -- if not the best. His name is Bob Hill, and what makes Bob unique is not only his tremendous ability at the dials of a radio, but his deep understanding of the hobby and his patience and desire to teach others about it.

Bob is a fascinating guy to talk to -- as evidenced by the fact that MT's Larry Miller talked with Bob late one night in what was to be a short chat -- and ended up in the wee hours of the next morning. Here is a man who truly loves DXing. We hope you enjoy meeting him.

MILLER: How long have you been DXing?

HILL: Oh, I'd say about 35 years?

MILLER: Do you mean actually DXing -- hard-core DXing, or do you occasionally sit down and listen to a program, maybe take in a series on copper wire production in Bulgaria?

HILL: Well, I have to be quite honest with you. I think I am probably as close to being a totally hard-core DXer as there is on the planet. [Laughter] Once in a great, great while, if I happen to tune in to a program that interests me, I might listen to it for a while. But the chances are remote. I'm pretty single minded.

MILLER: So when you listen to something, you're not listening for content at all, right?

HILL: Not really. No. If it's something exotic -- if it's Somali music or something of that sort or a particularly unusual language, I might take some pleasure in that but in terms of program content itself goes, it's very seldom that I would spend any time on it. I think if you're going to be serious about DXing, you've got to commit yourself to DXing during the listening time that you have.

MILLER: What do you mean by DXing. What are the three most exotic catches you've had recently?

HILL: Oh, Lord! I guess maybe All India Radio, Lucknow, on 3205 which I caught at 0025 sign on a few weeks back and also All India Radio station at 3365 which came on at the same time.

MILLER: From Simla?

HILL: No, that particular one was Delhi. And it seemed as if it was in parallel with Lucknow. I suspect I did hear Simla but the signal was so poor that I wouldn't even put it as a tentative. Still, it's really quite a thrill to get All India Radio regional on 90

meters -- particularly at sign on during our evening. You might think you'd have some shot at them, say around 1200 during the winter mornings, but to get them in the evening was quite a thrill.

MILLER: You did hear Voice of the Mountain in Lebanon a couple of months ago?

HILL: I assume it was. I never got a positive ID on it, but everything checked out. I read about it in one of the publications and I checked it out idly, not really expecting to hear anything and by God, there was something there. It was there for, it must have been ten days or two weeks in a row, every single day, and I was able to piece together enough program content to be very certain in my own mind it was Voice of the Mountain. But I think sometime even when you're certain in your own mind, you've got to call it tentative because otherwise you're doing a disservice to other DXers. There's so much list loggings that goes on as it is.

MILLER: You don't QSL the stations you hear, do you?

HILL: No, I've never really just had any interest in that facet of the hobby, but I don't denigrate it. If you're interested in QSLing, more power to you. It's just that I'd rather spend my time, my money, and my effort in other pursuits. I don't think that QSLs prove that you heard something, which is not to knock them as very interesting souvenirs or momentos, or whatever you want to call them.

In fact, when Jerry Berg announced that he was going to start a museum for QSL card, I offered to send him all four of mine.

MILLER: You certainly have your own style of DXing...

HILL: I have very little interest in Latin America. I very seldom spend any time at all on the Latins which is

DXING WITH AN EXPERT cont'd from page 13

considerably at variance with a lot of well-known DXers in North America. I just have never been able to develop that much interest in them. My Spanish is moderately good so I can generally follow what is going on...

MILLER: I was just going to ask you how much your knowledge of foreign languages plays in your choice of targets.

HILL: Well, I think it's essential to have a facility for languages, at least to the degree where you can distinguish one from another or that you can at last recognize what language family you're listening to. And this is something I've developed over the years. I think this is absolutely essential if you're going to be serious about DXing. You certainly can't be much of a DXer if you all you listen to are English language broadcasts.

MILLER: Do you set up certain times when you DX? Or just casually when you feel like it?

HILL: My approach to DXing is very hit or miss. I sit down when the spirit moves me and I leave when the spirit moves me. More often than not, I don't have any particular objective in mind. I just kind of sit down and start spinning the dial and say, "Hmmm. Let's see what we can find." I find that more entertaining than just sitting down with a long list of objectives and kind of rigorously monitor night after night. I find that a chore, although I do have a hit list, arranged by hour.

I try to cover a lot of territory. I have a good working knowledge of propagation so I know pretty much what can possibly be heard and when and so forth. So I think that the combination of knowledge of languages and knowledge of propagation is a very useful one. It's something you have to develop over the years, not something that comes overnight.

MILLER: A lot of people consider themselves really DXers when they hear Radio New Zealand in English.

HILL: Everybody's definition of DX and being a DXer is different. And as you spend more and more time in the hobby, your standards get more and more stringent until you finally get to the point where something that might be a really thrilling DX catch for somebody else might be almost commonplace for you. Again, you have to continually find new sources of interest and satisfaction. To me there's always something new. If it isn't a new station, maybe it's a new frequency range.

MILLER: You hear stuff that if absolutely phenomenal. It's amazing. Stuff that 999,999 out of a million could not imagine, you hear. How?

HILL: I don't know. I guess that a lot of it lies in the ability to recognize what it is you've stumbled upon. Obviously, you've got to be able to hear weak, crummy, fade-y, static-y signals.

MILLER: And be willing to stick with them...

HILL: And be willing to stick with them. And have a hunch right off the bat what it is that you've come across. Again, the knowledge of propagation is absolutely essential. The knowledge of languages is essential.

For the first time in I don't know how many years, I have a location that is relatively low in electrical noise. And this has been a revelation to me because now I'm able to uncover signals that I could never, ever, hear anywhere else.

I don't have anything in the way of fancy equipment. I have a very ordinary antenna that winds through the trees and is only fifteen feet off the ground. My receiver is a Kenwood R-100 that's certainly nothing fancy. I've had fancier set-ups in my years in the hobby, but this just seems to be the right combination of location and equipment and everything kind of going right.

MILLER: You're talking to people who read *Monitoring Times*, many of whom think New Zealand is an incredible DX catch...

HILL: That may be for that person. And if you've been in the hobby six months, you shouldn't be trying to log All India Radio on 90 meters. You should proceed at the speed that's appropriate for you and keep moving up the ladder. I know when I started out I wasn't hearing all this marvelous stuff. It's a matter of experience, of learning this, that and the other and putting it all together with some good source material. And you've got to carry in your head an enormous amount of information.

In terms of propagation, you have got to know sunsets and sunrises all over the world because if you don't, you're almost helpless when it comes to low band DXing. That's the kind of thing you absolutely have to know.

You can get a lot of exotic catches but you've got to pay your dues to the laws of propagation.

MILLER: Explain the sunrise-sunset thing.

HILL: It is characteristic of short-wave propagation that signals, particularly in the lower frequencies, say below seven or eight megahertz, whatever, can be enhanced by perhaps 20 dB when the listener is at his local sunset and the signal that he's hearing is at its local sunrise, or vice versa. So if it's getting right toward sunrise in your area of the world, you want to know where it's sunset somewhere else, or vice versa. Because you're going to get enhanced reception and you're going to be able to pick up stuff that you absolutely would have no shot at at any other time.

MILLER: Clean, pure and simple -- impossible.

HILL: That's really it. And it's interesting, this doesn't always work reciprocally. You can hear, let's say, Laos, on 41 meters at 1200 which is your sunrise in midwinter and it's just about their sunset. And you'd think that the opposite would be true at their sunrise and your sunset, but it is not true at all. If you've ever tried to hear Laos on 41 meters around 2300, it's absolutely hopeless.

MILLER: Any reason for that?

HILL: I don't know why. I really don't. I'm sure there is someone who does, but the important thing is that as a DXer, you must realize this, otherwise you'll spend a lot of futile time listening for something that isn't going to happen. It doesn't mean you should never check for it, but you want to go where your odds are greatest, particularly if you have a limited amount of time to DX. You want to use it as wisely as possible.

When I sit down, I'm always spinning the dials, almost constantly. I probably check six or seven shortwave bands every fifteen minutes, almost never sitting still. Unless I stumble across something of tremendous interest to me, I'm just checking, checking, checking, up and down.

I should mention that in addition to some of the things we've talked about -- language and propagation -- you've got to be able to tune through a band and know what's there. What is uncommon should jump out at you immediately. You've got to know the inhabitants of the town so you can stop the strangers.

MILLER: Which is a matter of experience.

HILL: It certainly is. And that's really what it's all about.

MILLER: There's so much pressure in this hobby to hear the exotic stuff

from day one, it makes people feel like fools.

HILL: To me, and to most serious DXers, the number one attribute that any DXer can have -- far and away -- is accuracy. That does not mean that you necessarily get all the greatest catches in the world.

Ernie Behr is respected as one of the best DXers in the world and he has been for many, many years. I've known him since I came into the hobby. When you think of people who get all of the best catches, Ernie Behr doesn't necessarily come to mind. But for someone who is absolutely, rigorously accurate, there are few people that can exceed Ernie.

MILLER: It's that pressure in the hobby that forces people to rush and over-extend and...

HILL: But the thing is, you don't have to be an old-timer in the hobby or terribly experienced to be accurate. That's what I want to get across.

MILLER: My point is that people feel this pressure to be tremendous, and let their imagination run away with them, exaggerate or even, in the worst case, steal loggings.

HILL: I can't quite comprehend it. I know people do things like that. They report to stations using material with some very specific details that they got from a magazine and then another person uses those details to fabricate a report. But I'd like to think that it's a miniscule part of the hobby.

MILLER: Or the old trick of writing a reception report with program details that reads, "Man and woman speaking, presumably news..."

HILL: The thing is this. It's ridiculous to think that a QSL card actually confirms reception because a lot of stations will issue you a QSL simply because you wrote and they don't want to hurt your feelings. There was a kid who got a QSL from Bhutan on 46 something or other and to this day nobody actually believes he heard it.

MILLER: We send out letters to stations all the time asking for general information to use in our various publications. And I've got a whole album full of full-data QSLs as a response to those letters -- which had nothing to do with hearing the station.

HILL: And not only does a QSL not prove you heard a station but [laughing] what does the lack of a

(Please turn to page 25)

"Meteor Bursts" Carry Digitized Voice Signals

Ionized (electrically charged) trails in the upper atmosphere have the characteristic of being reflective to radio waves at certain optimum frequencies. Since the disintegration of a meteor is very brief, the characteristic charge only lasts from roughly one-third to three seconds.

Because of the short duration, data must be in a highly condensed form, ready for instantaneous transmission. Fortunately, the number of meteoric events is very high, permitting ample opportunity for such bursts. About 60 digitized words may be conveyed over a single meteor trail.

Recent experiments conducted by the Strategic Systems Division of General Telephone and Electronics (GTE) on 46.99 MHz proved the feasibility of long haul communications (up to 1000 miles). Voice transmissions from Westborough, Massachusetts, to East Brownfield, Maine and from Westborough to Winchester, Virginia, were described as a "technological milestone".

Meteoric events are sporadic, varying from night to day, seasonally, and year to year. On the average, a suitable trail may appear in as little time as 30 seconds and as long a wait as 15 minutes or more. The hours between midnight and noon show about four times the activity as the remaining 12 hours between noon and midnight, for then the "front" of the earth is in its hurtling orbit, impacting more meteors in its path.

As the tiny meteoric particles enter the earth's atmosphere at about 50 miles per second, it vaporizes, leaving an ionized path typically 15 miles long but only a few feet across. About 100-200 million meteor trails each day are sufficient in size to accomplish a meteor-burst link.

Power and antenna directivity are important; for example, while a low power portable unit could reasonably expect a suitable burst every 15 minutes, a high power system increases chances to once every 15 seconds.

Similar applications have been in use since 1979. The U.S. Department of Agriculture's SNOTEL precipitation employs 550 remote transmitters in 11 western states. The U.S. Air Force Alaskan Air Command backs up their satellite links with a high powered (5,000 watt transmitter and 16 dB gain stacked Yagi antennas) system between radar sites and Elmendorf Air Force Base at Anchorage. The waiting time for this system is only 3-5 seconds.

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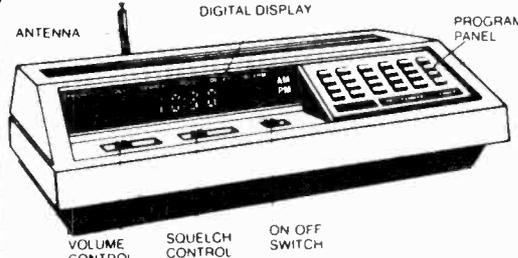
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Sophisticated microprocess-controlled circuitry eliminates the need for crystals, instead, the frequency for each channel is programmed through the numbered keyboard similar to the one used on a telephone. A "beep" acknowledges contact each time a key is touched. The Z30 scans approximately 15 channels per second.

Any combination of two to thirty channels can be scanned automatically, or the unit can be set on manual for continuous monitoring of any one channel. In addition, the search function locates unknown frequencies within a band.

Other features include scan delay, priority and a bright/dim switch to control the brightness of the 9-digit Vacuum-Fluorescent display. The Z30 can be operated on either 120 VAC or 12 VDC. Includes one year warranty from Regency Electronics (optional 3 yr extended warranty only \$39.99, gives you a total of 4 yrs complete warranty or 2 yr extended warranty only \$29.99, gives you a total of 3 yrs complete warranty.)

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Digital programmable 20 channel scanner operates as a Base or Mobile unit or can be used as a portable with rechargeable Ni-Cad batteries included. MX4200 covers the following frequency ranges: 30-50 MHz, 118-174 MHz, 406-512 MHz, 800-950 MHz. Features compact size of 5 1/2" x 2 1/2" x 7 1/4", memory backup, scan delay, priority, dual scan speed, channel lockout, jacks for earphone and external antenna, keyboard lockswitch, one year factory warranty. Sidelit liquid crystal display for night use, program AM or FM mode, search or scan, reset button. Complete MX4200 package includes telescopic antenna, mobile mounting bracket, mobile power cord, rechargeable Ni-Cad batteries, wall charger adapter. All for the low price of \$186.99 plus \$7.00 shipping each (Optional extended warranty: 3 years \$39.99, 2 years \$29.99). Optional cigarette lighter Plug #4200MPC \$4.99.

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An End to Wrok & Wrol?

More creative call letters for television and radio stations may become available, if a recent Federal Communications Commissions proposal is enacted. The FCC is

considering eradicating the distinction between stations east and west of the Mississippi River. Traditionally, those stations to the east of the Mississippi have been assigned letters beginning with "W," and those to the west were assigned a "K."

Perhaps stations which have gone to great lengths to discover a word in their call letters will soon be able to improve their spelling!

(Item contributed by Gary Westfall, Beaverton, Oregon)



Radio April Fool

NERDX is one of North America's best shortwave listening clubs but also one of its most secretive. It is one of several "by invitation-only" clubs and members are selected on the basis of their personal wealth, and a strong, overwhelming desire to be abused in print. Founded during the Spring of 1985 it is now in its 24th month of serving the DX community worldwide. NERDX became a member of ANERD, the Association of Noticeably Eccentric Radio Dummies in 1986 but only after the club's president was acquitted of a "frivolous" treason

charge the previous September. That technicality now aside, membership is growing by leaps and bounds and NERDX now boasts members in two countries, the U.S. and Canada. It expects to hear from someone in Mexico within the next couple of months.

Aside from publishing its bulletin, called NERD DXer, it sells cheap souvenirs to its members, including woven bamboo cups a member picked up while on vacation in Columbia, and club rings that open and reveal a secret members-only stamp that must be used on all correspondence with headquarters.

Members are forbidden to tell anyone -- even other members -- about what they have heard on the bands, "to avoid any possible legal problems in regard to the Electronic Communication Privacy Act." The rule does make publishing a club bulletin difficult, says president R.F. Burns, "but fortunately, two of the members have been ignoring the rule."

The secretive nature of the club also makes it difficult to obtain new members, but, says Burns, "I'd rather miss a chance to get a couple of lousy listeners on the mailing list than have everybody in the world know where we are."

Sample copies of NERD DXer are not available and new members are actively discouraged. Mail sent to the club's address in Utumwah, Iowa is marked "Moved: Left No Forwarding Address" by club secretary R.F. Burns and returned to the sender.

NERDX concentrates on some very specialized areas of shortwave and boasts the world's only WWV column as well as an extensive analysis of numbers transmissions. The publication is topped off with a DX section called "Tentatives," a review of the month's radio news and notes from club headquarters.

"Tentatives"

Editor: Dan "What's the Frequency" Rather

Radio Republik Indonesia, Jambi on 6175 kHz at 0100 UTC. Local Indonesian music, talk, station identification and news in Bahasa. Announcer's accent indicated he was probably from Bicoli on the island of Halmahera. Very strong signal. (Mark Swarbrick, Thorndale, PA 11/2/86) [This was obviously the BBC to North America. Very bad DXing, Mark! --ed.]

Radio Kara, Lama-Kara, Togo on 6030 kHz at 0100 UTC in Togolese. Mailbag program with greeting to NERDX member Mark Swarbrick followed by report on Togolese gold medal in skiing at the All-Togo Olympics. Very strong signal. (Ruth Hesch, White Plains, NY 11/15/86) [Obviously AFRTS in English. Exceptionally bad DXing, Ruth! --ed.]

Yanggang Provincial Service, Hyesan, North Korea on 7355 kHz at 0000 UTC in Korean. Martial music with typical impassioned speeches celebrating 46th birthday of "Dear Leader" Kim Jong-il, excoriating "South Korean Puppets" [Korean: *Kwow dong wha de do* South Korean Puppets] and discussing the illogical direction in which the imperialist powers seem to be pushing North Korea -- the "correlation of forces" in Soviet parlance -- on the Korean peninsula. Very strong signal. (Mark Swarbrick, Thorndale, PA 10/30/86) [Correct me if I'm wrong, but I think rock station WRNO is on 7355 at 0000 UTC. Bad DXing, nonetheless, Mark! You are THE WORST! -- ed.]

Radio Tuvalu, Tuvalu (formerly Ellice Islands) at 2330 UTC on 5000 kHz in Tuvaluese. Man giving long, dry discussion about the time with station ID at top of the hour. (Ruth Hesch, White Plains, NY 11/10/86) [This was WWV,

not Radio Tuvalu, and the language was not Tuvaluese. What you were hearing were time pips. Very, very bad DXing, Ruth! In the future, please send such loggings to the WWV column. -- ed.]

WWV/WWVH Intrigue

Editor: R.F. Burns

As you know, the purpose of this column is to explore some of the unusual listening found on time and frequency station WWV. Most recently, reader Mark Swarbrick has noticed that WWV is announcing the time as xx hours xx minutes *Coordinated Universal Time*. Why then, asks the always suspicious Swarbrick, don't they call it CUT instead of UTC? A point very well taken, Mark. Could the CIA be involved in this sordid affair? A full NERDX investigation will surely follow, you can count on that. And now on to the loggings. -- ed.

20000 kHz 2137 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, twenty one hours, thirty seven minutes Coordinated Universal Time" followed by pause and loud beep. (Mark Swarbrick, Thorndale, PA 11-10-87) [Good catch, Mark! --ed.]

10000 kHz 2330 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, twenty three hours, thirty minutes Coordinated Universal Time" followed by pause and loud beep. (Mark Swarbrick, Thorndale, PA 11-11-86)

20000.0007 kHz 1115 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, eleven hours, fifteen minutes Coordinated Universal Time" followed by pause and loud beep. (Mark Swarbrick, Thorndale, PA 11-10-86) [Caught 'em off frequency again! Good for you, Mark! --ed.]

2500 kHz 1115 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, eleven hours, fifteen minutes Coordinated Universal Time" followed by pause and loud beep. (Mark Swarbrick, Thorndale, PA 11-01-86) [Good catch, Mark! --ed.]

1500 kHz 1115 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, eleven hours, fifteen minutes Coordinated Universal Time" here's Led Zeplin from 1969" and into rock music. (Mark Swarbrick, Thorndale, PA 11-2-86) [Good catch, Mark! --ed.]

1500 kHz 1115 UTC

Forty-four beeps, ten ticks and OM saying, "At the tone, eleven hours, fifteen minutes Coordinated Universal Time" followed by pause and loud beep. (Mark Swarbrick, Thorndale, PA 10-30-86) [Good catch, Mark! --ed.]

Inside Shortwave

Editor: R.F. Burns

Not to be outdone by evangelist-colleague Oral Roberts, WHRI preacher Lester Sumrall announced on a recent edition of his "Happy Station" mailbag program that a 900 foot Lassie appeared to him and told him to complete a 60-story dog-and-cat hospital. Those who did not contribute, said Lassie, would die by May 1. Those who would like to live should send cash (only) to 3 Lisa Drive, Thorndale, PA 19372 USA.

In an effort to increase revenues, the U.S. Commerce Department's WWV time and frequency stations will change format. Beginning in late April, look for "Time Talk Radio" on 2500 kHz, a lively "Continuous Country" music format on 5000 kHz, "Hot Hits" top-40 on 10000 kHz, sports on 15000 kHz and continuous live coverage of Senate Subcommittee hearings on Roads and Highways on 20000 kHz. Says a disappointed WWV program director Peter Boyle, "We had a hunch that this all-time format wasn't going over too well. When was the last time you heard an advertisement on WWV?"

Radio Discovery in Santo Domingo was heard.

XDNE Global Stereo Radio, which teased the world of international radio with promises of a sign-on for the last 25 years, has apparently decided to drop the "stereo" in favor of the more ambitious slow-scan TV. "We'll be the first shortwave TV station in history," said the always talkative N. "Dixie"

Normal. Sign on is expected to coincide with the 1999 World's Fair in Opelika, Alabama, also run by Mr. Normal.

XDNE is offering a wide range of station souvenirs to listeners. They include a road map of Opelika, Alabama (\$600.00), cafeteria trays with the letters "XDNE" written on them in indelible Magic Marker and suitable for placement in the back window of your car (\$900.00) and XDNE "Meet Me at the World's Fair in Opelika in 1999" Bumper Stickers (\$400.00) each. The toll free number is 1-800-555-1212. MasterCard, Opelika Express, Visa and the new XDNE "DixieCard" are eagerly welcomed.

NERDX member Mark Swarbrick, on vacation in Norway, visited Radio Norway International and its frequency division. According to Mark, frequencies for the station are chosen by the head of the department every Friday during a staff cocktail party. "They have this big wheel with hundreds of bad frequencies marked on it," says Mark, "and everyone gets real drunk and they spin the wheel. Wherever it stops gives the frequencies they use for the next week." Sometimes, adds Mark, they spin the wheel several times a week.

New frequencies for Radio Norway International, effective April 1, are as follows: 2,500 kHz, 5,000 kHz, 10,000 kHz, 15,000 kHz, 20,000 kHz. (Direct)

Numbers Report

Editor: Bonnie Letit

The month's featured numbers transmission was heard on October 28, 1986 by member Mark Swarbrick. The transmission began at 0100 UTC and lasted until 2330 the following day, switching frequencies several times with occasional short interludes of soft flute music. For the sake of brevity, we have condensed Swarbrick's report into the most important numbers in the transmission.

Attencion! Attencion! Attencion! 364 564 397 264 562 405 402 506 233
104 482 068 205 583 294 604 230 385 450 506 238 594 284 204 230 382 111 934
194 349 495 111 406 303 504 295 883 220 294 820 293 604 293 204 220 607 785
493 293 203 450 292 405 345 302 545 024 605 205 196 285 264 264 562 405 402
506 233 104 482 068 205 583 294 204 220 607 785 493 293 203 450 292 402 506

233 104 482 068 205 583 294 204 220 607 785 493 293 203 450 292 405 583 294
204 220 607 785 493 293 203 450 292 405 405 402 506 233 104 482 068 205 583
294 204 220 607 785 493 293 203 450 292 405 384 222 210 283 238 594 284 204
230 382 111 934 194 349 495 111 406 303 504 295 883 220 294 820 293 604 293
204 220 607 785 493 293 203 450 292 405 345 302 545 024 605 205 196 285 264
264 562 405 402 506 233 104 482 068 205 583 294 204 220 607 785 493 293 203
450 292 405 405 402 506 233 104 482 068 205 583 294 204 220 607 785 493 293
203 450 292 405 583 294 204 220 607 785 493 293 203 450 292 405 405 402 506
233 756 344 264 264 562 405 402 506 233 104 482 068 205 583 294 204 220 607
785 493 293 203 450 292 402 506 233 104 482 068 205 583 294 204 220 607 785
493 293 203 450 292 405 583 294 204 220 607 785 493 293 203 450 292 405 405
402 506 233 104 482 068 205 204 220 607 785 493 293 203 450 292 405 384 222
210 283 238 594 284 204 230 382 111 934 194 111 406 349 934 194 349 495 303
504 295 883 220 294 820 293 604 293 204 220 607 785 493 293 203 450 292 405
345 302 545 024 605 205 196 285 264 264 562 405 402 506 233 104 482 068 205
583 294 204 220 607 785 493 293 203 450 405 405 402 506 233 104 482 068 205
583 294 204 220 607 785 493 293 203 450 999 349 934 194 349 495 333 Ende!
Ende! Ende!

From the Headquarters

Editor: R.F. Burns

NERDX President R.F. Burns has once again voted himself "NERDX DXer of the Year." Saying that, "Frankly, I am the only one who deserves it," he presented himself with the award at the annual ANERD convention in Toronto, Ontario. Said Burns on accepting the award, "After all of this, I might even start listening to shortwave again."

NERDX President R.F. Burns will be the guest on the nationwide ABC talk radio program, the Ray Bean Show. The show, which will be aired between 3:00 AM and 6:00 AM, features Burns along with XDNE Global S. promoter N. "Dixie" Normal, who will speak on his latest plans for his massive, global, quadrophonic, slow-scan TV shortwave station.

The ABC Talk Radio Network has announced the cancellation of the Ray Bean show, citing low ratings and what one network executive called, "Bean's penchant for the ultra-boring."



Membership in NERDX isn't open to just anyone



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frequency SECTION

The MT Monitoring Team

Greg Jordan, NC

Rich Foerster, NE

Gayle Van Horn, FL

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

Some of this month's data is based on our best predictions of time and frequency changes, as we switch into Daylight Savings Time.

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

0000-0015	Voice of People of Kampuchea	9693, 11938
0000-0025	Kol Israel.....	7410, 7465
		9435
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, 9730
0000-0030	Radio Canada International..	5960, 9755
0000-0030 M	Radio Norway International..	9590, 9610
0000-0045	WYFR, Florida.....	9555, 15440
0000-0050	Radio Pyongyang, North Korea	15140, 15160
0000-0100	Armed Forces Radio and TV..	6030, 11790
		15345, 17765
		9910, 11715
0000-0100	All India Radio.....	9910, 11715
0000-0100	CBC Northern Quebec Svce...	6195, 9625
0000-0100	CFCX, Montreal, Canada.....	6005
0000-0100	CFRX, Toronto, Canada.....	6070
0000-0100	CFVP, Calgary, Canada.....	6030
0000-0100	CHNX, Halifax, Canada.....	6130
0000-0100	Christian Science Monitor...	7365
0000-0100	CKFX, Vancouver, Canada.....	6080
0000-0100	KCBI, Texas.....	11910
0000-0100	KSDA, Guam (AWR).....	15115
0000-0100	KVOH, California.....	9505
0000-0100	KYOI, Saipan.....	15405
0000-0100	Radio Australia.....	15160, 15240
		15320, 15395
		17750, 17795
0000-0100	Radio Baghdad, Iraq.....	11735
0000-0100	Radio Beijing, China.....	9550
0000-0100v	Radio Dublin International..	6910
0000-0100	Radio Havana Cuba.....	6090, 9740
0000-0100	Radio Korea (South).....	15575
0000-0100	Radio Moscow.....	5915, 5920
		5940, 6000
		7115, 7150
		7215, 7310
		7440, 13665
0000-0100	Radio Thailand.....	9650, 9665
		11905
0000-0100	Radio Veritas, Philippines..	9740
0000-0100	Radio New Zealand Int'l....	11780, 15150
		17705
0000-0100	RTL Luxembourg.....	6090
0000-0100	Spanish Foreign Radio, Spain	6125, 9630
0000-0100	Voice of America.....	5985, 6125
		6130, 9455
		9650, 9775
		9815, 11580
		11680, 11740
		15205
0000-0100v	Voice of Nicaragua.....	6015
0000-0100	WINB, Pennsylvania.....	15145
0000-0100	WHRI, Indiana.....	9680
0000-0100	WRNO Worldwide.....	7355
0015-0100	AWR, Costa Rica.....	15460
0030-0100	BBC, England.....	5975, 6005
		6075, 6120
		6175, 7325
		9515, 9590
		9915, 11750
0030-0055	BRT, Belgium.....	5910, 9825
0030-0100	HCJB, Ecuador.....	9870, 11910
		15155

0030-0100 A	KTWR, Guam.....	15340
0030-0100	Radio Belize.....	3285
0030-0100 W.A	Radio Budapest Hungary.....	6025, 6110
		9520, 9835
0030-0100	Radio Kiev, Ukrainian SSR...	6200, 7165
		9765, 13645
		15180
0030-0100 T-A	Radio Portugal.....	9680
0030-0100	SLBC, Sri Lanka.....	6005, 9720
		15425
0045-0100 M	Radio Cultural, Guatemala...	3300, 5955
0045-0100	Radio Korea World News Svc..	7275
0050-0100	Vatican Radio.....	6030, 9605
		11845

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

0100-0115	All India Radio.....	6035, 7215
		9595
0100-0115	Vatican Radio.....	6030, 9605
		11845
0100-0120	RAI, Italy.....	6010, 9575
0100-0124	Kol Israel.....	7410, 7465
		9435
0100-0130	HCJB, Ecuador.....	9870, 11910
		15155
0100-0130 T-A	Radio Budapest, Hungary....	6025, 6110
		9520, 9835
0100-0130	Radio Japan General Service.	7140, 9675
		15235, 17810
0100-0130	Radio Vientiane, Laos.....	7112v
0100-0130	WINB, Pennsylvania.....	15145
0100-0145	Radio New Zealand Int'l....	15150, 17705
0100-0150	Deutsche Welle, West Germany	6040, 6085
		6145, 9545
		9565, 11785
0100-0200	ABC, Perth, Australia.....	15425
0100-0200	Armed Forces Radio and TV...	6030, 11790
		15355
0100-0200	BBC, England.....	5975, 6005
		6120, 6175
		7325, 9515
		9590, 9915
0100-0200	CBC Northern Quebec Svce....	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	KVOH, California.....	9505
0100-0200	KYOI, Saipan.....	15405
0100-0200	Radio Australia.....	15320, 15395
		17715, 17750
		17795
0100-0200	Radio Belize.....	3285
0100-0200	Radio Canada International..	5960, 9535
		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.....	6000, 6070
		7115, 7150
		7215
0100-0200	Radio Moscow World Service..	7130, 7315
		11720, 11845
0100-0200	Radio Prague, Czechoslovakia	5930, 6015
		6055, 7345
		9540, 9740
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
		7205, 9455
		9650, 9815
		11580, 11740
0100-0200	Voice of Indonesia.....	9680, 11790
0100-0200v T-A	Voice of Nicaragua.....	6015v
0100-0200	WHRI, Indiana.....	9680
0100-0200	WINB, Pennsylvania.....	15145
0100-0200	WRNO Worldwide.....	7355
0100-0200	WYFR, Florida.....	11805
0115-0200	Radio Berlin International..	6080, 9730
0130-0200	KNLS, Alaska.....	11905
0130-0140	Voice of Greece.....	7430, 9395
		9420
0130-0200	HCJB, Ecuador.....	9670, 15155
0130-0200	Radio Austria International.	6155
0130-0200	Radio Veritas Asia, Philipp.	15135, 15360
0130-0200	WINB, Pennsylvania.....	15145
0145-0200	Radio Berlin International..	6125, 6165
0145-0200	Radio Korea.....	6480, 7275

0200 UTC [8:00 PM EDT/7:00 PM PDT]

0200-0215	Radio Budapest, Hungary....	6025, 6110
		9520, 9835
0200-0215	Vatican Radio.....	6145, 7125
		9650
0200-0230	BBC, England.....	5975, 6005
		6120, 6175
		7325, 9515
		9590, 9915
0200-0230	Burma Broadcasting Corp....	7185
0200-0230 S.M	WINB, Pennsylvania.....	15145
0200-0230	Radio Berlin International..	6125, 6165
0200-0245	Radio Berlin International..	9560, 9620
0200-0230 M-F	Radio Canada International..	5960, 9755
0200-0230	Radio Korea World.....	7275, 11810
0200-0230	Swiss Radio International...	6135, 9625
		9725, 9885
0200-0230 T-A	Voice of Nicaragua.....	6015
0200-0250	Deutsche Welle, W. Germany..	6035, 7285
		9650, 9690
		11945
0200-0256	Radio RSA, South Africa.....	6010, 6185
		9615
0200-0300	ABC Perth, Australia.....	15425
0200-0300	Armed Forces Radio and TV...	6030, 11730
		11790, 15355
0200-0300	CBC Northern Quebec Service.	6195, 9625
0200-0300 TEN	Christian Science Monitor...	9745
0200-0300	GBC, Guyana.....	5950
0200-0300	HCJB, Ecuador.....	6230, 9870
0200-0300	KCBI, Texas.....	11910
0200-0300	KSDA, Guam (AWR).....	15115
0200-0300	KVOH, California.....	9852.5
0200-0300	KYOI, Saipan.....	15405
0200-0300	Radio Australia.....	15240, 15320
		15395, 17795
0200-0300	Radio Belize.....	3285
0200-0300	Radio Bras, Brazil.....	11745
0200-0300	Radio Bucharest, Romania....	5990, 6080
		9510, 9570
		9835, 11810
0200-0300	Radio Cairo, Egypt.....	9475, 9675
		9900
0200-0300 T-A	Radio Canada International..	5960, 9755
0200-0300 TES	R. Discovery, Dominican Rep.	6245v
0200-0300 T-S	Radio Dublin International..	6910
0200-0300	Radio Havana Cuba.....	5965, 6035
		6080, 6035
		6140, 6190
		9740
0200-0300	Radio Japan.....	11870, 15420
		15195, 17825
0200-0300	Radio Korea, South.....	11810
0200-0300	Radio Moscow, U.S.S.R.....	5915, 5940
		6000, 6070
		7115, 7150
		7165, 7185
		7310

frequency SECTION

0200-0300	Radio New Zealand Int'l....	15150	
0200-0300	Radio Polonia, Poland.....	6095, 6135 7145, 7270 9525, 11815	
0200-0300	Radio Thailand.....	15120	11905
0200-0300	Radio Veritas, Philippines.	9665, 11905	
0200-0300	SBC Radio 1, Singapore.....	9740, 15195	
0200-0300	Sri Lanka Broadcasting Corp.	11940	
0200-0300	Voice of America.....	6005, 9720	
0200-0300	Voice of Asia, Taiwan.....	15425	
0200-0300	Voice of Free China, Taiwan.	7205, 9455	
0200-0300	WHRI, Indiana.....	9650	
0200-0300	World Music Radio.....	7285	
0200-0300	WRNO Worldwide.....	5985, 9555	
0215-0220	Radio Nepal.....	11740	
0230-0300	BBC, England.....	7400	
		6910	
		7355	
		5005	
		5975, 6005	
		6120, 6175	
		7325, 9515	
		9915	
0230-0300	Radio Netherland.....	6020, 6165	
0230-0245	Radio Pakistan.....	9590, 9695	
		5905, 7315	
		11745, 15115	
		15580, 17660	
0230-0300.	Radio Sweden International..	9695,	
0230-0300	Radio Tirana Albania.....	17840	SSB
		7060, 7120	
0230-0300	SLBC, Sri Lanka.....	9760	
0240-0250	All India Radio.....	9720	
		6110, 9545	
		9610	

0300 UTC	[11:00 PM EDT/8:00 PM PDT]		
0300-0310	CBC Northern Quebec Service.	6195, 9625	
0300-0315	Radio Budapest.....	6025, 6110	
		9520, 9835	
0300-0325	Radio Netherland.....	6020, 6165	
		9590, 9895	
0300-0330	BBC, England.....	5975, 6005	
		6120, 6175	
		7185, 7325	
		9515, 9600	
0300-0330	Radio Cairo, Egypt.....	9475, 9675	
0300-0330	Radio Canada International..	5960, 9755	
0300-0330	Radio Japan General Service	17810, 17835	
		17845	
0300-0330	Radio Kiev, Ukrainian SSR...	6200, 7165	
		9765, 11790	
		13645,	
0300-0330	Radio Portugal.....	9705	
0300-0350	Deutsche Welle, West Germany	6045, 6185	
		9565	
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	Christian Science Monitor...	9745	
0300-0400	CKFX, Vancouver, Canada.....	6080	
0300-0400	HCJB, Ecuador.....	6230, 9870	
0300-0400	KNLS, Alaska.....	9670	
0300-0400	KSDA, Guam (AWR).....	17840	
0300-0400	KVOH, California.....	9852.5	
0300-0400	KYOI, Saipan.....	15190	
0300-0400	La Voz Evangelica, Honduras.	4820	
0300-0400	Radio Australia.....	15180, 15240	
		15320, 15395	
		17715, 17750	
		17795, 11750	
0300-0400	Radio Beijing, China.....	9645, 11980	
		11970, 15445	
0300-0400	Radio Belize.....	3285	
0300-0400	Radio Cultural, Guatemala...	5955	
0300-0400	Radio Dublin International..	6910	
0300-0400	Radio Earth.....	7400	
0300-0400	Radio Havana Cuba.....	6090, 6140	
		6190, 7400	
		9740	
0300-0400	Radio Moscow.....	6130, 7155	
		9500, 11770	
		12030	
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, 6055	
		7345	
0300-0400	Radio RSA, South Africa....	3230, 4990	
		7270, 9585	

0300-0400	Radio Sofia Bulgaria.....	7115	
0300-0400	Radio Thailand.....	9560, 11905	
0300-0400	SLBC, Sri Lanka.....	6005, 9720	
		15425, 5055	
0300-0400	TIFC, Costa Rica.....	5055	
0300-0400	Trans World Radio, Bonaire..	9535	
0300-0400	Voice of America.....	9455, 9575	
		9650	
0300-0400	Voice of Free China, Taiwan.	5985, 9680	
		11745	
0300-0400	Voz Evangelica, Honduras....	4820	
0300-0400	WHRI, Indiana.....	7400	
0300-0400	WMLK, Pennsylvania.....	9455	
0300-0400	World Music Radio.....	6910	
0300-0400	WRNO Worldwide.....	6185	
0305-0400	Radio Austria International.	5945, 6055	
		6155	
		6150	
0310-0330	Vatican Radio.....	6005, 6055	
0315-0330	Radio France International..	6175, 7135	
		9535, 9600	
		9790, 9800	
0330-0400	CBC Northern Quebec Service.	6195, 9625	
0330-0400	BBC, England.....	3955, 5975	
		6120, 6175	
		9410, 9600	
		6155, 9620	
0330-0400	Radio Austria International.		
0330-0400	Radio Berlin International..		
0330-0400	Radio Havana Cuba.....	6090, 6100	
		6140, 9740	
0330-0400	Radio Sweden International.	11705	
0330-0400	Radio Tanzania.....	5985	
0330-0400	Radio Tirana Albania.....	6200, 7065	
0330-0400	UAE Radio, Dubai.....	9640, 11940	
		15435	
		3905, 4860	
		7105, 9545	
		9610, 11830	
		11895, 11940	
0340-0400	Voice of Greece.....	7430, 9420	
0345-0400	Radio France International..	6175, 7135	
		7175, 9535	
		9800, 9901	
0345-0400	Radio New Zealand Int'l....	9620, 9645	
		11705	
0350-0359	Radio Yerevan, Armenian SSR	11790, 13645	
		15180	

0400 UTC	[12:00 PM EDT/9:00 PM PDT]		
0400-0410	Voice of Kenya.....	6090	
0400-0415	Kol Israel.....	7464, 9435	
		9815, 11585	
		17630	
0400-0415	Radio Cultural, Guatemala...	3300	
0400-0425	Radio Netherlands.....	7175, 9895	
0400-0425	Radio RSA, South Africa....	3230, 4990	
		7270, 9585	
		3955, 5975	
0400-0430	BBC, London, England.....	6005, 6120	
		6175, 7105	
		7160, 7185	
		9510, 9600	
0400-0430	KNLS, Alaska.....	9670	
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	S,M Trans World Radio, Bonaire..	9535	
0400-0430	Trans World Radio, Bonaire..	4835, 7295	
0400-0500	ABC, Perth, Australia.....	15425	
0400-0500	Armed Forces Radio and TV...	6030, 12060	
		11730, 11790	
		17765	
0400-0500	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	KVOH, California.....	9852.5	
0400-0500	Radio Australia.....	9755, 11945	
		15160, 15240	
		15320, 15395	
		17715, 17795	
0400-0500	Radio Beijing.....	9645, 11980	
0400-0500	Radio Belize.....	3285	
0400-0500	T-S Radio Dublin International..	6910	
0400-0500	Radio Havana Cuba.....	5965, 6035	
		6080, 6140	

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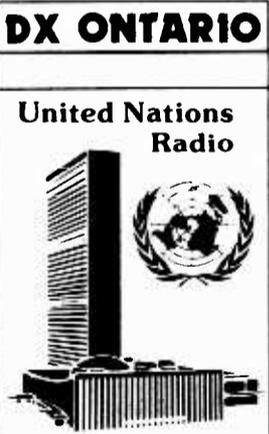
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frequency SECTION

0400-0500	Radio Japan.....	9525, 9675	0500-0600	VLW 15, Lyndhurst,Australia	15230	0700 UTC	[3:00 AM EDT/12:00 AM PDT]		
0400-0500	Radio Moscow.....	5905, 5915	0500-0600	VLW 15, Waneroo, Australia.	15425	0700-0712	Radio Bucharest, Romania...	11940, 15250	
0400-0500	Radio Moscow World Service.	6000, 7150	0500-0600	Voice of America.....	5995, 6035			15335, 17790	
0400-0500	Radio New Zealand.....	9620, 11780			7200, 7280			17805, 21665	
0400-0500	Radio Pyongyang, N.Korea...	15140, 15160	0500-0600	Voice of Nicaragua.....	6015	0700-0730	Burma Broadcasting Corp....	9730	
0400-0500	Radio Uganda.....	4976, 5026	0500-0600	Voice of Nigeria, Lagos....	7255	0700-0730	BBC, London.....	5950, 5975	
0400-0500	RAE, Argentina.....	9690, 11710	0500-0600	WHRI, Indiana.....	6100			6195, 7120	
0400-0500	VLW 15, Lyndhurst,Australia	15230	0500-0600v M	World Music Radio.....	6910			7150, 7185	
0400-0500	VLW 15, Waneroom, Australia	15425	0500-0600 S	WRNO Worldwide.....	6185			9600, 9640	
0400-0500	Voice of America.....	3990, 5995	0500-0600	WYFR, Okeechobee, Florida...	6065, 7355	0700-0730 A,S	TWR, Bonaire.....	9535	
		6035, 6040	0530-0600	BBC, London.....	5975, 9510	0700-0730v	Radio Zambia.....	11880v	
		7170, 7280	0530-0600	Radio Cameroon.....	4850	0700-0735	TWR Swaziland.....	6070	
		9575, 9670	0530-0600	Radio Netherland.....	6165, 9715	0700-0745	Radio New Zealand Int'l....	11780, 15150	
		11835, 15205	0530-0600	Radio Sofia, Bulgaria.....	9700, 11720	0700-0750	Radio Pyongyang.....	11930, 13750	
		9560			15140			15340	
0400-0500	Voice of Turkey.....	9560				0700-0800	ABC Brisbane.....	9660	
0400-0500	WHRI, Indiana.....	7400				0700-0800	ABC Lyndwurst.....	9680	
0400-0500v M	World Music Radio.....	6910	0600 UTC	[2:00 AM EST/11:00 PM PST]		0700-0800	Armed Forces Radio and TV..	15400	
0400-0500	WRNO Worldwide.....	6185	0600-0610	Ghana Radio.....	4915	0700-0800	CFCX, Montreal, Canada.....	6005	
0415-0430	Radio France International..	6055, 6175	0600-0610	Voice of Kenya.....	4808, 6090	0700-0800	CFRX, Toronto, Canada.....	6070	
		7135, 7175	0600-0620	Vatican Radio.....	6185, 9645	0700-0800	CFVP, Calgary, Canada.....	6030	
		9550, 9800	0600-0625	Radio Netherland.....	6165, 9715	0700-0800	CHNX, Halifax, Canada.....	6130	
0425-0450	RAI, Italy.....	5980	0600-0630	Deutsche Welle.....	7290, 9625	0700-0800 A,S	CKFX, Vancouver, Canada....	6080	
0430-0500	BBC, London, England.....	5975, 6175			9700	0700-0800	ELWA, Liberia.....	11830	
		9510	0600-0645	WYFR, Florida.....	6065, 7355	0700-0800	FEBC, Manila.....	11850, 15350	
0430-0455	Radio Tirana Albania.....	9480, 11835			9680	0700-0800	GBC-2, Accra, Ghana.....	3366	
0430-0500	Deutsche Welle, W. Germany..	7150, 7225	0600-0700	Armed Forces Radio and TV...	6030, 15330	0700-0800	HCJB.....	6130, 6205	
		9565, 9765			17765			9745, 9845	
0430-0500	Radio Austria International.	5945, 6155	0600-0700	BBC, London.....	3955, 3975	0700-0800	King of Hope, Lebanon.....	6280	
		9755			5975, 6195	0700-0800	KNLS, Anchor Point, Alaska.	5960	
0430-0500	Radio Truth, S. Africa.....	5015	0600-0700		7150, 7120	0700-0800	KYOI, Saipan.....	15190	
0430-0500	TWR, Swaziland.....	7210			7185, 9640	0700-0800	NBC, Papua New Guinea.....	4890	
0445-0500	Radio France International..	6055, 6175	0600-0700	CFCX, Montreal, Canada.....	6005	0700-0800	Radio Australia.....	5995, 9655	
		7135, 9535	0600-0700	CFRX, Toronto, Canada.....	6070			11720	
		9550, 9790	0600-0700	CFVP, Calgary, Canada.....	6030	0700-0800 S	Radio Earth (via Milano)...	7295	
		9800	0600-0700	CKFX, Vancouver, Canada.....	6080	0700-0800	Radio Havana Cuba.....	9525	
			0600-0700	CHNX, Halifax, Canada.....	6130	0700-0800	Radio Japan General Service.	9675, 15230	
0500 UTC	[1:00 AM EDT/10:00 PM PDT]		0600-0700	Christian Science Monitor...	7365			15235, 17810	
0500-0505	Radio Belize.....	3285	0600-0700	GBC-2, Accra, Ghana.....	3366	0700-0800	Radio Kuwait.....	9560	
0500-0510	Radio Lesotho.....	4800	0600-0700	HCJB, Quito, Ecuador.....	6230, 9870	0700-0800	Radio Thailand.....	9655, 11905	
0500-0515	Vatican Radio.....	11725, 15190	0600-0700	King of Hope, Lebanon.....	6280	0700-0800	SBC Radio 1, Singapore.....	5010, 11940	
0500-0530	BBC, London.....	6005, 7105	0600-0700	KVOH, California.....	6005	0700-0800	Soloman Islands Bcasing Svc	5020	
		7160, 9410	0600-0700	KNLS, Anchor Point, Alaska..	9555	0700-0800	VLM4 Brisbane, Australia....	4920	
		9510, 9600	0600-0700	KYOI, Saipan.....	15190	0700-0800	Voice of America.....	3990, 5995	
		9825, 12095	0600-0700	Radio Australia.....	11910, 11945			6035, 6080	
		3927.5			15160, 15240			6125, 7280	
0500-0530	Capital Radio, S. Africa....	11840	0600-0700	Radio Cook Islands.....	11760			9530, 9540	
0500-0530	Radio Canada Int'l.....	11840	0600-0700	Radio Havana Cuba.....	9525	0700-0800	Voice of Free China.....	5985	
0500-0530 M	Radio Norway International.	11860	0600-0700	Radio Korea, South.....	9570, 7275	0700-0800	Voice of Malaysia.....	6175, 9750	
0500-0530 S,M	Trans World Radio, Bonaire..	9535	0600-0700	Radio Moscow.....	7165			15295	
0500-0550	Deutsche Welle.....	5960, 6120	0600-0700	Radio New Zealand Int'l....	11780	0700-0800	Voice of Nigeria.....	15120, 15185	
		6130, 7225	0600-0700	Radio Pyongyang, N. Korea..	13650, 13680			17800	
0500-0600	ABC, Melbourne, Australia..	15330	0600-0700 S	Radio Zambia.....	11880	0700-0800	WHRI, Indiana.....	7355	
0500-0600	ABC, Perth, Australia.....	15425	0600-0700	SBC Radio 1, Singapore.....	11940	0700-0800 S	World Music Radio.....	6910	
0500-0600	Armed Forces Radio and TV...	6030, 11790	0600-0700	Soloman Islands Bcasing Co.	5020	0700-0800 S	WRNO Worldwide.....	6185	
		17715, 17750	0600-0700	VLQ 9, Brisbane, Australia..	9660	0715-0730 M-A	Vatican Radio.....	11725, 15190	
0500-0600	CBC Northern Quebec Service.	9625	0600-0700	VLW 15, Lyndhurst,Australia	15230	0715-0800 S	FEBA Radio, Seychelles....	15120, 17795	
0500-0600	CFCX, Montreal, Canada.....	6005	0600-0700	VLW 15, Waneroo, Australia.	15425	0715-0800 S	KTWR Guam.....	11715	
0500-0600	CFRX, Toronto, Canada.....	6070	0600-0700	Voice of America.....	3990, 5995	0725-0800	TWR Monte Carlo.....	7105	
0500-0600	CFVP, Calgary, Canada.....	6030			6035, 6080	0730-0735	All India Radio.....	5990, 6010	
0500-0600	CHNX, Halifax, Canada.....	6130			6095, 6125			6020, 6050	
0500-0600	Christian Science Monitor...	9745			7280, 9530			7110, 7250	
0500-0600	CKFX, Vancouver, Canada.....	6080			9550			9610, 11730	
0500-0600	HCJB, Quito, Ecuador.....	6230, 9870			7285			11850, 11935	
		11910	0600-0700	Voice of Asia, Taiwan.....	5985			9510, 9600	
0500-0600	KVOH, California.....	6005	0600-0700	Voice of Free China,Taiwan..	6175, 9750	0730-0800	BBC, London.....	9600, 9640	
0500-0600	KYOI, Saipan.....	15190	0600-0700	Voice of Malaysia.....	6175, 9750			11860	
0500-0600	Radio Australia.....	15160, 15240			15295			11330	
		15320, 15395	0600-0700	WHRI, Indiana.....	6100	0730-0800 S	CPBS, China.....	11715	
		17715, 17750	0600-0700	WRNO Worldwide.....	6185	0735-0800 M-H	KTWR, Guam.....	6120, 11755	
		17795, 17795	0600-0700 S	World Music Radio.....	6910	0730-0800	Radio Finland.....	15265	
0500-0600	Radio Beijing, China.....	9565	0615-0655 A,S	BRT, Belgium.....	9880, 21810	0730-0800	Radio Netherlands.....	9630, 9715	
0500-0600	Radio Canada International..	6140	0615-0630 M-F	Radio Canada International..	6050, 7155	0730-0800	Swiss Radio Int'l.....	3985, 6165	
0500-0600v	Radio Dublin International..	6910	0625-0700 M-A	Vatican Radio.....	15190, 17730			9535	
0500-0600	Radio Havana Cuba.....	5965, 6035	0630-0655	TWR, Monaco.....	7105				
		6090, 6190	0630-0655	Radio Netherland.....	9895, 11930				
		9740	0630-0700	Radio Poland.....	6135, 7270				
0500-0600	Radio Japan General Service.	9675, 15235			9675				
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0500-0600	Radio Korea World News Svc..	7275			9585, 11900				
0500-0600	Radio Moscow.....	5905, 5915	0630-0700	Radio Tirana.....	7065				
		5940, 5980	0630-0700	Swiss Radio International...	3985, 6165				
		7175, 7310			9535, 9870				
		7270, 7300	0645-0700	Radio Canada Int'l, Montreal	12030, 15430				
		9490, 9635			6140, 7275				
		9580, 9755			9750, 11775				
		11770, 11950	0645-0700 M-F	HCJB, Quito, Ecuador.....	11840, 15180				
		12030, 13605			6205				
0500-0600	Radio Uganda.....	4976, 5026				0800 UTC	[4:00 AM EDT/1:00 AM PDT]		
0500-0600 S	Radio Zambia.....	11880				0800-0805	GBC, Accra, Ghana.....	3366	
0500-0600	SBC Radio 1, Singapore.....	11940				0800-0825 M-F	BRT, Belgium.....	9880, 17595	
0500-0600	Soloman Islands Bcasing Co	5020				0800-0825	Radio Netherlands.....	9630, 9715	
0500-0600	Spanish Foreign Radio.....	9630				0800-0825	Voice of Malaysia.....	6175, 9750	
0500-0600	TWR, Swaziland.....	7210						15295	
						0800-0830	Voice of Islam,Bangladesh..	11645, 12030	
						0800-0830	HCJB, Quito, Ecuador.....	6130, 6205	
								9745, 9860	
						0800-0845 S	FEBA, Seychelles.....	15120, 17795	
						0800-0900	AFAN, Antarctica.....	6012	
						0800-0900	AFRTS Far East Network....	11750	
						0800-0900	BBC, London.....	5975, 7150	
								9600, 9640	

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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.....	15420
1500-1600	WYFR, Florida.....	11830
1513-1600 F-S	FEBC, Seychelles.....	11820
1530-1600	KNLS, Alaska.....	7355
1530-1545	Radio Bangladesh.....	7195
1530-1600	R. Prague, Czechoslovakia..	9735, 11690
		11990, 13715
		17705, 17840
		21505
1530-1600	Swiss Radio International..	9735, 11690
		15430
1530-1600	Voice of Asia, Taiwan.....	5980, 7445
1540-1550	Voice of Greece.....	11645, 15630
		17565
1545-1600	Vatican Radio.....	11810, 15090
		17730

1600 UTC	[12:00 PM EDT/9:00 AM PDT]	
1600-1605	SBC Radio 1, Singapore....	11940
1600-1615	Radio Pakistan.....	9645, 11615
		11675, 11735
		11925, 15515
		15595, 17660
1600-1630 S	Radio Norway International..	9660, 11860
		11925, 15310
1600-1630	Radio Polonia.....	6135, 9540
1600-1630 M-F	Radio Portugal.....	15105
1600-1630	Radio Sweden Int'l.....	11705
1600-1630	Voice of Vietnam.....	9755, 9840
		12020, 12035
1600-1645	TWR, Swaziland.....	3200
1600-1700	AFRTS.....	9700, 15330
		15430
1600-1700	BBC, London.....	9515, 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 S	KCBI, Texas.....	11735
1600-1700	KNLS, Alaska.....	7355
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.	11720, 11955
		15440, 17820
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1600-1700	Radio France International.	
1600-1700	Radio Jordan.....	9560
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1600-1700	Radio Malawi.....	3380, 5995
1600-1700	Radio Moscow.....	9470, 9490
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1600-1700	Radio Prague, Czech.....	11990, 13715
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1600-1700	Voice of America.....	6110, 9575
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		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	WINB, Pennsylvania.....	15295
1600-1700 TEST	WMLK, Pennsylvania.....	9455
1600-1700	WRNO Worldwide.....	15420
1600-1700	WYFR, Florida.....	11580, 11830
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1610-1620 M-F	Radio Botswana.....	4820, 7255
1610-1645	Radio Belem.....	3205
1630-1655 M-F	BRT Belgium.....	9905, 11695
1630-1700	ELWA, Liberia.....	11830
1630-1700	Radio Nacional Angola.....	7245, 9535
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1630-1700	Radio Netherland.....	6020, 15570
1630-1700	Radio Polonia.....	7125, 9525
1630-1700	Radio Sofia, Bulgaria.....	11735, 11840
		15310
1630-1700	Voice of Africa, Egypt.....	15255
1645-1700	Radio Berlin Int'l.....	9730
1645-1700	Radio Pakistan.....	6205, 7100
		9455, 9465

1700 UTC	[1:00 PM EDT/10:00 AM PDT]	
1700-1710	Voice of Lebanon.....	6548
1700-1715	Kol Israel.....	9385, 9460
		11585, 11655
1700-1720	Radio Netherland.....	9515, 15570
1700-1730	BBC, England.....	9515, 12095
		15070, 15260
		15400
1700-1730	Radio Australia.....	6035, 6060
		7205
1700-1730	Radio Berlin Int'l.....	9730
1700-1730	Radio Japan.....	5990, 11815
1700-1730	Radio Norway International..	9655, 15220
		15310
1700-1800	AFRTS.....	9700, 11805
		15330, 15345
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1700-1800	CBC, N. Quebec, Canada....	9625, 11720
1700-1800	CFCX, Montreal, Canada.....	6005
1700-1800	CFRX, Toronto, Canada.....	6070
1700-1800	CFVP, Calgary, Canada.....	6030
1700-1800	CHNX, Halifax, Canada.....	6130
1700-1800	CKFX, Vancouver, Canada....	6080
1700-1800	CKZU, Vancouver, Canada....	6160
1700-1800	KCBI, Dallas.....	11735
1700-1800	KNLS, Alaska.....	7355
1700-1800	KYOI, Saipan.....	9665
1700-1800	Radio Beijing.....	9570, 11600
1700-1800	Radio Korea, South.....	5975, 15575
1700-1800	Radio Moscow.....	7115, 7150
		9625, 11840
1700-1800 MWF	Radio Nacional, Eq. Guinea	9535
1700-1800	Radio Nacional Angola.....	7245, 9535
		11955
1700-1800	Radio Pyongyang, 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.....	15410, 15445
		15580, 15600
		17785, 17800
		17870
1700-1800	Voice of Nigeria.....	11770
1700-1800	WHRI, Indiana.....	15105
1700-1800	WINB, Pennsylvania.....	15400
1700-1800	WMLK, Bethel, Pa.....	9455
1700-1800	WRNO Worldwide.....	15420
1700-1800	WYFR, Florida.....	11580, 11830
		11875, 15170
1715-1800	Radio Berlin International..	6080, 6115
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 Portugal.....	11915, 13250
1730-1800	Radio Sofia, Bulgaria.....	6070, 9700
		11720
1730-1800	Radio Surinam.....	17755
1745-1800	BBC, London.....	9410, 9750
		11745, 12095
		15070, 15260
		15400
1745-1800	SLBC, Sri Lanka.....	11800

1800 UTC	[2:00 PM EDT/11:00 AM PDT]	
1800-1810	Voice of Kenya.....	6135
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 Mozambique.....	3340, 9620
1800-1830	Swiss Radio Int'l.....	9535
1800-1830	TWR, Monte Carlo.....	11965
1800-1900	Voice of Africa, Egypt.....	15255
1800-1830	Voice of Vietnam.....	9755, 9840
		12020, 12035
1800-1900	Deutsche Welle.....	7285, 9700
		9745, 11785
1800-1850	Radio Nacional do Brasil...	15265
1800-1900	4VEH, Haiti.....	4930
1800-1900	AFRTS.....	15330, 15345
		15430, 17765
1800-1900	All India Radio.....	11620, 11940
		15280
1800-1900	BBC, London.....	6180, 6195
		7325, 9410
		11820, 12095
		15070, 15400

1800-1900	CBC, N. Quebec Service.....	9625, 11720
1800-1900	CFCX, Montreal, Canada.....	6005
1800-1900	CFRX, Toronto, Canada.....	6070
1800-1900	CFVP, Calgary, Canada.....	6030
1800-1900	CKFX, Vancouver, Canada....	6080
1800-1900	CKZU, Vancouver.....	6160
1800-1900	KCBI, Texas.....	11735
1800-1900	KNLS, Alaska.....	7355
1800-1900 M-F	KVOI, California.....	17775
1800-1900	KYOI, Saipan.....	9665
1800-1900	Radio Australia.....	5995, 6045
		6060, 6035
		6080, 7215
		9580
1800-1900 A,S	Radio Canada International.	15260, 17820
1800-1900 TES	R. Discovery, Dominican Rep	15045
1800-1800v	Radio Jamahiriya, Libya....	15450v
1800-1900	Radio Korea.....	5975, 15575
1800-1900	Radio Moscow.....	9735, 9765
		11840
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 Riyadh, Saudi Arabia..	9720v
1800-1900	Radio Tanzania.....	6105
1800-1900	Radio Zambia.....	9505
1800-1900	RAE, Argentina.....	15435
1800-1900	TWR, Swaziland.....	9550
1800-1900	Voice of America.....	11760, 11920
		11580, 15445
		15580, 15410
		15600, 17785
		17870, 17800
1800-1900	Voice of Nigeria.....	11770, 15120
		17800
1800-1900	WHRI, Indiana.....	11705
1800-1900	WINB, Pennsylvania.....	15400
1800-1900	WRNO Worldwide.....	15420
1800-1900	WYFR.....	9652.5
1805-1830 A,S	Radio Austria Int'l.....	9725, 12015
1814-1817	Radio Suriname Int'l.....	17755
1815-1900	Radio Bangladesh.....	6240, 7295
		7505
1830-1855 M-A	BRT Brussels, Belgium.....	5910, 9905
1830-1900	Radio Polonia.....	5995, 6135
		7125, 7285
		9525, 9675
		11840
1830-1900	Radio Sweden Int'l.....	11845
1830-1900	Radio Tirana.....	7065, 9480
1830-1900	Swiss Radio International..	6165, 9535
		9885, 11955
1830-1900	Radio Netherlands.....	6020, 8540
		17605, 21685
1830-1900	Radio Sofia, Bulgaria.....	9700
1830-1900	Spanish Foreign Radio.....	7275, 9765
		11840, 15375
1830-1900	Radio Abidjan, Ivory Coast.	11940
1830-1900	Radio Havana Cuba.....	11795
1830-1900	Radio New Zealand.....	11780, 15150
1840-1900	Voice of Greece.....	11645, 12105
		15630
1845-1900	All India Radio.....	7412, 11620

1900 UTC	[3:00 PM EDT/12:00 PM PDT]	
1900-1915	Radio Bangladesh.....	6240, 7295
		9855, 11555
1900-1925	Radio Netherland.....	6020, 9540
		17605, 21685
1900-1925	Radio Prague, Czechoslovakia	5930, 7345
1900-1930	Kol Israel.....	7465, 9010
		9435, 9815
		9855
1900-1930	Radio Budapest Hungary.....	6025, 7220
		9585, 9835
		11910, 12000
1900-1930 M-F	Radio Canada International..	5695, 7285
		15260, 15325
		17820, 17875
		21695
1900-1930	Radio Japan.....	11705
1900-1930	Radio Kiev, Ukrainian SSR...	7230, 6010
		6090, 6165
1900-1930 S	Radio Norway Int'l.....	9590, 11870
		15310
1900-1930	Radio Yugoslavia.....	6100, 7240
		9620
1900-1930	Spanish Foreign Radio.....	15375
1900-1930	Voice of Vietnam.....	9755, 9840
		12020, 12035
1900-2000	4VEH, Haiti.....	4930
1900-2000	AFRTS.....	15330, 15345
		15430, 17765
		21620

freq SECTION

DXING WITH AN EXPERT cont'd from page 14

2205-2230	Vatican Radio.....	6015, 9615 11830
2230-2300 S	CBC Northern Quebec Service.	9625, 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, 6005 6120, 6175 7325, 9590
2300-2330	Radio Berlin International..	6080
2300-2330	Radio Canada International..	9755, 11710
2300-2330	Radio Sweden International..	6045, 9695
2300-2330	Radio Vilnius, Lithuania....	6200, 7165 9765, 11790 13645, 15180
2300-2345	Kol Israel.....	7410, 7465 9435
2300-2350	Voice of Turkey.....	9560
2300-0000	4VEH, Haiti.....	4930
2300-0000	AFRTS.....	6030, 11720 15345
2300-0000 A,S	CBC Northern Quebec Service.	6195, 9625
2300-0000	CFCX, Montreal, Canada.....	6005
2300-0000	CFRX, Toronto, Canada.....	6070
2300-0000	CFVP, Calgary, Canada.....	6030
2300-0000	CHNX, Halifax, Canada.....	6130
2300-0000	CKFX, Vancouver, Canada....	6080
2300-0000	CKZU, Vancouver.....	6160
2300-0000	Falkland Islands Bcast Svc..	2380 / 3958
2300-0000	FEBC, Manila.....	15320
2300-0000	KCBI, Texas.....	11910
2300-0000	KVOH, California.....	17775
2300-0000	KYOI, Saipan.....	15405
2300-0000	Radio Australia.....	15320, 17795
2300-0000	Radio Baghdad.....	11735
2300-0000	Radio Clarin, Dominican R.	11700
2300-0000	Radio Korea, South.....	15575
2300-0000	Radio Moscow, U.S.S.R.....	5915, 5940 6000, 6070 6170, 7115 7150, 7185 7215, 7310 13665, 15425 15590
2300-0000	Radio Sofia Bulgaria.....	6070, 11720
2300-0000	Radio Prague, Czechoslovakia	6055, 9630
2300-0000	Radio Pyongyang, N. Korea..	11735, 13650
2300-0000	Radio Thailand.....	9650, 11905
2300-0000	RTL, Luxembourg.....	6090
2300-0000	Spanish Foreign Radio.....	6020
2300-0000	Voice of America.....	9640, 11740 15160, 15185 15290, 17730 17740, 17820
2300-0000	WHRI, Indiana.....	11770
2300-0000	WRNO Worldwide.....	7355
2300-0000	WYFR, Florida.....	9660, 9852.2 15440
2330-0000	BBC, London.....	5975, 6005 6120, 6175 7325, 9515 9590, 9915 12095
2330-0000 S-F	Radio Canada International..	5960, 9755
2330-0000 TES	Radio Veritas, Philippines...	9740
2330-0000	Voice of Vietnam.....	9765, 9840 12020, 12035
2330-0000	Voice of Nicaragua.....	6015
2330-0000	WINB, Pennsylvania.....	15145
2335-2345	Voice of Greece.....	9395, 11645
2345-0030	Radio Berlin Intl.....	6080, 9730
2345-0000	Radio Korea, South.....	7275, 15575

QSL mean -- that you definitely did not hear the station? [laughing] It's a subject on which I could wax rather eloquent. I honestly don't put down people who collect QSLs. There are people who have really, really impressive collections of QSLs that they've spent years and huge sums of money on and they're loads of fun to go through. But I don't think they prove anything.

MILLER: After 35 years in the hobby, do you have an overview of DXing today?

HILL: It's hard to say. My immediate reaction is to sound like an old-timer and say everything's worse. But that's not truly the case. In some cases, a lot of countries that once were available on shortwave have gone away and may never return and that's really disappointing. But by the same token, a lot of countries that were not available 35 years ago are now available so actually it's a trade off.

MILLER: Do you see any trends?

HILL: The trend toward higher and higher power is one I find very discouraging. It's almost destroyed the international bands. If you try and tune 49 meters late afternoon on the east coast and you'll be lucky if you can hear anything at all because all of the European powerhouses are knocking your socks off. And these aren't even signals beamed to North America! It's a wonder that you can log anything at all. So to that extent, logging good DX nowadays is more difficult than ever on the higher bands.

On the lower bands, there's not a lot of difference. They stay the same year after year and most of them run low power, except for say, Africa Number One, which is a freak. There are still good catches there and the best DX is always down there. The main difference is in the higher bands. And it's too bad.

As far as DXers, I'm not sure there are as many people around who take the hobby as seriously as they once did because perhaps DXing isn't as exciting as it once was. You can pick up the telephone and connect in a matter of seconds with any country in the world. So some of the luster of radio has, I think, diminished over the years.

MILLER: So what is your advice to those who want to become a good DXer?

HILL: I'd say that you've got to set your goals and decide what it is that you want out of the hobby. You have got to be patient and realize that it doesn't all come overnight. Nobody's going to look down on you if you don't report rare catches all the time. After all, if they were that easy, they wouldn't be rare. You kind of have to pay your dues.

You note that I haven't stressed equipment all that much. A lot of people have this idea that you have to have all this high-priced, fancy equipment to hear good DX and it just simply isn't true. The most important piece of equipment you have at your listening post are your two ears.



WE'RE UGLY

**Station News * DX Tips * Advance Program Details * Frequencies *
Equipment News * Articles * and More**

We've got to be honest with you. If you send for a copy of World Radio Report and expect a full-color, slick 'n glossy magazine with ads for \$50,000 cars and designer cigarettes, you're going to be disappointed. On the other hand, if what you want is the latest, most up-to-date information on what to hear and where to tune, then you're going to love World Radio Report. Written and published by full-time shortwave pros, we cover the world -- from station and equipment news to DX tips -- for you each month.

If you're serious about your shortwave, you owe it to yourself -- and your radio -- to check out World Radio Report. One year of World Radio Report is just \$18.00. Sample copies are just \$2.50 in the U.S.; \$3.50 elsewhere in the world. Send check, money order or cash to World Press International Inc., 3 Lisa Drive, Thorndale, PA 19372. From the publishers of International Radio.

World Radio Report
It's nothing flashy. It's just the best.

SHARE THE WEALTH

Did you monitor something we missed? Why not drop a card to Larry Miller and be one of our Honorary Monitors for the month?! The rest of us broadcast listeners will sure be glad you did!

Receivers

When I started in SWLing the question of what receiver I wanted was fairly easy to answer--what could I afford? Affordable was a one-tube receiver built from plans I found in a book. It served very well; each time it was turned on was a new adventure.

As I advanced in the hobby the little one-tube set was updated and rebuilt until it was a three tube radio that I considered the ultimate! Then I heard a new "Howard 435." Good grief! How could one receiver pack so many features into such a small box?

Later, upon hearing one of the famous Hammarlund 120's, I knew it was the ultimate--or so I thought. I disdained the little three-tube set that served me so well; I needed more and better!

Cash being in short supply the little three-lung receiver continued to do yeoman's service until I managed to raise enough money picking apples and mowing lawns to purchase a used Hallicrafters S-40.

Now here was a really big improvement. No longer did I need to change coils in the receiver to change bands--a flick of the bandswitch was all it took. The dial on the new receiver was calibrated so I always knew what frequency I was tuned to (or so I thought). The S-40 did not make me a DX champ, but it was an improvement and it had a lot of neat switches and knobs!

I have no idea how many different receivers came and went during the last 37 years but there were a lot! Yes, some were indeed super receivers, but there is always the promise of something better, so the search goes on.

TODAY'S RECEIVERS

Some may not receive signals better than those of 30 years ago, but there are features available on modern receivers that make life a lot easier for the SWL. Perhaps the greatest advance has been digital readout; now you can read the frequency the receiver is tuned to with great accuracy.

Another fantastic feature on the newer sets is multi-channel memories. Even many inexpensive receivers have ten or more memories that will store your favorite frequencies until you want to listen to them. Push a button and there it is, or the receiver can be set to scan certain frequencies and keep the listener posted on activity.

CHOOSING YOUR FIRST

Uncertainty about what receiver to buy is still with us. Manufacturers competing for your dollars tout this or that feature, making it difficult for the beginner to know just what receiver is best for him. Beware of the cheap receiver; some inexpensive receivers (\$50.00 to \$100.00) do a fair job but many more fall far below expectations.

Beginners should think about what particular aspects of the SWL hobby interests them the most; that is, do you want to listen to SWBC (mostly AM signals) or does tuning utilities and ham radio signals (SSB and Morse code) appeal to you more? Some listeners want to copy teletype, facsimile or slow-scan TV signals. Your interests should dictate what receiver you should buy.

The next step is to determine how much you want to spend for a receiver. Talk to other SWL's to get their advice. Read product reports on receivers in your price range.

You can get good unbiased product reports in SW magazines like *MT*. Handbooks like *Radio Database International* or *World Radio TV Handbook* carry reviews of many different receivers. The book, *Radio Receiver: Chance or Choice* reviews about 60 receivers and makes it easier to choose what is right for you. These handbooks are available from several advertisers in *MT*.

Talk to better-known radio dealers; most are sincere, honest people who want your business and will do everything they can to ensure your satisfaction. A dealer wants you to be happy with your choice and will give you as much information as he can to aid you with that choice. You should have some idea of what you want to do with the radio before you inquire; be as specific as possible.

USED RECEIVERS

Older receivers that will do an excellent job are available at reasonable prices. Receivers that cost hundreds of dollars a few years ago often sell for under \$100.00 today. Chances are these receivers use vacuum tubes and will not have digital readout or memories, but for the SWL on a budget they are great!

The best places to locate older equipment are ham fests and electronic flea markets. Many dealers offer older gear at greatly reduced prices and frequently offer a 30 day warranty (dealer prices will be higher than flea market prices but this higher cost is more than offset by the warranty).

Those were the days... and still can be, if you can pick up a real bargain!

5X100—LOW COST SSB RECEPTION — A dual conversion, continuous coverage ham receiver with 538-1580 kc and 1.7-34 mc covered in 4 bands with velvet precision gear drive tuning. "Upper-lower" SSB selection, plus notch filter reject unwanted heterodynes. Selectivity variable in 5 steps: 5 kc to 500 cycles. Built-in 100 kc. crystal calibrator. Sensitivity less than 1 uv on all bands. Trimmer compensates for various impedance antennas. Gray and satin black cabinet with brushed chrome trim. Size: 18½"W, 9"H, 11"D. Less speaker. 42 lbs. **295.00** 98F034. NET

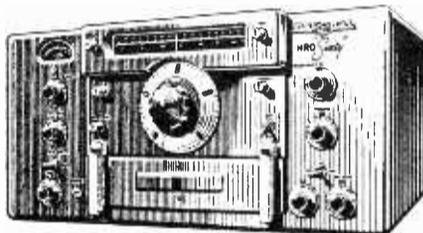


\$189⁰⁰

HQ-100

True Hammarlund quality at low cost! General coverage, 540 KCS to 30.0 MCS. 10-tube superheterodyne with automatic noise limiter. Electrical bandspread. Q-multiplier.

Optional Telechron clock-timer \$10



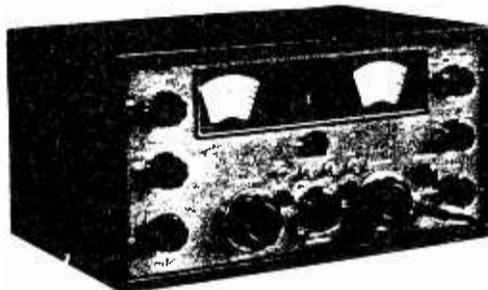
\$269⁰⁰

HQ-145

Brand-new general-coverage receiver! 540 KCS to 30.0 MCS. Dual conversion. Adjustable 60 db slot filter. Crystal filter. 11-tube superheterodyne with automatic noise limiter.

Optional Telechron clock-timer \$10
Optional plug-in 100 KCS calibrator \$15.95

NATIONAL HRO-60



GPR-90



Hammarlund Model HQ-160

Compares with receivers costing hundreds of dollars more! Dual conversion. 540 KCS to 31 MCS. SSB. Q-multiplier. Electrical bandspread. Separate stabilized BFO. Crystal-controlled 2nd IF. Crystal calibrator. Adjustable 60 db notch filter. 13-tube superheterodyne. Amateur Net \$379.00

WHAT TO LOOK FOR

If possible, take someone along who knows receivers and listen to his advice. Try to listen to a used receiver before you purchase it. Check for signals on the higher bands (tune the citizens band; there is always some activity there; some receivers begin to lose sensitivity at higher frequencies).

Tune the receiver to WWV (5, 10 or 15 MHz) with the BFO turned on; let it sit there for several minutes and if you must retune the receiver frequently, it drifts. Not the dial setting at WWV's frequency; is it right on? If not, the receiver may need realignment.

Tune in signals in a crowded portion of a band; listen for signals that are interfering with each other, then switch on and adjust the selectivity

controls; they should improve the signal you want to listen to.

If you hear a station that does not belong in the frequency range the receiver is tuned to, the receiver might have an image problem. Realignment the receiver may help (then again, it may not!).

Audio quality of received signals should be clean and crisp. A strong hum usually indicates bad filter capacitors in the receiver. Replacement of the filters is fairly easy and inexpensive; but the hum can mask more serious problems.

Do not reject the unit out of hand for one of the above problems; use the problem as a bargaining point. Most minor problems can be repaired easily and at little cost. Look for receivers that were top of the line and don't be afraid of receivers that are 20 or more years old--if the price

is right! Top of the line tube type receivers should sell for \$60.00 to \$300.00.

Receiver types to keep an eye open for are:

- Collins
 - R388 R390** R392
- Hammarlund
 - HQ-100* HQ-140
 - HQ-140X or XQ
 - HQ-145 HQ-150
 - HQ-160 HQ-180
 - Super Pro
 - Pro 310**
- National
 - NC-173 NC-183 HRO-7
 - HRO-50 HRO-60
 - HRO-500** NC-88
 - NC-98 NC-109 NC-188
- Hallicrafters
 - SX-25* SX-28* S-40*
 - S-40A or B* SX-99*
 - SX-100 SX-73 S-85*
- Technical Material Corporation
 - GPR-90#

Average prices run from about \$10.00 to \$100.00. Do not pay more than \$45.00 for units marked *, even in excellent condition. Receivers marked ** are worth at least \$250.00 if in good working order.

If you can't listen to a receiver, check it for such things as obvious modifications, missing or defective controls and parts, odd colored wires or solder blobs, scrape marks around screws (indicating unit was removed from cabinet), worn paint, broken or black tubes, cracked AC cords.

Be especially wary of new paint jobs (ask why!). If the unit looks reasonable and you are willing to take a chance, offer half of asking price. If the seller says yes right away, forget it! If he is willing to dicker, take his best price and hope for the best.

One last piece of advice about buying used gear: Always ask if the seller guarantees the unit to be operational. If he does, ask for the manual (no manual--offer five bucks less). Get his name, address and phone number. If he is a ham, get his call letters. My experience with hamfest and flea market receivers has been very good! Over the years I have purchased at least 25 receivers that way.

Thanks for all the cards and letters. I try to answer all mail within one week of receiving it although I did fall behind in January. Please remember a self addressed stamped envelope if your letter requires a reply. ■

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



Here's your chance to win a complete monitoring package from Regency Electronics and Lunar Antennas. 18 scanners in all will be awarded, including a grand prize of the set-up you see above: the Regency HX1500 handheld, the Z60 base station scanner, the R806 mobile unit, and a Lunar GDX-4 Broadband monitoring/reference antenna.

55 Channels to go!

When you're on the go, and you need to stay tuned into the action, take along the Regency HX1500. It's got 55 channels, 4 independent scan banks, a top mounted auxiliary scan control, liquid crystal display, rugged die-cast aluminum chassis, covers ten public service bands including aircraft, and, it's keyboard programmable.

Compact Mobile

With today's smaller cars and limited installation space in mind, Regency has developed a new compact mobile scanner, the R806. It's the world's first microprocessor controlled crystal scanner. In addition, the R806 features 8 channels, programmable priority, dual scan speed, and bright LED channel indicators.

Base Station Plus!

Besides covering all the standard public service bands, the Regency Z60 scanner receives FM broadcast, aircraft transmissions, and has a built-in digital quartz clock with an alarm. Other Z60 features include 60



Send in a photo (like this one of Mike Nikolich and his Regency monitoring station) and receive a free gift from Regency. Be sure to include your name, address and phone number.

channels, keyboard programming, priority control, digital display and permanent memory.

Lunar Antenna

Also included in the grand prize is a broadband monitoring/reference antenna from Lunar Electronics. The GDX-4 covers 25 to 1300 MHz, and includes a 6 foot tower.



Grand Prize (1 awarded)

- 1—Regency Z60 Base station scanner
- 1—Regency HX1500 Handheld scanner
- 1—Regency R806 Mobile scanner
- 1—Lunar GDX-4 Antenna

First Prize (5 awarded)

- 1—Regency Z60 Base station scanner
- 1—Regency R806 Mobile scanner

Second Prize (5 awarded)

- 1—Regency HX1500 scanner

Contest rules: Just answer the questions on the coupon, (all answers are in the ad copy) fill in your name and address and send the coupon to Regency Electronics, Inc., 7707 Records Street, Indianapolis, IN 46226. Winners will be selected from all correct entries. One entry per person. No purchase necessary. Void where prohibited by law. Contest ends June 30, 1987.

1. The Regency Z60 is
 - a digital alarm clock
 - an FM radio
 - a scanner
 - all of the above
2. The Regency R806 is the world's first _____ controlled crystal scanner.
3. The Regency HX1500 features
 - 55 channels
 - Bank scanning
 - Liquid crystal display
 - all of the above
4. The Lunar GDX-4 antenna covers _____ to _____ MHz.

Name: _____

Address: _____

City: _____ State: _____ Zipcode: _____

I currently own _____ scanners.

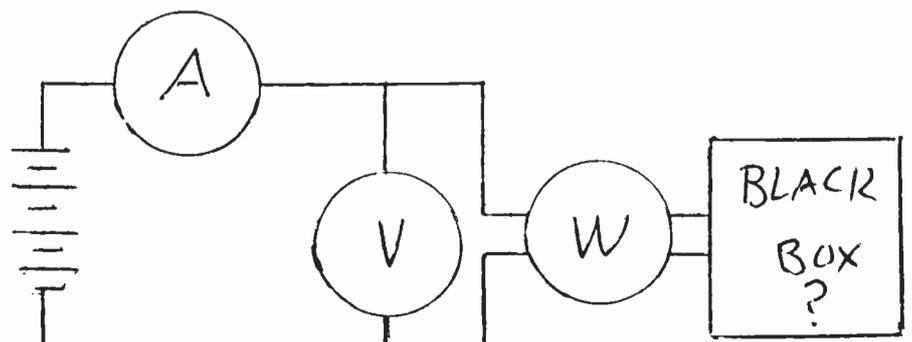
Brands owned: _____

The Black Box Solution

Joseph C. Strolin KIREC

Ammeter reads 2 amps.
Voltmeter reads 2 volts
Wattmeter reads 0 (zero) watts.
What's in the Black Box??

(Answer on page 46)



Bearcat Parts and Service

A letter received from *MT* reader Gilles Thibodeau in Canada prompted us to remind our readers that the Uniden service department (6345 Castleway Court, Indianapolis, IN 46250; ph. 317-842-1036) can provide service parts direct to customers.

Gilles also suggests that Canadians who need parts get in touch with Uniden direct rather than attempt to order parts locally; he says that even after customs fees for purchases over \$50 Canadian, it is less expensive than purchasing the parts in Canada.

Hobby Radio on a Shoestring Budget

With the costs of receivers and scanners getting higher and higher, it's a wonder that we budget-restricted hobbyists can continue to enjoy our recreational pursuits! But if anyone can help find shortcuts to saving money, it is Arnold Timm of HARK, publisher of a "low-tech" newsletter with a distinct "back to the basics" flavor.

Home made gear and fun weekend and evening projects pepper Arnie's paper which is targeted primarily to low income youth and elderly. A sample of his newsletter is only \$1 and six bimonthly issues can be your for a mere \$6 postpaid sent to Arnold Timm, KA0TPZ, 2308 Garfield #304, Minneapolis, MN 55405.

We applaud Arnie's efforts and are pleased to support his endeavor to provide low-cost enjoyment to the radio fraternity.

More on the PRO-2004

Last month we described the procedure to restore cellular mobile telephone coverage on the Realistic PRO-2004 scanner by the simple expedient of snipping a diode which had been added to the underside of the controller board, PC-3. We have learned that later versions of the popular new scanner from Radio Shack have relocated the diodes to the top of the board, but the fix is the same.

Facing the front of the radio, pry loose the metal cover on the top of PC-3 and locate diode D513 toward the back left of the module. This is the diode which must be deleted to restore 800 MHz cellular coverage. It may be unsoldered, one lead snipped, or removed completely.

Another complaint is the "rubbery" action of the squelch control, commonly referred to as hysteresis. Bob Parnass reports that this sloppy feel is easily cured by changing a resistor.

Remove the lid from the shielded box on the top side of the larger circuit board and locate resistor R148 (47k ohms--yellow, violet, orange) between pins 12 and 14 of IC2 (marked TK10420 3357).

Bob says that this resistor may be replaced by a 220K unit or even omitted entirely and the squelch performance will be improved.

A Caveat

While it is completely legal to own and use any scanner which covers the cellular telephone band, it is no longer lawful to eavesdrop on the conversations which may be heard on cellular or other mobile telephone bands in the listening range of your scanner.

Apparently, it was a marketing decision by Tandy executives to delete the cellular coverage of their new scanner so as not to conflict with claims of their other marketing venture, cellular mobile telephones, which are still being advertised by many manufacturers as being inherently "private".

R-7000 Record Relay Failure

R. Kemp of West Palm Beach experienced an unusual problem with his ICOM R-7000 receiver. When using it with a standard Radio Shack cassette recorder, the contacts on the ICOM's record activator relay would weld closed after a few minutes of use. Several sets of replacement relays began to get expensive!

Listener Kemp finally decided to take the brute force approach: He replaced the original relay with a high-current device listed in the Radio Shack catalog as #275-247 and which had a contact rating of 3 amps. It solved the problem.

Since the relay is not a direct replacement, Kemp found it

necessary to solder four lengths of 3/4" wire to the relay tabs (and he recommends four small pieces of heat-shrink tubing be placed over the tabs for insulation) and attached them to the appropriate solder pads on the circuit board; he fastened the side of the relay to the adjacent wall with a drop of quick-setting glue.

While the larger relay can be heard quietly clicking when it is activated, the sound did not prove objectionable and might even be reassuring!

Preamp Bypass Switch

I live in an apartment complex where there are strict rules against outdoor antennas. This made me a prime candidate for the Grove PRE-3 Preamplifier and TUN-3 MiniTuner.

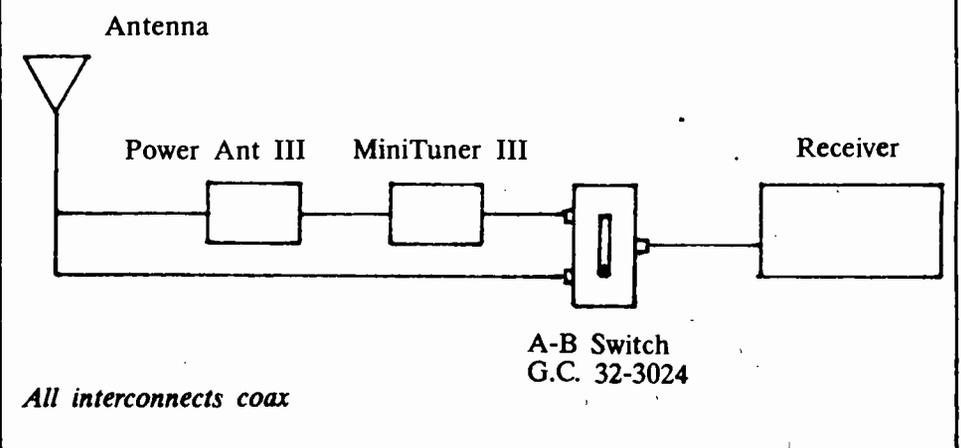
I was kept quite busy logging new countries and pulling them out of the mud, not to mention having marginal signals moved up to listenable levels.

There were times, however, when I did not need the preamplifier; for example, for honest S-meter readings and reduced noise levels when staked out on a frequency.

Here's a quick fix for the problem: obtain a two-way antenna switch (sometimes called an A-B switch) from your video club or store (GC Electronics Cat. No. 32-3024) and install it as shown in diagram.

Remember to turn your preamp off when in the bypass position; not doing so may reduce the signal somewhat. (Contributed by S. Fissell)

PowerAnt-III MiniTuner-III Bypass Switch



Active Antennas

An active antenna consists of a short element connected to an amplifier. Their singular advantage is that they are compact and may be installed where larger antennas are impractical or disallowed.

Active antennas come in two types: remote units which may be mounted at a convenient distance and controlled from the operating position, and desktop units which do all of their business next to the radio.

All wideband active antennas have one common fault: Their high-gain amplifiers are vulnerable to overload from strong signals (poor dynamic range). This may produce gain compression (apparent lack of sensitivity) and intermodulation ("intermod", the mixing of signal frequencies producing spurious signals heard spread over the listening range).

Some active antennas improve this shortcoming significantly by providing a tunable preselector which allows the user to narrow the spectrum to those frequencies to which he is listening. Examples include the MFJ 1020A, Yaesu FRA7700, Palomar loop antenna, AMECO active antenna, and Grove Hidden Antenna system.

While the tunable variety is less susceptible to signal overload, its indoor location invites interference from close-by electrical appliances such as TV sets, brush-type motors, computers, and other notorious sources of electrical interference.

Because of their limitations, the active antenna should be chosen only when an efficient outdoor antenna is not possible.

UTILITY INTRIGUE
con't from page 35

COMMON ABBREVIATIONS

As is true of many fields, utility monitoring also has its own particular set of abbreviations extremely useful in reducing the volume of textual material. For example, it is much briefer to use "CW" rather than "continuous wave" for every logging in this mode. Or how about "DIOI" in place of "date and time of the intercept"? Following is a glossary of common abbreviations.

- AA Arabic language
- AAF Army airfield
- AB Airbase
- AF Air force
- AFB Air force base
- AM Amplitude modulation
- ALLOC Allocation
- ARQ Error correcting RTTY
- ATC Army training command
- BC Broadcast
- CALL TAPE Recorded message sent repeatedly to alert recipient
- CC Chinese language
- CHARAC Character(s)
- CIPHER Encrypted plaintext
- COMINT Communications Intelligence
- COMMS Communications
- CS Call sign
- CT Net Control Station
- CUT NBRS Abbreviated Morse character for numbers; letters are sent for numbers.
- CW Morse code transmission
- DE Morse code designator for "This is (CS)"
- DIP Diplomatic
- DISSEM Dissemination
- DIOI Date-Time of intercept
- EE English language
- EMB Embassy
- ETA Estimated time of arrival
- ETD Estimated time of departure
- FAX Facsimile
- FF French language
- FH First heard
- F,FIG Figure(s)
- FM From
- FOLL Followed, Following
- FREQ Frequency
- FSK Frequency shift keying
- GG German language
- GND Ground
- GRP Group(s)
- HDNG Heading
- HQ Headquarters
- HRD Heard
- ID, IDENT Identification
- INFO Information
- INTEL Intelligence
- ISB Independent sideband
- ITU International
Telecommunications Union
- L, LTR Letter(s)
- LA Latin America(n)
- LANG Language
- LSB Lower sideband
- MARKER Any continued or repetitive signal sent to keep frequency occupied
- MIN Minute(s)
- MCW Modulated continuous wave
- MFA Ministry of Foreign Affairs. In Latin American traffic MFA is usually indicated as MINREX
- MSG Message
- NAS Naval air station
- NCS Net control station
- OM Old man (male operator)
- OPS Operations
- POSS Possible, possibly
- PP Portuguese language
- P/P Phone patch
- PREV Previous(ly)
- PROB Probable(ly)
- PT Plaintext (not enciphered or encoded)

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- SS Spanish language
- SPEC Special
- SSB Single sideband
- STN Station
- SWL Short wave listener
- TFC Traffic
- TOI Time of intercept
- UNID Unidentified
- USA US Army
- USAF US Air Force
- USB Upper sideband
- USCG US Coast Guard

USMC

- USMC US Marine Corps
- USN US Navy
- UTE Utility (utility monitor)
- VY Very
- WRKG Working (or WKG)
- WPM Words per minute (Morse code speed)
- WX Weather
- XSMN Transmission
- YL Young lady (female operator)
- 5F, 5L 5-Figure, 5-Letter

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Where are the Broadcast Bands?

Compared to tuning in your local AM station, shortwave can frustrate listeners with its bewildering array of terms. Given, however, that the shortwave broadcast bands are spread out over 23,800 kHz (so-called AM radio, which runs from approximately 540 to 1600 kHz, covers only 1060 kHz), it becomes obvious that some sort of labeling is necessary. Two terms you'll hear used to describe a station's place on the dial are "kilohertz" and "meter band."

Frequency is attributed to every radio wave. It's the amount of times a wave goes or "cycles" from positive to negative in a second. A "hertz" is one cycle per second and a kilohertz is one thousand cycles.

But beside frequency, radio waves can also be identified by their wave length. This is the distance that a radio wave, traveling at the speed of light, goes between each complete cycle.

So, if you have a radio station broadcasting at 1000 kHz, those waves have one thousand thousand -- or one million cycles each second. Light travels at a speed of 300,000 kilometers each second and since a frequency at 1000 kHz has one cycle every one millionth of a second, the wave would travel 300 meters in that one millionth of a second. The wavelength of a station on 1000 kHz would then be 300 meters. Simply put, it's a mathematical calculation based on the metric system.

Fortunately, this gobbledegook is not necessary for your ability to simply tune in a favorite station. But it does explain why stations say, for example, "We're broadcasting on 6175 in the 49 meter band." 6175 is, as most people know, the station's frequency in kilohertz. But where does the 49 meter band come from?

"Meter band" is used to identify a range of shortwave frequencies. For example, 6175 is part of a range that runs from 5950 to 6200 kHz. If you apply the above-mentioned mathematical equation to the middle frequency in that range -- 6075 kHz, you'll find that it comes out to be darned close to 49 meters.

Fortunately, the use of meters is not often used except to identify ranges of frequencies. But you may well hear a station like Radio Netherland, on their African Service, give the meter equivalent of a station instead of the frequency in kilohertz as meters are still used in some parts of the world to identify a station's position on the dial.

Armed with this intensive knowledge, numbers bouncing off the back wall of your head -- and thoughts of pitching your radio out the window in the front of your head -- you can forget it all.

In short, the shortwave or high frequency spectrum is that part of the radio band that lies between 3,000 and 30,000 kilohertz. Common usage, which plays a large part in molding those frequencies into what we're familiar with, places shortwave between approximately 2,000 and 30,000 kilohertz.

These are broken up into the following:

120 Meters
2300-2498 kHz (Tropical Domestic Broadcasting only)

90 Meters
3200-3400 kHz (Tropical Domestic Broadcasting only)

75 Meters
3900-3950 kHz (Asia and Pacific only)
3950-4000 kHz (Except the Americas)

60 Meters
4750-4995 kHz (Tropical Domestic Broadcasting only)
5005-5060 kHz (Tropical Domestic Broadcasting only)

49 Meters
5950-6200 kHz (Worldwide)

41 Meters
7100-7300 kHz (Except the Americas)

31 Meters
9500-9900 kHz (Worldwide)

25 Meters
11650-12050 kHz (Worldwide)

21 Meters
13600-13800 kHz (Worldwide)

19 Meters
15100-15600 kHz (Worldwide)

16 Meters
17550-17900 kHz (Worldwide)

13 Meters
21450-21850 kHz (Worldwide)

11 Meters
25600-26100 kHz (Decreases to 25670-26100 kHz in September, 1989)

If you look at your copy of Radio Database International, you will notice, however, that there are stations broadcasting outside of these bands. Many of these are

1987 SURVEY cont'd from page 5

greater awareness and interest in "Down Under" to shortwave listeners.

The rest of the results come in as follows:

- #4 Radio Netherlands (5%)
- #5 HCJB (4% - tie)
Radio RSA (4% - tie)
- #6 WRNO (3%)
- #7 Deutsche Welle (2% - tie)
Radio Sweden International (2% - tie)
Radio Tahiti (2% - tie)
Voice of America (2% - tie)
Voice of Free China (2% - tie)

Of the nine stations in the number 4, 5, 6, and 7 position, it is interesting to note that seven of them are noted for their powerhouse signals, thus confirming, perhaps, the importance of a strong signal in gaining a large shortwave listenership. Note for example how the Voice of Free China appears in the results but not their across-the-straits colleagues at Radio Beijing. It's hard to imagine on a medium filled with politics of virtually all persuasions that shortwave listeners are refusing to tune in to Radio Beijing for political considerations, and since the programming is so similar in content and delivery, it's a good bet that the powerhouse signal provided VOFC by its relay over WYFR have given it the necessary boost into the ratings. The appearance of Sweden with its notoriously bad signal in North America in the ranks is probably do to the strength of their Sweden Calling DXers program. Missing from the survey for the first time in recent memory is Radio Moscow.

Clearly a winner in this year's survey is Radio Canada's perennial favorite, Ian McFarland. McFarland has long held the top spot in balloting but for a time, Jonathan Marks of the competing Media Network program on Radio Netherlands was closing in as favorite broadcaster. No more. Marks' position slipped severely in this year's survey, with a mere 3% as opposed to McFarland's solid 8. Only one other broadcaster showed significant enough response to warrant

operating illegally, but others are not, contrary to popular belief. The ITU, the governing body which sets the rules concerning spectrum occupancy, does allow, under certain circumstances, out-of-band broadcasting. And, on a more practical level, as the bands continue to get more crowded, more and more stations, looking for a clearing in the jungle, will move out of band. But for now, these are the cages that the ITU keeps its broadcasting animals in. ■

inclusion in the survey, another perennial favorite, Tom Meyer, host of Radio Netherland's "Happy Station" program. Meyer's high marks must be respected -- he is only heard on the air once a week. Both other broadcasters are heard not only weekly but on other daily programs as well, increasing their exposure but apparently, not their popularity. Gone from the poll for the first time in its existence, is Glenn Hauser.

In terms of programming, the choices indicated in this year's survey follows the same line as previous years -- the first choice was news, followed by DX programs, followed by non-western music and finally, current affairs.

FAVORITE MT SUBJECTS

If you really want to become confused, try asking your fellow readers what they enjoy most in *Monitoring Times*! There seem to have been as many different answers for this question as there were for all other questions combined! Even more confusing is what to do with responses of equal numbers adamantly in favor of and vehemently opposed to the same topic!

In general, our readers favor general shortwave and scanner articles, frequency information, equipment reviews, antenna information, and practical hints for better listening. *MT* readers are more practically oriented than technically inclined.

FAVORITE RECEIVERS

There were no real surprises here. Leading the shortwave receiver list were the ICOM R71A and Kenwood R2000 with the JRC NRD525 and Kenwood R5000 gaining ground. Scanner listeners favor the ICOM R7000, Bearcat BC300 and Bearcat BC100XL. Many other programmables were mentioned as well.

We must remind our readers that these data are preliminary, representing only a superficial look at a fair sampling of the returned cards. We expect them to be consistent with the findings of the FIBI grant, but some variation can be expected once the full tally has been examined. ■



CLASSIFICATIONS
cont'd from page 11

reasons, it is in the interest of both the U.S. and the U.S.S.R. not to let certain other countries know that we know.

Along comes some insider who is aware that Russia knows (and who, like many people, thinks that they are the only enemy), and decides that we are just keeping it secret from our own citizens for political reasons, and so leaks it to the press. Both we and the Russians then have problems with other countries which we were both trying to avoid.

There are those in government who regularly classify information simply to hide it from public scrutiny. So the people who leak information feel free to do so even though they are not in a position to determine whether or not the classification is legitimate. This is a serious problem within the system and, as yet, no one has come up with a workable solution.

To be fair, the amount of information which is truly dangerous to our national defense which is released in this manner is very small, but that which is leaked is often top level stuff and does weaken our position. One obvious answer is an independent, third party classification authority with total oversight control. The Congress does this now to some extent, but they have their own political axes to grind. I mean totally independent!

Thinking and Planning in Secret

Another big problem area is keeping our thinking and planning a secret in a democracy where our basic belief is that we should all have a say in our country's future. Actions that have to be taken for our preservation (spying and planning the unthinkable) are often distasteful to our open and free society.

Recently, a big deal was made in the press about Israel spying on the U.S. and, naturally, Israel said it was not true ("just some misguided zealots") and the U.S. readily agreed. In fact, the U.S. and every other government on this planet spies on both friend and enemy alike. And they plan for possible actions against them, too.

Keep in mind the last two hundred years of history and warfare on the earth. England, currently our closest friend (along with Canada), fought a war with us. Countries who were our friends at times have become our enemies; countries which were our enemies have become our friends. This is true of many countries around the world.

For that reason, we maintain, deep in our most guarded vaults, war plans against Russia and Cuba, right alongside similar war plans for England, Canada, Australia, and Israel. *And so do they!*

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Bands: 30-50, 88-108, 118-136, 144-174, 440-512 MHz. The Regency Z60 covers all the public service bands plus aircraft and FM music for a total of eight bands. The Z60 also features an alarm clock and priority control as well as AC/DC operation. Order today.

Regency® Z45-LA

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7-Band, 45 Channel • No-crystal scanner
Bands: 30-50, 118-136, 144-174, 440-512 MHz. The Regency Z45 is very similar to the Z60 model listed above however it does not have the commercial FM broadcast band. The Z45, now at a special price from Communications Electronics.

Regency® RH250B-LA

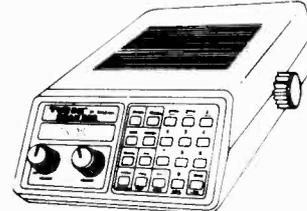
List price \$699.95/CE price \$329.95/SPECIAL
10 Channel • 25 Watt Transceiver • Priority
The Regency RH250B is a ten-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to ten frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH250 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A 60 Watt VHF 150-162 MHz. version called the RH600B-LA is available for \$439.95. A UHF 15 watt version of this radio called the RU150B-LA is also available and covers 450-482 MHz. but the cost is \$439.95.

Bearcat® 50XL-LA

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Bands: 29-7-54, 136-174, 406-512 MHz. The Uniden Bearcat 50XL is an economical, handheld scanner with 10 channels covering ten frequency bands. It features a keyboard lock switch to prevent accidental entry and more. Also order part # BP50 which is a rechargeable battery pack for \$14.95 or the new double-long life battery pack part # BP55 for \$29.95, a plug-in wall charger, part # AD100 for \$14.95, a carrying case part # VC001 for \$14.95 and also order optional cigarette lighter cable part # PS001 for \$14.95.



Regency RH250



MODEL TS-2



MODEL HX 1500

We even wrote a study called "Strategic Surrender" regarding how best to lose a war if (God forbid!) it should ever happen. It was leaked and a lot of Congressmen got mad; they were emotional and super-patriotic as usual and insisted that the document should be destroyed. Actually, it should have been quietly filed along with those unthinkable war plans.

Such think tank documents provide insights which strengthen

NEW! Scanner Frequency Listings

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our ability to see that we never get into a situation where we need that planning.

IN CONCLUSION

We must be able to keep some things secret even from ourselves (the public at large) if we are to survive. And this brings us back to the dilemma that those who leak, by not having the big picture and not understanding why something is

secret, can thereby cause great damage. And yet they also occasionally leak a real misuse of classification (a cover-up) and thereby cause us to re-evaluate and improve our system. It's a real paradox.

The system is imperfect because it is operated and controlled by humans. Humans are both the strongest and the weakest links in the system. But because most people do care, and try to do the job securely, it works. ■

Have Antenna Will Travel

Before you know it, the DXpedition and camping season will be upon us, and that's why I promised last issue to give you some hints as to how you can DX inside an all-metal camper or trailer.

Naturally, if you have a beverage antenna which runs up to the camper, you can extend a jumper wire from it to your radio. But *MT* reader George T. Appleton of Las Vegas has a neat method of making an inductive antenna for use with portable radios, either in a camper or just around the house.

First, he takes an uncut 50-foot length of small-diameter insulated hookup wire and marks it into three sections: from one end, to three feet, then to 32 feet, and finally 15 feet. He then creates a coil with the 32-foot section by wrapping it around something like a soft-drink can and then he tapes the coil to hold it roughly in shape.

The three-foot length goes to ground, which can be the camper itself, or even the DXer -- George clips it to his wedding ring. The 15 foot section is the ground wave pickup wire. The coil is placed against the postable radio and moved around until it is closest to the built-in ferrite rod antenna inside, which results in a dramatic increase in signal strength.

You can then tape the coil of the radio at that spot and enjoy good reception. George testifies to using this method with good results in Death Valley, and I've used a similar method for radios with no antenna terminal in the Mojave Desert by simply wrapping the antenna around the radio and holding on to the bare end. Thanks for the tip, George!

Let's Hear It! The flea-powered signal of CJFT-530 Ft. Erie, Ontario continues to reach further and further. DXer Pat Martin of Seaside Oregon was the first west coast DXer to hear them, reporting a January 4 reception. Roy H. Millar of Marysville, Washington reported a tentative reception on January 16.

Trans Atlantic stations were commonly received in early January. Reporting great catches in Quebec was DXer Andy Rugg who pulled in a few exotic catches in Radio Moscow-1386, Rome-1332, BBC-1089, Radio Sweden-1179, Tullamore, Ireland-567, and Sebaa-Aioun, Morocco-612. Massachusetts DXers Stan Morss, Ernest Cooper and Ray Arruda have reported Yugoslavia-1134 and Belgium-1512.

Although the medium wave DX season is nearing an end, good condi-

tions can bring these and other TA's back at a moment's notice at any time during the year.

Beware the dog! I've been trying to suggest the best values in receivers during the past few issues, and several readers have agreed with me that the GE Superadio II is probably the best value for the money, with some discount stores selling it for as little as \$39.95. But now I think it's time to warn you against at least one radio in particular that I think is a real dog.

Beware the Worldstar MG-6001. This multiband receiver has been around for at least eight years and ironically originates in Hong Kong, the same as the Superadio.

I've seen this bow-wow advertised for as much as \$120, and never is it offered where you can examine it before you purchase -- it's always a mail order item, either as a stuffer in credit card billings or by direct mail. It includes AM, FM, CB, TV (ch. 2-13), low-band FM public service (108-174 MHz), and SW (4-12 MHz or so). Included with it is a microphone so you can use it as a PA.

Years ago this howler engendered bad reviews, and unless someone has upgraded it, thousands of hapless consumers will be stuck with it again, as a major oil company is attempting to market it at \$89.95 through credit billing stuffers. What's wrong with it? It has poor selectivity and sensitivity, with AM stations overlapping across its 6" dial. As for shortwave, you can forget it, unless you live within sight of the towers or at the first-hop point of transmission. But at least you can hear your local AM stations -- across the shortwave bands!

A few years ago, when I was still selling electronics for a major retail chain, an elderly couple approached me and asked for advice on what to do to improve reception on their Worldstar, which they had purchased (mail order, again) from a division of our company. They couldn't get a single shortwave station!

I advised them to attach a wire to the telescoping antenna and toss the end out their apartment window; I should have told them to toss the radio out the window instead.

The point is that this cheapie (which might make a nice PA system) should have been retired years ago, but someone is still merchandising it. I strongly advise you to send it back, if you've purchased it, and ask for a refund, or at least send a letter of protest to any company still carrying it.

MT's Family of Writers

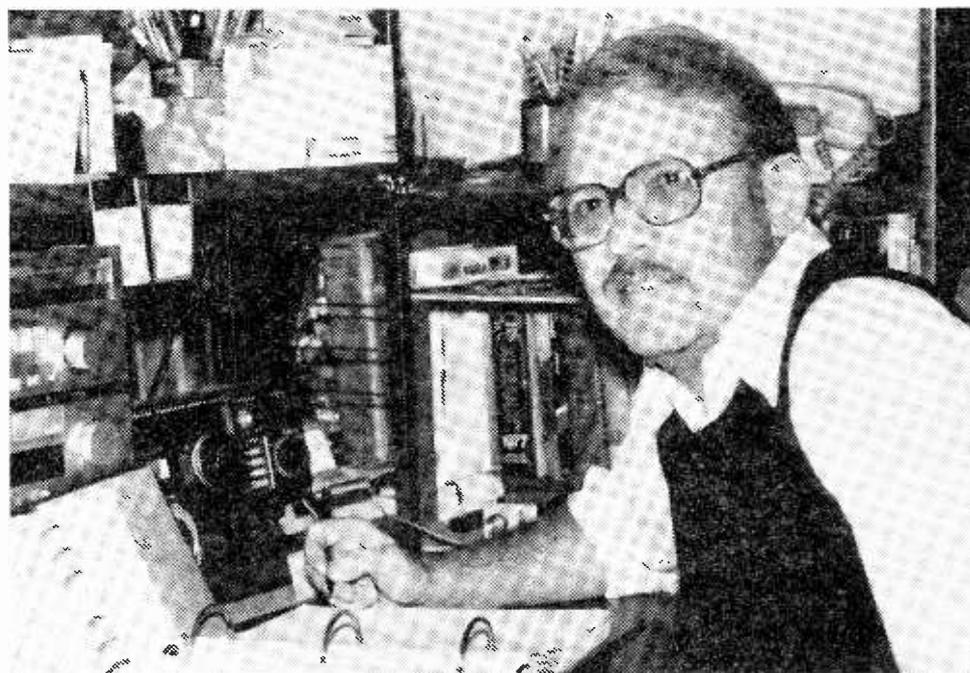
Paul Swearingen

Paul Swearingen started DXing in the mid '50s on a 5-tube table radio when he started chasing the "Big John and Sparky" show across the dial and ended up on WLW-700. Although occasional DX forays across the TV and FM dials interrupt his broadcast band DXing, he has never really ventured into other bands and today claims AM DXing as his favorite.

Swearingen has taught high school English, Spanish and journalism for twelve years and also worked at a number of radio stations in Kansas, doing everything but engineering at

some of them. After moving to California in 1982, he started a third career in retailing and currently is personnel manager at a large department store, after selling radios for two years. He edits the "Musings" column for the NRC and the "DXWWII" column for the IRCA.

"The DXing hobby has put me in touch with new friends all over the world" says Swearingen. "I correspond with DXers on all continents and find that this hobby is one which has the potential to pull us together into a global community."



On the other hand, Amoco has had the good sense to offer the Magnavox (Philips) D1835 recently for \$99.95. It's a decent little performer as a travel portable and at only ten bucks more than the Worldstar. Perhaps some real DXer at Amoco made the final decision to carry it. Our only reservation is that retail discounters carry it for around \$60... but you can't have everything!

I invite you to write to me if you've purchased the Worldstar (your name will be withheld to avoid embarrassment) or similar errata and let me know if you'd feel moved to issue a similar warning to consumers.

Springtime Skipping: Now is the time to monitor the FM and TV bands for increased DX activity. Although the major peak in E-skip activity usually occurs some time in June or early July, excellent tropo and E-skip openings can sneak up on you in the springtime, too. Make it a habit to check channel 2 and 3 often for herringbone interference, the classic indicator of a second incoming signal. Tune across the

UHF band to see if unusual signals are present; if you have a rotatable antenna, get in the habit of swinging it around at least once a day and scanning the bands. Tropospheric enhancement usually occurs in the morning, but it can happen almost any time and on any channel, pulling in stations hundreds of miles distant.

Eastern TV DXers were treated to an unusually strong tropo around Thanksgiving last year, with Bob Seybold of Dunkirk, New York reporting catches of as far away as 1,325 miles into Iowa and Texas! Reporting in WTFDA's VHF-UHF Digest, he noted stretches of 72+ hour tropo without a break, enabling him to log eight different stations on channel 16, and to view 1000+ mile stations with local-quality strength.

Next issue I'll comment on the AM stereo and high fidelity sound issue. Until then, 73. ■

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

The Contras: Some readers may have already logged the new Nicaraguan Contra AM outlet, Radio Liberacion. It is using the frequency of 1520 kHz, and the present schedule is 0000 to 1200 UTC. All programming is in Spanish, but the frequent references to Nicaragua and the Sandinistas will make it relatively easy for you to know whether you have bagged this one or not.

For many, interference on 1520 will make Radio Liberacion something of a challenge. Those in the Northeast will have to contend with WWKB Buffalo's 50,000 watts. Others will have to battle QRM from local stations. Still, with some persistence, and perhaps a bit of luck, you should eventually be able to catch this one. Here in Florida it is much easier to hear in the interior portions of the state than along the East Coast, an exception to most medium wave situations. Give it a try, and see how well it does in your area.

Those who do log Radio Liberacion and want to verify the reception might get a reply from the following address: Nicaraguan Development Council, 1000 Thomas Jefferson Street, Suite 607, Washington, D.C. 20007. While an English language report should do the trick, a prepared verification card and a stamped, addressed envelope will probably greatly increase your chances of getting a reply. Like most of the other Contra stations, Radio Liberacion is run by the United Nicaraguan Opposition (UNO).

Fantasy Broadcast Station: We received a letter from "Magic Man" of the Fantasy Broadcast Station. He invited *Monitoring Times* readers to look for the station on 26610 kHz. This pirate also claims to operate an FM outlet, FNTC, Radio Free Magic, on 101.8. Reception reports can be sent to F.B.S., P.O. Box 23792, Phoenix, AZ 85063.

Scott and I would be pleased to hear from anyone fortunate enough to log this one. We also hope other stations will follow the example of the Fantasy Broadcast Station and let us know about their activities.

Soul Power! Our thanks to Carl Smith of California who sent us a clipping from the *Fresno Bee*. According to staff writer Irwin Speizer, the F.C.C. shut down a Fresno FM pirate called Zoom Black Magic 108. The station, operated by Walter Dunn, Jr., had been broadcasting for about two years. Dunn called himself The Black Rose. His station played records and offered public service announcements. It was aimed primarily at a black audience. Dunn stated, "It is virtually impos-

sible for a black man to get an FM radio station unless he can raise 1 million dollars."

Dunn's plight is one faced not only by virtually every minority group in this country and other nations, but by other persons as well. Has broadcasting become a virtual monopoly of governments, the rich who can afford to buy stations and fundamentalist religious groups? There are few genuine community stations, but they appear to be the exception to the norm.

Well, let's see what "alternative broadcasters" some of you have been hearing lately. It's time to hear from Scott.

The McClellan Report:

Thanks, John. Pirate activity continues at a relatively low level, but if recent propagation conditions are any indication, we may be finding pirates taking to the air on a more regular basis. The current sunspot cycle seems to have bottomed out in late 1986, so perhaps the bootleggers will become more prevalent in 1987.

We received a letter from a new station, which is called Molobicule Radio. They said that they went on the air starting last month with a transmitter power of eight kilowatts. It's highly unlikely, but who am I to argue with 8 kW and the word of "Pirate Captain Blaney Jones"? Here is the station's tentative schedule, times in UTC and frequencies in kHz:

0530-0600	7142, 6190	Fridays
1753-1940	7480, 7142	Saturdays
0200-0400	7480, 7142	Sundays
0200-0215	7480	Mondays

I hope that Blaney will reconsider the use of 7142 kHz, since that is in the middle of the 40 meter ham band -- no place for a pirate to be.

Mace Twigg in Minnesota nabbed another broadcast of the Voice of Communism on 7490 kHz, between 2203 and 2313 UTC. This offbeat station had a contest in which they invited an American to the USSR. They interviewed him the day he arrived, and again three months later. It seems he had been converted to the Soviet way of life, so they awarded him a new name, and a job as a bartender. You never know what these guys will come up with next! Word has it that they are "working on" getting QSL cards to their listeners, so it might pay to send a report via P.O. Box 982, Battle Creek, MI 49016.

Juan Palmer in Kansas logged another broadcast of Radio Clandestine on 4858 kHz between 0130 and

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0149 UTC. He tuned into a novelty tune (an unusual find on 60 meters!). He didn't hear an ID until just before sign-off -- "From the tranquility of an anonymous ocean anchorage, this is pirate bootleg station Radio Clandestine." This station can also be contacted via the Battle Creek address given above.

Dipping into the mailbag, Mike Schaub asks, "What do these pirate stations use to get their signal out?" A typical pirate uses an old ham radio transmitter. Many of the models from the 1950s and '60s include the ability to transmit in the AM (amplitude modulation) mode, as opposed to the SSB (single sideband) mode used by the majority of hams today. This explains why the most common frequencies to hear pirates are between 7.3 and 7.5 MHz; just above the 40 meter ham band, and within reach of most ham transmitters. As for antennas, many pirates use a simple dipole with good results.

That wraps it up for another month. Let me hear from you! Please send your loggings, questions, or

suggestions to me at the address at the end of the column. Thanks -- let's meet again, same plot, next month.

Other news: From Pennsylvania, John Demmitt notes Cuba's Radio Reloj formerly on 570, has moved to the 590 kHz spot normally occupied by Radio Rebelde. There is no trace of a Cuban on 570. John suspects that the time station was moved to 590 to keep claim on the frequency while the big (150 kW) transmitter gets an overhaul. The question is, does the overhaul involve an increase in power? If so, for what purpose?

Demmitt has also learned that the December 2 broadcast from Cuba on which we reported last month appears to have been made with at least 300 kW of power. This writer has been told the F.C.C. is monitoring all Cuban medium wave activity very closely. Keep an ear tuned to Cuba. Things have been happening and it looks as if more will.

Finally, here are a few clandestines that have been logged here in Florida

(Please turn to page 52)

LETTERS FROM LISTENERS

A letter from Michael Leary contained some items for the "Listeners Log" plus a "Voyager" intercept made during a critical situation on the historic around-the-world flight. Here is what he heard on 8822 kHz, USB, on 23 December, 2100-2400Z.

"The pilot and the engineers were arguing about a broken fuel pump and the problems this caused. While they were discussing this, the engine quit! The fuel tank being used had run dry. A quick flick of some switches solved the problem and the pilots, engineers, and I, were able to breath again."

To all who send in loggings of Voyager communications, thanks so much; all of the items were appreciated.

Paul Scolese, New York, reported a double intercept of some "numbers" broadcasts on 7887 kHz on 2 January. At 0755Z he heard a strong carrier come up. At 0758 he heard faintly the sign-on for the VOA. At 0800 a Spanish number station came on the air and in the background another Spanish number station could be faintly heard.

At 0814 the loud station went off and the weaker signal remained on the air until 0816. Paul added that the first signal was very strong with no fading and no QRN/QRM.

Paul also provided information on an unusual activity he monitored on 6760.2 kHz USB using a callup of "3D3 This is 14." One of the stations replied with what sounded like "Port call Rainage" and the voice activity was intermixed with what appeared to be data bursts.

The traffic exchange concerned some type of "surveillance in Seattle" and at one point one station state, "Roger, my chops are echoing" and a reply of "Roger, this is Romeo Charlie" was given.

I checked my reference books but can't put my finger on a definitive identification.

RUSSIAN JAMMING

When the Soviets discontinued the jamming of the BBC broadcasts, it was hoped the SW bands would become somewhat quieter, but such is not to be the case. According to a recent press release from Radio Liberty, they have determined that the Soviets are now using the transmitters formerly used to jam the BBC for additional jamming of the Radio Liberty broadcasts.

REFERENCE PUBLICATIONS

In response to many requests for recommended SWL/utility titles, I prepared the following list:

- Guide to Utility Stations*, Klingenfuss, \$24.95
- Shortwave Directory*, Grove, \$14.95
- Confidential Frequency List*, Ferrell, \$15.95
- Guide to Embassy and Espionage Communications*, Kneitel, \$10.95
- Shortwave Radio Listening with the Experts*, Dexter, \$22.95
- SPEEDX Reference Guide to the Utilities*, \$11.75
- World Press Services*, Harrington, \$8.95

The SPEEDX book can be obtained from SPEEDX, 7738 East Hampton Street, Tucson, AZ 85715. The other publications can be ordered from various MT advertisers.

THE SWEEPING SIGNALS

I read with a great deal of interest the item written by Dave Beauvais which appeared in the February MT (p.45). I could not help but note the similarity between the signals he reported and those I had heard on the lower frequency bands over a period of many months. I plan to watch closely for further activity and will try to determine if there is some type of relationship existing between these sweeping signals.

SUSPECTED MERCENARY NET

I would like to add my observations to those offered by Ed Vest, Virginia, in the February MT (p.4). His comments concerned the USB network on 6593 kHz.

I have been watching this frequency for awhile and have noted that, in addition to the Spanish and English language conversations, several members of the network converse in Portuguese. During conversations I have monitored, I have noted reference to West Coast ports such as San Diego and possibly San Pedro. J. Hall, Washington, believes the operators were on board fishing vessels possibly working out of San Pedro.

To date I have not had good clear reception of the conversations because of severe QRM from what appear to be Mexican CW stations and an AM SW broadcaster that shifts back and forth frequently. By the way, this broadcaster appears to be a clandestine station operated by one of the anti-government revolutionary groups in El Salvador, containing the usual "down with the Americans" diatribe.

SPECIAL INTEREST ITEMS (all monitored in January)

2724 kHz 260221Z CW
An unidentified station sent BOF an odd message of various length figure groups, pausing after a

few groups for a receipt from BOF and would then proceed with a few more groups, again pausing for a receipt and so on throughout the message. Here is what a portion of a typical message looks like:

NR 2120 010121240 0770184 017707 K
NR 02014028 0108 0152 0007707 K
NR 03012007 0115 0309 001067. K
NR 0412359 01056 0144 0012707 K
NR 05012055 0225 02050 0008707 BT QSL

BOF gave his QSL for the message and went down. Another outstation was heard calling BOF using the call FYV but he did not receive an answer. In the past this activity has been seen transmitting weather messages in plaintext Spanish so perhaps the above message format is coded WX.

3424 kHz 260247Z CW

I cut in on this unusual message format and here is what I heard:

(IN HERE) 2890 BT NR 1722 AAA 192 AAA 2996 BT BT BT
NR 1723 AAA 192 AAA 249 BT BT

NR 1721 AAA 192 AAA 279 BT BT
NR 1722 AAA 192 AAA 269 BT BT
NR 1723 AAA 192 AAA 259 BT BT
NR 1721 AAA 192 AAA 419 BT BT
NR 1722 AAA 192 AAA 429 BT BT
etc etc

After each line, the other end would reply with BT and then the sending station would continue with the next line.

3426.7 260257Z LSB

Two OM/SS were heard in simplex operation; the stronger station was sending 5F groups and the weaker station would periodically indicate "Roger" and the sender would proceed with the message.

There were several CW stations sending V's right on top of the voice activity so it was very difficult to obtain solid copy of the message.

4374 kHz 131850Z USB

Call signs "Xray Nine November" and "Six November Delta" were conversing and 6ND asked X9N to "Come up on a Unofmrm Playground for Alligator, Over" and X9N replied "Standby Out." The stations apparently shifted frequency because nothing further was heard on 4374.

JANUARY 1987 LOGGINGS

KHZ	DTOI	MODE/IDENTIFICATION/COMMENTS
216	191108	MCW/CLB/Beacon/Carolina Beach, NC
219	19114	MCW/BA/Beacon/Baltimore (Wash Int'l-Jeans),MD
223	19116	MCW/DA/Beacon, Ft. Belvoir (Davison AAF-Davee)VA
223	19117	MCW/YYW/Beacon, Armstrong, Ontario
232	19118	MCW/MX/Beacon, Camp Springs (Andrews AFB-Jenkins),MD
272	191122	MCW/YQA/Beacon, Musoka, Ontario
272	191123	MCW/MTN/Beacon, Baltimore (Glenn Martin-State),MD
346	191125	MCW/IA/Beacon, Chantilly (Wash.Dulles Int'l-Tille),VA
360	191126	MCW/RW/Beacon, Camp Springs (Andrews AFB-Kirby),MD
366	191127	MCW/YMW/Beacon, Maniwaki, PQ, Canda
368	191131	MCW/L/Beacon, Toronto (Int'l-Lima) Ontario, Canada
375	191132	MCW/ELM/Beacon, Elmira (Corning REgional), NY
378	191133	MCW/GFG/Beacon, Leesburg (Municipal-Godfrey),VA
385	191134	MCW/EMR/Beacon, Augusta (Bush Field-Emory),GA
398	191135	MCW/G/Beacon, Windsor (Golf),Ontario
409	191137	MCW/YTA/Beacon, Pembroke, Ontario
412	181138	MCW/UKG/Beacon, Downsview (Leinburg), Ontario, Canada
414	191139	MCW/BC/Beacon, Baie Comeau, PQ, Canada
419	191140	MCW/RYS/Beacon, Grosse Ile (Municipal-Detroit), MI
424	191142	MCW/RVJ/Beacon, Reidsville (Prison), GA
2631	220640	CW/Z, Single letter beacon
2762	240416	USB/Santa Cruz de...La Plata/2 OM/SS passing commercial type msgs. Addees have Havana and nearby locations.
2854	220647	CW/No calls/5Fgps, hand sent
3167	120342	CW/P, Single letter beacon
3171.6	260242	RTTY 50-850/Coded WX
3457	100014	CW/ATB DE KQC, YVR DE RV (All uniden)
3465	220653	CW/WX in English, for Caribbean area
4665	230110	CW/AUL DE MZK (both uniden)
6200	131844	USB/OM-EE on board uniden vessel sending coded WX msg to Miami
6243	121431	CW/DEL,ABA DE TRU (All uniden)
6604	242256	USB/OM giving WX in English for Canadian locations
10050	121721	USB/OM giving WX in English for Canadian locations
12200	071353	CW/DE COL (Havana Aeradio, Cuba)
13363.6	241619	CW/West German Press Agency with press items in German
13403	141440	RTTY/Musical sounding tones; Picollo?
13528	252121	CW/5L grps, 4spec charac AA IM OE OT
13932.9	142208	RTTY 50-425/News items in Spanish for Cuban Embassies from MFA Havana
14354	121715	RTTY 50-425/Coded WX
14361	141413	CW/Automatic sent, Polish texts
14394.9	201423	USB/Two OM conversing in what is blvd be Arabic. One stn strong, other very weak. Strong stn sending msg with each phrase repeated twice.
14415	141418	RTTY 50-425/Press items in English from KUNA (Kuwait News Agency)
14420	141411	RTTY 50-425/Arabic text
14466	152139	LSB/TANGO...DE UNO SEIS/Uniden
14495	121718	RTTY 50-425/Coded WX
14555	141408	CW/? DE RIW (Khiva Naval Rdo, Uzbek, SSR) Hand sent 5F grps, zero cut as T
14680	141404	CW/Automatic sent, 5F grps, all figs sent full, signal has echo, fading
14826.8	261702	CW/No calls/Interpol Traffic in French, Originator IP Dakar
14899.3	152155	RTTY 50-425/Press items in English from Prensa Latina (Cuban News Agency)
16338	071450	CW-RTTY 100-45/DE KNY25 (Rumanian Emb. Washington DC), sent encrypted xmsn

LISTENERS LOG

CENTRAL CALIFORNIA MONITORING

contributed by
LaVern Visser, Stockton, CA

4444 kHz 131852Z CW

Instead of the normal ten groups per line, this station was sending eight five-letter groups per line, pausing briefly, then continuing with another line of eight groups. The other end was not heard and the message ended with BT AR K K.

A moment later it sounded as though a transmitter was being tuned and then some kind of a high speed transmission. This signal was much weaker than the CW signal. Nothing more was heard so coverage was dropped.

6757.7 252225Z CW

From the place names appearing in the message headings and in the plaintext French language messages, this activity was Guinea (Conakry) governmental. Organizational units noted were Ministre Defense Nationale, Gendarmere, Prefet, and Service de Police. Possible abbreviated callsigns 04 and G6 were noted.

7754.6 271458Z RTTY 50-850

This station ran a "Quick Brown Fox" test tape for a long time but did not include any station identification that showed it was the ITT New York to Havana link.

13415.2 261529Z CW

This plaintext French message seemed to indicate it was military traffic based on the signature line of Commander Medical Service Regt.

13497 121444Z CW

More 5F traffic was sent with digits 3 4 5 6 7 sent full and 1 2 8 9 0 cut as A U D N T. The operator did not always pause after each group so sections of the message were sent in one continuous string of characters.

13714.6 161321Z USB

A possible Colombian Air Force activity with the units being alerted to a request from the Peruvian Air Force for traces on a missing aircraft, Fuerza Aerea Peruana 371. The missing plane was going from Tulua to Baranquilla.

13761 kHz15225Z CW

Spanish plaintext traffic indicated this was probably a Colombian governmental network. There were Colombian placenames mentioned in the texts and there were government titles appearing in the message headings and on the signature lines.

14362 171439Z CW

The signal sounded like a typical time signal with CW dashes at one second intervals, but there were no announcements or identification sent and I could not find this frequency listed in my *Time Signal Stations* reference book.

460.250 Stockton PD Ch.1
460.075 Stockton PD Ch.2
460.400 Stockton PD Ch.3
460.200 Stockton PD Ch.4
464.975//151.745 U.O.P. Police
460.1625 S.J. Delta Coll.PD
460.2875 S.J. Delta Coll.PD
460.125 S.J. Co. Sheriff Ch.1
460.350 " " " , Records
460.225 " " " , Garage
460.475 " " " , Detectives
453.325 Detention Courthouse Sec.
453.600 Honor Farm Security
453.375 Sheriff West Utility
453.650 Sheriff East Utility
42.560 CHP Stockton
42.460 CHP Stockton
42.340 CHP Stockton
42.520 CHP Tracy
460.300 Lodi PD
154.785 Lodi PD
154.755//460.475 Manteca PD
159.150//153.950 Manteca PD
154.830 Port of Stockton PD
42.340 CHP statewide Blue
39.900 CHP Interoffice
154.750 S.J. Co.
154.755 S.J. Co.
155.505//154.695 State Police
464.925 Cecilis Security
464.925 S.U.S.D. Plice
155.370//460.475 Tracy PD
39.140//39.180 DUI Tracy
155.445 State Police Tracy
460.025//460.450 State Police Stockton
460.325 Sacramento PD
460.425 Sacramento PD
460.500 Sacramento PD
453.575 Sacramento PD
453.575 Vacaville PD
460.375 Modesto PD
460.625//460.600 Stockton FD Ch.1
460.575 Stockton FD Ch.2
460.525 Stockton FD
154.070 San Joaquin Co. FD
154.130 San Joaquin Co. FD
154.135 San Joaquin Co. FD
154.280 Calif. White Ch. FD
33.660//33.980 Calif. State FD
154.190//154.280 Galt FD

14382-14392 121700Z MCW

The main signal was a constant MCW tone with another carrier superimposed on the first which changed slightly in intensity and tone. It also appeared that there was a third carrier being switched on and off at irregular intervals.

14458 kHz141425Z RTTY 50-425

The heading was rather simple consisting of a message number, address indicator ALG (Algiers??) and a date/time group, then into 5L groups. Upon completion of the message, "Page 2" of some German plaintext was sent, so it would seem that the plaintext message had been interrupted for the transmission of the cipher message.

16498 252121Z CW

A practice network was in operation with English language plaintext messages being handled. A typical heading was: -R- JAN 87 FM D8N TO 9FJ GR17 BT. Some of the operators must have been beginners because the fists were somewhat sloppy and numerous errors were made in sending the Morse characters.

(Please turn to p.29)

154.010 Lodi FD
153.950 Manteca FD
154.310 Tracy FD
453.800 Yolo Co. FD
154.130 Clements, Farmington, Forest Lake-Acampo, French Camp, Liberty-Acampo, Linden Peters, Mokelumne, Victor, Thorton, Tracy-Banta
154.900 Woodbridge
154.800 Woodbridge
453.150 Stockton Paramedics
155.400 S.J.Co. Paramedics
155.340 S.J.Co. Med Net
155.025 S.J.Co. Hospital
155.205 Lodi Ambulance
155.280 Lodi Hospital
463.1750 Lodi Memorial Hospital
155.160 Stockton Ambulance
155.280 Stockton A-1 Ambul.
155.220//453.075 St. Joseph's Hospital
463.175 Dameron Hospital
155.160 Delta Ambulance
155.220 American Allicity Ambulance
462.950//462.975 Alpine, S.J.Co. EMS
467.950//467.975 Alpine, " " "
462.950//462.975 Alpine, S.J.Co. EMS
467.950//467.975 Alpine, " " "
463.175 Alpine, " " "
463.1750 Tracy Community Hospital
463.000 Med 1
463.025 Med 2
463.075 Med 4
463.100 Med 5
463.125 Med 6
463.150 Med 7
463.175 Med 8
462.950 Med 9 Dispatch 1
462.975 Med 10 Dispatch 2
453.125 Doctors Med. Cneter Modestor
453.025 Kaiser
148.150//149.925 Found.Hosp.Sacramento
460.850 149.925 Civil Air Patrol
125.100 Golden Pacific Airlines Stockton
120.300 Stockton Airport
121.900 Stockton Tower
161.730 Stockton Airport
170.150 KGNR Airwatch
450.450//455.950 KOUR Ch.13
44.150 KCRA Ch.3
173.225 Stockton Record
173.375 Stockton Record
173.275 Stockton Record
162.000 Stockton Marine Phone
158.745 Port of Stockton
452.575 Cal.State Auto Assoc.
160.950//161.550 S.P.R.R. Stockton
161.400 S.P.R.R. Sepcial Agent
160.650 Stockton ATSF RR
160.260//160.360 W.P.R.R.
160.920 W.P.R.R. Road Channel
160.515 Tide Water Southern R.R.
463.225 Stockton Bus
453.225//452.800 Stockton Transit Dist.
464.650 Stockton Mobile Operator Bus
157.530//152.270 Service Cab Taxi
152.389 Yellow Cab Taxi
159.240//159.300 State Parks, Stockton
159.330//159.345 " " "
159.450//159.465 " " "
458.875 San Joaquin Co. Local Gov
155.025//453.325 " " " Local Gov
453.375//453.650 " " " Local Gov
153.920 Stockton, Local Gov't
153.845 Galt, Local Gov't
158.835//458.875 Manteca Local Gov
155.895//458.875 Tracy Local Gov
153.755//154.980 Stockton Local Gov
154.965 Stockton Local Gov
151.985 Pacific Bell-Utilities
151.980 Pacific Bell-Utilities
451.350 Pacific Bell-Utilities
156.800 Marine-Emergency Ch.16
156.850 Marine-State Ch.17
156.900 Marine-Commercial Ch.18
153.920 C.O.S. Water, Sewers
453.700 C.O.S. Electrical Streets Admin
151.855 C.O.S. Chamber of Commerce
154.830 Port of Stockton PD
158.745 Port of Stockton Ops
155.865 Port of Stockton Warehousing
456.250 Stockton E. Water District
451.250 Stockton E. Water District
48.100 Stockton E. Water District

47.780//48.440 S. San Joaquin Irrig. Dist.
47.840 West Side Irrigation Dist.
861.00-865.0625 Woodbridge Irrig. Dist.
154.0250 S.J.Mosquit ABMT Dist. Lodi and Stockton
155.025 Stockton Local Gov't
159.150 Escalon-PD
154.300 Escalon-FD
158.760 Escalon-Public Works
155.925 Escalon-Public Works
155.715 Escalon-Dial A Ride
46.000 Escalon Schools
460.650 Lodi-Park & Rec Mobiles
154.040 Lodi Public Works
451.050 Lodi Power
155.265 Lodi Schools
158.835 Manteca-Public Works
155.295 Manteca-Schools
155.370 Ripon-PD Ch. 1 Primary
154.755 Ripon-PD Ch.2
154.130 Ripon-FD
155.895 Tracy-Dial A Ride
155.220 Tracy-Trauma One
48.340 Banta Carbona Irrig. Dist.
155.175 Lincoln School Dist. Stockton
48.060 Naglee Burk Irrig. Dist.
155.205 New Jerusalem School-Tracy
158.745 Port of Stockton Ops
155.865 " " " Warehousing
151.895 S.J. Delta Coll. Maintenance
154.025 San Joaquin MAD
451.250 Stockton W. Water Dist.
48.100 Stockton E. Water Dist.
48.440 S. San Joaquin Irrig. Dist.
151.745 Univ. of Pacific
47.840 West Side Irrig. Dist.
129.2 American Airlines
129.3 United Airlines
129.5 United Airlines
129.55//131.45 Delta Airlines
130.1 Western Airlines
130.9 Continental Airlines
131.75 Eastern Airlines
161.370 Atchison, Topeka & Sant Fe R.R. Stockton
161.325 Modesto & Empire Traction R.R. Ch.1
160.965 M&ET R.R. Ch.2
161.175 M&ET R.R. Ch.3
161.505 M&ET R.R. Ch.4 Maintenance
160.260 S.Pac.R.R. Yard
160.290 " Yard
160.320 " Road-Calif.(R)
160.350 " Road-S. Calif(R)
160.380 " Yard
160.410 " Yard
160.470 " Yard
160.485 " Road-Calif(R)
160.530 " Container Terminal
160.740 " Yard
160.845 " Yard
160.890 " PBX Ch.2
160.950 " PBX Ch.3
160.980 " Yard-Roseville
161.100 " Yard
161.205 " Police Mutual Aid
161.310 " Yard
161.400 " Maintenance/Police
161.430 " Yard
161.550 " Road Ch.1
160.455 Stockton Terminal & Easter R.R. Ch.1
161.205 " Ch.2
160.515 Union Pacific R.R. Road Ch.2
160.605 " Maintenance
160.680 " Yard Ch.4
160.710 " Yard
160.740 " Road Ch.1
160.830 " Yard
160.980 " Yard
161.025 " Maintenance
161.310//161.340 " Carmen
160.230 "
160.350 "
160.560 "
160.800 "
160.860 "
160.230 Western Pacific R.R. Yard
160.260 " Train Dispatcher Ch.1
160.380 " Road Ch.2
160.530 " Yard
160.620 " Special Agents
160.770 " Yard
160.830 " Yard
161.115 " Yard

TIROS -

The coming of a new dawn in weather reporting

As early as 1952 scientists were experimenting with captured World War II German V-2 rockets, using them to provide images of the earth's surface from rocket-borne cameras to heights of up to 100 miles. It soon became apparent from images taken from these space camera platforms that the world and its atmosphere were much different from what was earlier believed and that there was much to be learned from the great wealth of information that could presently be made available if one had a permanent platform in space.

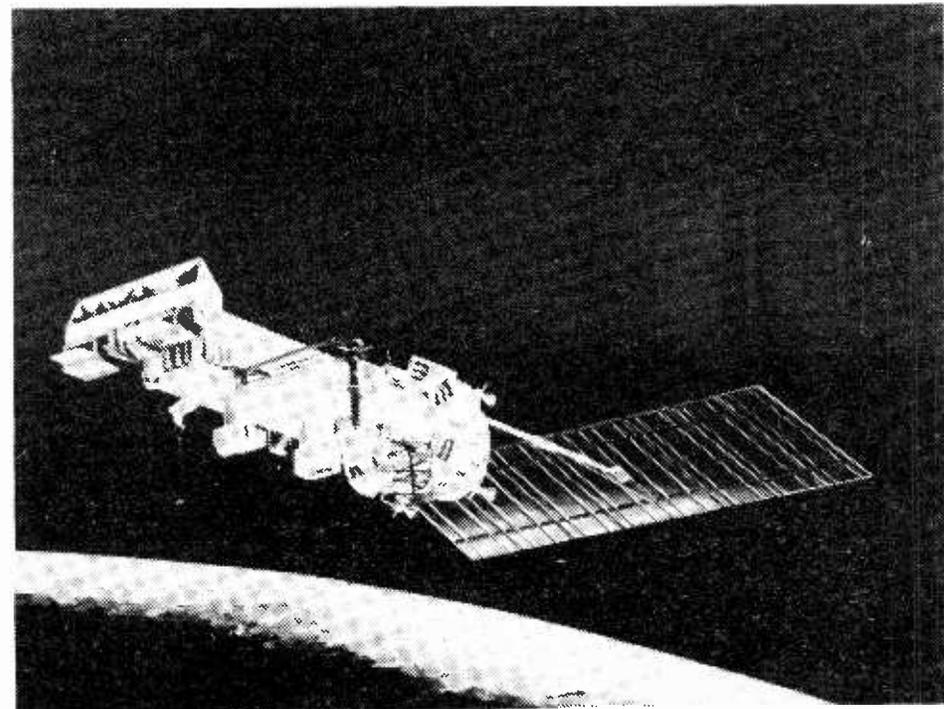
Scarcely eight years later, in 1960, the United States launched the TOS (Television Observation Satellite) satellite "BETA2." Now long extinct, in its short span of 78 days it provided some 23,000 satellite pictures, 50% of which were usable meteorological data.

APT

This success paved the road for feverish research and, in less than a year, an enthusiastic U.S. Navy announced the prototype of an airborne camera and transmitter that could broadcast directly to ground stations. This "Automated Picture Taking" (APT) system continues to be an important part of the satellite program.

TIROS

TIROS I and II (TIROS stands for Television and Infra-Red Observation Satellite) carried dual cameras, both wide and narrow view; TIROS III, on the other hand, carried wide and medium angle cameras. TIROS I-VIII-X used vidicon tubes (similar to a TV camera) which converted light patterns into electronic signals, stored them on tape and transmitted



Tiros-N

them to earth.

TIROS VIII carried the APT mode which rendered products of local cloud cover and could be received and reproduced on relatively inexpensive ground station equipment. This was the predecessor to the modern weather satellite.

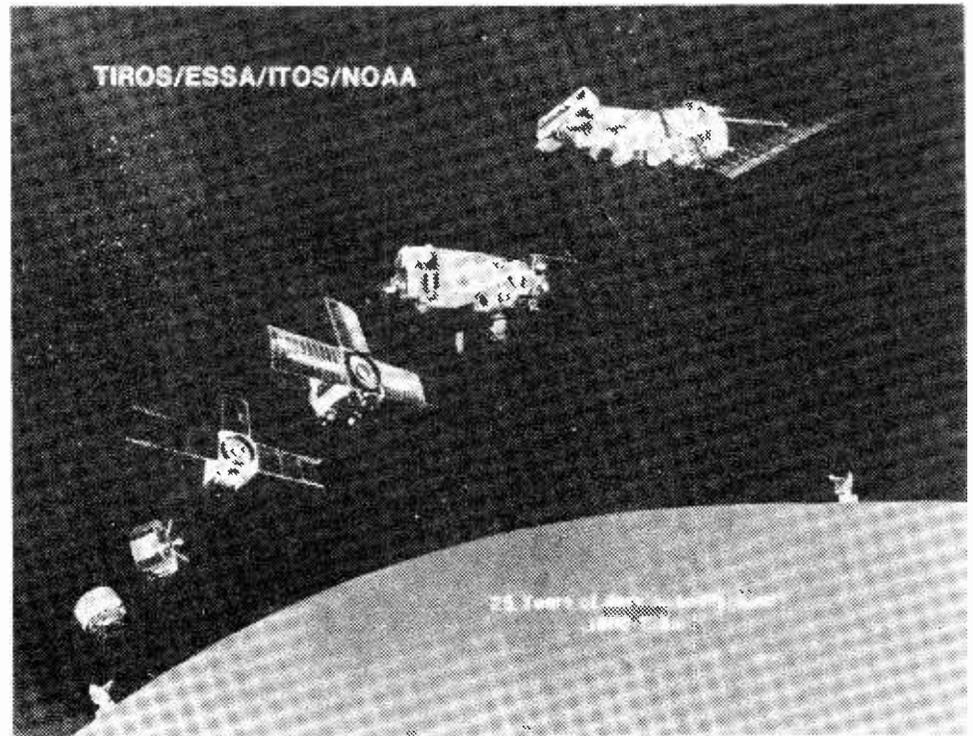
Due to early construction aberrations, the early TIROS systems could only face the earth 20% of the time. TIROS IX employed a change in orbit and utilized two cameras 180 degrees apart and each camera would only operate when facing the earth. In addition, the satellite was sun-synchronous, providing full coverage of the earth during daylight hours.

During approximately the same evolutionary period of development as TIROS was a system known as "Nimbus." Nimbus I was launched on August 28, 1964, followed by Nimbus II (1966), Nimbus III (1969), and Nimbus IV (1972).

The Nimbus "birds" were shaped somewhat like a winged chess piece: two "solar" wings protruded from a pointed top with a round bottom holding imagery and telemetry devices. They were "test beds" for new equipment now taken for granted on the TIROS-N and GOES satellites.

These large "polar orbiters" carried and flight tested APT, advanced vidicon cameras, radiometers, and other data relay devices in use today.

In April of 1969, signals were received from a new instrument aboard the Nimbus III spacecraft--SIRAS "A" (and in 1979 SIRAS "B"), the forerunners of today's water vapor and infrared detectors.



TIROS-N: The Polar Orbiter

The early orbiters, TIROS I through X, remained experimental. Other operational satellites in the winter of 1966, ESSA 1-9, "rolled" along their orbits true to their wheel design. They were truly low cost, effective, weather meteorological satellites which provided worldwide photographic coverage of the globe and its atmosphere.

The improved TIROS Operational Satellite (ITOS) system was launched in the winter of 1970, a successful venture which lasted through 1976.

The career of TIROS-N began at the Western Test Range in Lompoc, California; the year was 1978--18 years after the launching of the first meteorological satellite from Cape Kennedy, Florida, in April of 1960.

TIROS-N represents a radical departure from its predecessors; it is about 12 feet long and the main body is in the shape of a five-sided, four-foot-diameter box. The fifth side is wider than the rest and accommodates the earth-facing communication antennas and the earth viewing sensors.

Also on board are stabilization rockets and the injection motor. Two wing-like appendages are the solar sails, banks of solar cells that are motor-driven by on-board sensors to that they always face the sun.

At the opposite end from the solar wings resides the instrument mounting platform which consists of the attitude control sensors and critical control items such as scanners which operate the imagery acquisition devices. With the exception of the data acquisition systems which monitor space events, all imagery instruments face the earth while in mission mode.

Data/Imagery Systems

The heart of the data acquisition system is the advanced, very high resolution radiometer (a space camera) which provides both real time images and taping for later release both automatic picture transmission and high resolution pictures of earth. This instrument is used in cloud mapping, day and night, sea surface temperature mapping and hydrological event chronicling.

The advanced very high resolution radiometer (AVHRR) releases data in four modes:

- A) Automatic Picture Transmission which produces direct picture readout to properly equipped ground stations world-wide. The resolution (picture clarity) is about 4 kilometers. This product is delivered simultaneously in both visible and infrared modes.
- B) High Resolution Picture Transmission (resolution of 1.1 kilometers).
- C) Global area coverage, an intense 4 kilometer resolution, full range instrument scan of the entire globe for digestion by special computer processing at the Suitland, Maryland, NOAA facility.
- D) Local area coverage which is the onboard recovery of recorded data from selected portions of each orbit at a resolution of 1.1 kilometers. Due to the intense nature of the scan which uses all instrumentation, the data are channeled only to Suitland, Maryland.

The first two channels of the AVHRR are used to image clouds and land formations: land/water boundaries and snow and ice extent; when the two are combined it is possible to gain an indication of ice snow melt inception. Channels three and four can be used to determine

RTTY LOGGINGS

444.0 N-- 7/170r 1010
 47.15 WLO Mobile ARQ AP Stock Market Reports 0935
 2280.9 LRO? B.A. 50/850 N.A. Nx SS //LRO23 (3840.4 kHz) 0030
 3840.3 LRO23 B.A. 50/850r N.A. Nx SS // LRO? (2280.9) 0045
 4549.8 LRO9 B.A. 75/850r DYN Nx SS 0050
 5187.2 ETD3 Addis Ababa 50/85r ry 2200. New Channel.
 5528.5 SBFA Santiago, Chile T170B (Circuit Indicator SRA) msg SS to other Chilean stns on this "Todos Bucaneros" net 0020. Other freqs in this net include 5433.5 6529.5 8984 10296 12419.5 13588.5 15473.4

6865.3 GYU Gibraltar 50/850r ryr & fox for MUL, requesting shift from 14 to 8. 2300

7871.6 GPR27? London? T415 idle 1300. Signoff at 1415. On again before 2020 then QRMed at time by CLP-1 Havana. At 2200 CLP-1 started rty on 7873.0

7873.0 CLP-1 Havana 50/500n Long Nx report SS to CLP5 (Algiers) 2203
 7868.2 ? T380B encryption 2230, still on 1122. T380A 1300. Both off 1315

8014.2-16.5 VER Ottawa VFCT (Voice Freq Carrier Telegraph) All channels 75/170, all carrying "fox" with tape reversed. 2121

8130.6 DFH23L3 Cologne 50/425n Telex msgs to Deutsche-Welle relay station, Malta // DFK25L1 on 10127.4 kHz. Better copy here on 8130.6 at 1125! Msgs mostly in GG, some EE. Sign-off at 1128 with "God Save the Queen, Bye Bye." Quite obvious that the rty operators were English.

8526.5 CTW8 Lisbon 50/170r Wx in EE 2015 then switched to PP.
 8608.5 Y5M Ruegen 50/170r Nx GG to ships, off at 0220 GMT.
 8706.0 SPA Gydnia FEC and signing in CW. Use to sign "SPC." 0100
 8708.0 UFN Novorossiysk FEC 2100. First time logged on this freq.
 8707.5 VIP33 Perth FEC TLX to ship 2055.
 8711.5 VIS68 Sydney FEC TLX to ship - usually ARQ for that.
 8716.4 VCS Halifax ARQ msg EE to 3FRE2 1215; sometimes 75/850n at 0300. ARQ mode new on this channel. Registered for 8715.5 kHz; we'll overlook the deviation.

8852.2 CA17E? Easter Is? T450, both A&B channels idle at 1230. We'll keep after positive identification.

These RTTY entries were logged in January by Fred Hetherington of Ormond Beach, Florida. Frequencies are for HiTone reception.

9044.2 GHH St. Helena Is. 50/425n meteo wx msgs, WMO format, to Kano, Nigeria 0245

9077.6 FKO? Djibouti? T425A 2340

9092.6 MKD Cyprus 50/170n fox 0140 (one chan. of multi-channel system)

9093.4 GXQ London 50/170r ryi,fox,count,test 0130. One channel of VFCT system

9097.6 CUA44 Lisbon T380A XQ msg from Lisbon giving time of day 1000. First time logged here on rty, this freq. "VAXQ" might indicate a svc msg to Vatican.

9114.1 HGG31 Budapest 50/425n MTI Nx in EE comes to an end at 1124 Budapest time, saying the dawn temperature there was 18 degrees below centigrade zero. Thought you'd like to know.

9190.4 RDZ75 Moscow 50/1050r Meteo msgs, WMO format, 0130
 9203.5 CBMFD Chile T140A (Circuit Indicator EMD). Msg SS from CBMFD to CBDFA at 2300 Chile Summer Time, 0200 UTC, then msg to CBDFE. This station is part of a large Chilean military net. Try 5433.5 5528.5 6529.5 8984 9203.5 10296 12053.1 12419.5 13588.5 13918.5 14886.5 15473.4. What other freqs do you have?

9216.2 5UA Niamey T50/720 Both channels idle for hours, 1800. Shifts to Baudot meteo msgs sometime before 0100.

9223.5 TJK51 Douala 50/425n Off-freq a bit and QRming VER Ottawa VFCT channels. Usually TJK51 is found on 9226.1 kHz.

9230.5 9KT27 Kuwait 50/400n KUNA (TNB) Nx AA at 1900. Very nice signal (often 9231)

9236.5 AJE Wolvey, England One channel of VFCT system, 50/85 r A.P. Nx EE for several hours, still on at 1855

9237.2 AJE Wolvey VFCT channel 76/85r meteo wx msgs from EGWR Croughton meteo 1820

9238.4 AJE Wolvey 50/85r U.P.I. Nx EE at 1810. You will note that A.P. Nx (for AFRTS) is carried on a separate channel (9236.5)

9243.3 MSS Belize 75/350n fox, count for Forest Moor 1130 (Usually TDM2, both channels encrypted)

9252.4 ? T85, both A&B channels idle 0200-0330. Probably Papeete to Atuona

9282.3 ? Peru 50/345r Commercial msg SS 2240. The transmitter is off when not sending. Sort of break-in style.

9285.1 TNL24 Brazzaville T425A (Circuit Indicator FGA) Wx msg from FCCC Brazzaville to Libreville, Gabon 0153

9290.3 RTQ78 Sverdlovsk 50/1000r meteo to 1300. Then still on the air but silent

9315.1 RCT-54 Nicolaev 50/425r TASS Nx EE 1515. The same program in EE was also on RDZ-77, 9910 kHz and on RDZ-71 10258. Program ended at 1545. RDZ-77 on 9110 practically impossible to copy here because of strong USCG station (NMN?) on same channel. On another day RCT-54, 9315.1, TASS Nx EE in progress at 2110 and // RKA-25. Carried the Gorbachyov address to the Russian people on the State of the Union - hard work ahead in 1987. First time here for RCT-54.

9317.7 DHJ51 Gregel 50/500n ry then meteo wx msgs 1215 -
 9318.1 DHJ51 Gregel 50/425n meteo wx from EDZG Meteo Center, Oldenberg. Off 1900

9328-31 NMN? Portsmouth? VFCT System. Channel at 9328.5 50/85r A.P. Nx EE 1700. At 9329.2 75/85r wx rpts in abbreviated EE 1704. Channel at 9330.3 50/85r U.P.I. Nx EE 1706. All material for AFRTS subscribers.

9330.2 USZ Dikson 50/540r SAM (Soviet Arctic Meteo) wx msgs then ry to ULV Moscow (he was on 10340 kHz) at 1350. Then RR conversation in standard Cyrillic. Was mentioned that ULV was also supposed to be received on 340 kHz long wave. I tried to no avail.

9347.7 STK Khartoum 50/400r meteo (SKA) wx msgs Sudan to Kenya 0115

9353.1 OLX5 Prague 50/425n CETEKA ry prior to news bulletin 1919
 9395.0 HMF35/HMF8 Pyongyang 50/260r KCNA Nx EE starts 1500 after ry QRA de HMF35/HMF8 Pyongyang. This freq was // 13780.0 with poor copy here on both channels.

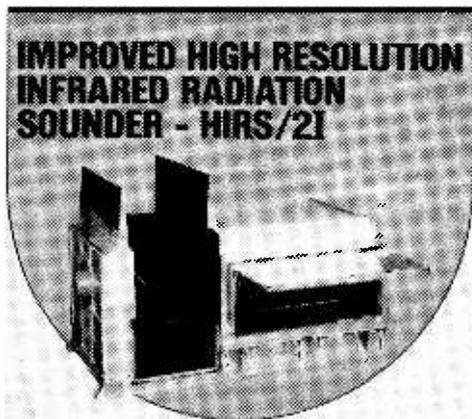
9423.8 to 25.9 Here we find a VFCT system, all channels busy with tfc and all with privacy, 75/170. There are 8 or 9 VFCT systems registered with ITU for use of this frequency range. 0230

9430.1 ZAT Tirana 50/535n ATA Nx EE 1520 (Coming thru better on 18860.35 - the 2nd harmonic) but quite readable on the fundamental.

9814.0 VZLH Here's a goodie: Lord Howe Island T86/850. My black box says "57 bauds" but the garbage looks and sounds like TDM so we try. Get a sync lock at 86 bauds. Both channels A and B idle - then at 0956 chan.A comes to life. It is VZLH Lord Howe Island, T86/850A meteo wx msg from Meteo Station ASLHYM, Circuit Indicator LSB indicating that the message routing is Lord Howe to Sydney, Australia on the B channel. Did not locate Sydney's transmitting frequency. Will work on that.

9827.85 SPK/10 Pnom Penh 50/470r ry, "QRA de SPK/10-9.830 kHz ZHC?" 1215. BUA on 5800 kHz was mentioned but it wasn't clear to me whether he was ry for benefit of reception at BUA (a XINHUA feeder Station). Then SPK Nx FF. Still on at 1300. As noted above he said 9.830 kHz, but he undoubtedly meant 9.830 MHz or 9830 kHz.

9838.0 ? 52/850n fox 1500, poor copy - pulses seem clipped too short. 52 bauds made the foxread better than 50 bauds.



sea surface temperature. Data from channel four alone can be used as an infrared "window" to measure day and night cloud distribution as well as measure the temperature of the surface.

made in the 5.5 millimeter oxygen band.

In addition to the AVHRR, TIROS-N incorporates an operational sounder (TOVS or vertical sounder). There are three instruments that comprise this unit:

Also on board TIROS-N is the DCS (Data Collection and Location System). Worldwide data within range of the polar orbiter are processed from floating weather ships, automatic weather buoys and remote land sites and are retransmitted in the HRPT and beacon modes of transmission.

- 1) The HIRS II (High Resolution Infrared Sounder) allows calculating of the temperature profile of the atmosphere from sea level to 10 millibars; water vapor current in the three layers of atmosphere; and the total ozone count. This instrument was first employed on the Nimbus spacecraft.
- 2) The SSU (Stratospheric Sounding Unit) obtains data from which one can deduce stratospheric temperatures from 25 to 50 kilometers.
- 3) The MSU (Microwave Sounding Unit) analyzes cloud structure and water droplet measurements

TIROS-N also contains an instrument called a space environment monitor (SEM) which measures sources of radiation and other particles in space.

In conclusion, we see TIROS as a very complex weather satellite which evolved over more than 20 years. It keeps the private individual in mind and anyone with as little as \$200 may receive this image. The exact methods will be dealt with later. ■

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

(Please turn to page 40)

Flight Deck Navigational Instruments

In Part One of "NAVAIDS," we discussed ground-based nav aids and how they are used. This month, we will look at various navigational instruments found on an aircraft flight deck and how they correspond with and utilize the nav aids on the ground.**

Airborne VOR Instruments

Typical VOR (VHF Omni Range) navigation equipment includes:

Receiver Control Panel	Indicator Unit (VOR Course Indicator)
Radio Magnetic Indicator (RMI)	Range Indicator

The Receiver Control Panel normally incorporates a two-way radio communications feature as well as the VHF navigation receiver. Large commercial aircraft have four communication units and two navigation sets; the wide-body "heavies" have back-up units for their back-up equipment!

Generally, the top side of the receiver control panel is used for communications, and the lower side is used to select the VOR frequency. There is also an "ident" feature included which it used to aurally check the VOR identification.

The Indicator Unit, or course indicator, must have these features: a course selector; a course selector indicator (usually a course selector window); ambiguity meter, also known as a TO-FROM indicator; warning flag (two flags are required for an ILS Glide Slope Indicator); and course deviation indicator (while these are not required to navigate on VOR airways, all commercial and private aircraft must have this component if they utilize airports with ILS--instrument landing system).

When a pilot selects the VOR frequency, he positively identifies the VOR by listening to its ID (Remember? Three letters in Morse Code and/or voice). Next, he sets his course TO or FROM the station in the instrument. Once the course is selected, the ambiguity meter will show whether the selected course will take him to or from the station.

If the signal is too weak for accurate navigation, if it fails or if the aircraft is 90 degrees either side of the selected course, no true indication of TO or FROM is possible and the indicator will show blank.

The Course Deviation Indicator shows the pilot whether his aircraft is to the right or left of the

selected course. The center of the instrument represents the aircraft. The course deviation indicator represents the course that has been selected.

If the needle is right of center, the selected course is right of the aircraft; if the CDI shows left of center, the opposite is true. If the CDI is centered, the aircraft is on or is crossing the selected course.

Correcting towards the vertical needle will keep the aircraft on the selected course, automatically compensating for the wind, as long as the aircraft's heading is generally within 90 degrees of the selected course.

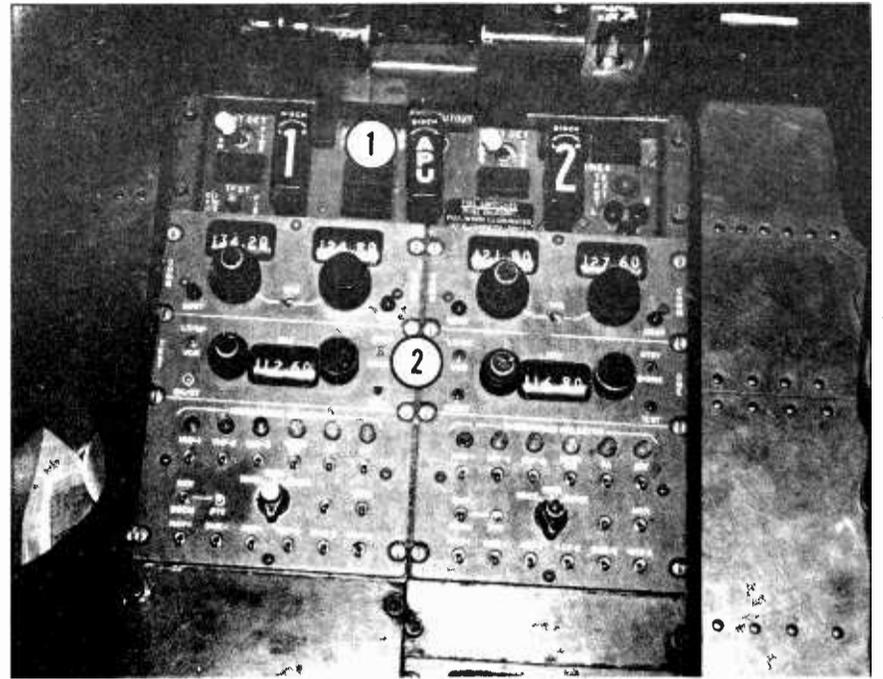
The Radio Magnetic Indicator is actually an Automatic Direction Finder (ADF) or a "radio compass." It shows the magnetic heading of the aircraft at the top of the 360° indicator at all times. The needle will point to the magnetic bearing of the station from the aircraft.

A Range Indicator (distance indicator) is required on aircraft which have DME installed. This instrument indicates slant range distance from the aircraft to the DME equipped NAV AID in nautical miles.

ADF, or Automatic Direction Finder (or Airborne Direction Finder as it is sometimes called) consists of a receiver and a 360° indicator. It can home in on commercial broadcast band stations and all low frequency nondirectional radio beacons. The needle on the 360° indicator will always point to the station which is tuned in on the ADF receiver regardless of the aircraft heading or position.

Airborne Distance Measuring Equipment

Flight deck DME equipment consists of a control unit which has an on/off switch and a channel selector; indicators which provide a continuous display of distance to the pilot (in nautical miles) of the slant



In the above photo, the communications and navigation radio frequency selectors are identified as No.2, just below the fire extinguishing switches and engine fire warning switch (identified as No.1). This is on the rear of the control pedestal on the flight deck of a Boeing 737.

range distance from the airplane to the ground station; an interrogator (transmits radio signals which trigger reply signals from the ground station transponder).

By computing the elapsed time between transmission of the interrogation signals and the receipt of the reply signals, the interrogator determines the distance between the aircraft and the ground station. Some newer models also display ground speed.

The antenna is located on the bottom of the aircraft to avoid adverse affects from the body of the plane getting between the antenna and ground station.

Basic Flight Deck Navigational Instruments

Magnetic compasses: This basic air navigation instrument indicates the direction the aircraft is flying with respect to the magnetic

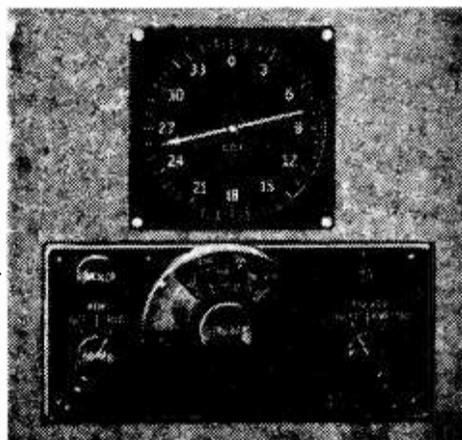
north pole.

Altimeter: This aneroid barometer measures the weight of the column of air above it, indicating the weight in terms of altitude instead of inches of mercury. Altimeter settings are obtained from an air traffic control facility prior to takeoff and is reset periodically during flight to conform to the setting of the nearest weather observation along a route of flight.

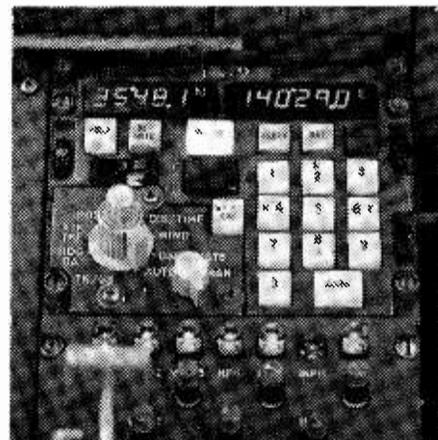
Radio Altimeter: This instrument is also referred to as terrain clearance or absolute altimeter and differs from the aneroid type in that it measures the actual altitude of an aircraft above the terrain.

Instrument Landing System

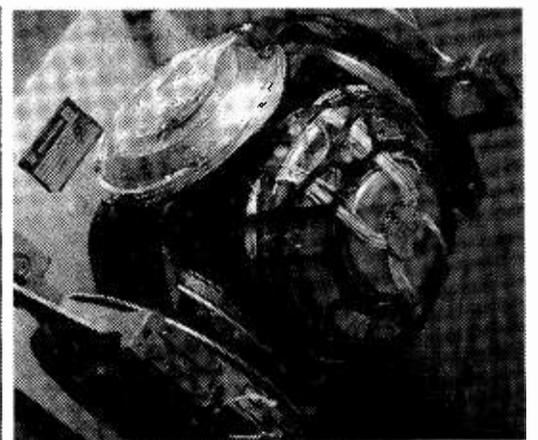
Antenna: The antenna array for ILS airborne installations consists of a dipole antenna mounted on the forward fuselage of the aircraft to serve as the localizer antenna. The



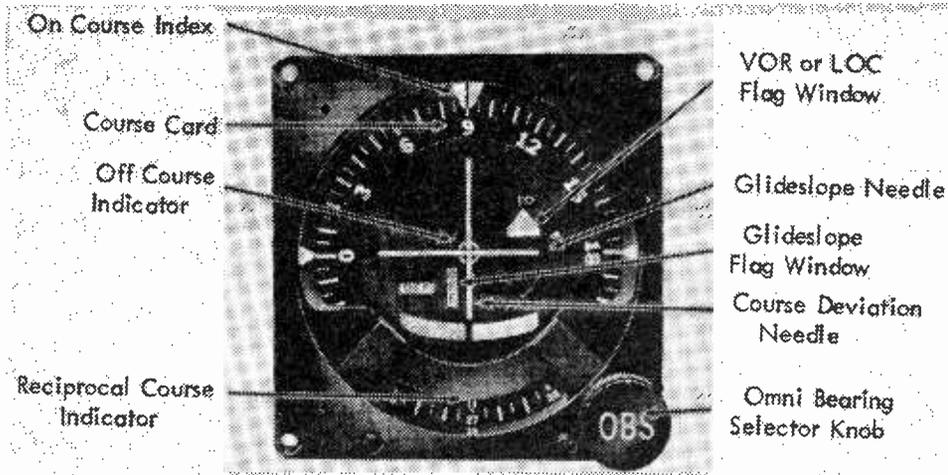
Automatic Direction Finder receiver points to the station tuned in



Left: Control and display panel for INS (Inertial Navigation System). Right: the gyro, the heart of INS. Both photos are from INS installations aboard a 747.



** All photos, material, etc., courtesy of the FAA



Localizer/Glide Slope Indicator

glide slope antenna is a straight dipole antenna mounted either in the same location as the localizer antenna or in the nose of the aircraft.

Localizer / Glide Slope Receivers and Indicators are located on the instrument panel of the flight deck; they incorporate an on/off switch, volume control and channel selector.

The vertical needle, called the Course Deviation Needle, shows the position of the localizer course with respect to the aircraft's position which is represented by a circle (or a small aircraft symbol in the center of the instrument face).

The horizontal needle indicates the relative position of the instrument face and the relative position of the glide slope. If insufficient signal for accurate readings is received or if either transmitter fails, red flags appear near the affected needles.

The sensitivity of this equipment is such that when the aircraft is approximately two and one-half degrees to the right or left of the centerline of the runway, the vertical needle will indicate a full-scale deflection.

This sensitivity permits the use of the indicator for highly accurate course guidance; if the needle is no further off center than one-quarter scale, the aircraft will likely be able to complete the approach with no problems.

The glide slope needle has equally high sensitivity and if the aircraft is as much as one-half degree above or below the glide slope, the horizontal needle will register a full-scale deflection.

Marker Beacon Receivers: A three-light indicator mounted on the instrument panel is controlled by the modulated frequency of the particular signal being received: The outer marker is modulated at 400 Hz and activates the purple light; the middle marker is modulated at 1,300 Hz and activates the amber light; and the white light is activated by an inner marker if the facility is so equipped. These lights along with aural signals transmitted by the markers give

pilots a double-check on distance as they pass over the markers.

ILS Ground Monitoring System

The high performance level and dependability demanded of all NAVAIDS require a reliable monitor system(s) to notify specialists of any malfunction. A panel for this purpose is installed in the tower cab to alert specialists by an aural alarm and/or light to show which component has failed. Localizer and glide slope are equipped with standby transmitters which automatically switch into operation when the regular transmitters fail.

State of the Art Navigation

Conceived some forty years ago, very high frequency omni range is the principal means of navigation worldwide. VOR provides guidance in azimuth and distance measuring equipment (DME) provides an aircraft's position in range. A third subsystem, Area Navigation (RNAV), is described next.

RNAV allows a pilot to fly a course to a predetermined point without overflying intermediate navigation aids and to set up his own navigation aids. The only real requirement is that a so-called "waypoint" (also called a "phantom station") is within transmission range/distance of the parent VOR/DME. A series of waypoints make up an area navigation route.

Approximately 50% of commercial aircraft in use today are equipped with RNAV. Surprisingly, more than 40% of biz jets (corporate aircraft) are similarly equipped. The major types of RNAV equipment in use today are:

VORTAC referenced or Course Line Computer (CLC) systems which account for about 50% of RNAV units in use. To function, the CLC must be in service range of a VORTAC.

OMEGA/VLF, although two separate systems, can be considered as one operationally. A long-range

navigation system based on very low frequency radio signals transmitted from a total of 17 stations worldwide.

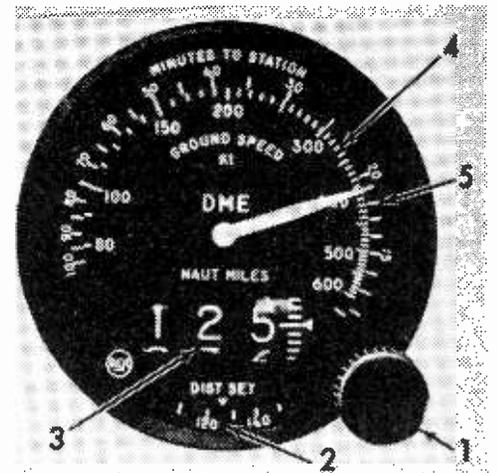
Inertial Guidance Systems (INS): Totally self-contained and requiring no information from external references, these provide aircraft position and navigation information in response to signals resulting from inertial effects on components within the system.

LORAN-C is a long-range radio navigation system that uses ground waves transmitted at low frequency to provide user position information at ranges of up to 600 to 1,200 nautical miles.

That's all for this month. Next month we will feature VOLMET stations (transmit-only aviation weather-reporting HF stations), their various worldwide locations and frequencies.

Until then, 73s and out. ■

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



Airborne DME Distance-Groundspeed indicator display to read out the amount of flying time in minutes to or from the VORTAC station, the knob (1) is rotated until value in the window (2) matches DME distance indication (3). At this point, groundspeed needle automatically points out groundspeed on inner dial (4), and also points out minutes-to-station on outer dial. Therefore, in this example, traveling at a speed of 400 knots, 125 nautical miles from the station, it will take 19 minutes to fly to the station.

SPECTRA-DISPLAY

NEW

At last an affordable "Panadapter" for the R-7000 receiver & no modifications. Use with a simple scope & see a new and exciting field of SWling. Discover elusive stations by displaying a full 200 KHz to 10 Mhz "Spectrum" of hidden signals you couldn't "See" before. Zero in on those quick "on-off" signals you never knew existed. Here are some actual displays —

Center Freq 100 Mhz	Center Freq 155 Mhz	Center Freq 152.5 Mhz
1. 10 Mhz Wide	2. 10 Mhz Wide	3. 1 Mhz Wide

Photo #2 shows a group of frequencies between 152 & 153 Mhz and photo #3 shows the expanded view of this same group!

Here are some exciting features of the "SPECTRA-DISPLAY"

- ± 1 Db flatness
- 1 Mhz Cal Markers
- G-10 double sided
- Variable Width/Centr
- Internal Pwr Sply
- All cables included
- Variable Gain
- 10 Mhz in 20 Ms
- 90 Day Warranty

SD10M Introductory price \$349.95 (free UPS) PA res add 6% tax

NEW! 10-1000 Mhz Pre-Amp

Dual GasFets 21 Db gain
 Bnc in/out Low Noise
 Req's 12V (powered by SD10M)

Introductory price \$149.95 (write for specs)

GTI ELECTRONICS
 RD 1 Box 272
 Lehighton, Pa. 18235
 717-386-4032

8842 Spells "Aeroflot"

A recent logsheet from Garie Halstead of St. Albans, West Virginia, was so informative that we thought other HF utilities listeners might wish to share it. Garie decided to monitor 8842 kHz, the primary frequency for Russian Aeroflot flights into Havana, Cuba, for about a week.

and COL in Havana really keep things hopping, according to Garie, and all transmissions are in CW--some quite sloppy, making solid copy quite a challenge!

A copy of Garie's logsheet is printed below, along with some of his comments which will make listening more productive and enjoyable.

Ground stations RFNV in Moscow

Date/Time Intercept	Flight Number	Aircraft Reg. No.	Ground Stn Worked	Position
1/15/87	Aeroflot SU347B	86534	RFNV	Estimating Lima at 1150
1/16/87	Aeroflot 301	86485	COL	Landed Montreal at 2056
1/17/87	Aeroflot 331	86477	COL	Airborne Havana 1401 Estimating Kingston 1506
1/18/87	Aeroflot 347	86512	COL	Airborne Gander 0050 Estimating Havana 0615
1/19/87	Aeroflot 339	86474	RFNV	Over Sable Island 0748 Estimating Managua 1615
1/19/87	Cubana 1496	86522	COL	Airborne Havana 1512 Estimating Sal (Cape Verde) 2240
1/19/87	Aeroflot 333	86478	COL	Over Daner 2248 Estimating Havana 0140
1/20/87	Cubana 492	86523	COL	Over 23N 60W 1800 Est. 23N 40W 2023 Est. Sal 2240
1/20/87	317	86531	COL	Over Hampton 1830 Estimating Dullas (Washington DC) at 1935

Notes Concerning the Net:

- "Q" Signals... "Q" signals are used extensively in the position reports of the aircraft. Some of the more common ones used are as follows...
 QAF I was over _____ at _____
 QTN I departed _____ at time _____
 QAH Used as Flight Level or Altitude
 QTR Time
 QRE Estimated time of arrival
 QAL I am landing at _____
- Relays... Usually if the aircraft is working COL, that position report will be related by ROL to RFNV a minute or two afterwards. The exception is when COL and RFNV have lost radio contact with each other. So if you couldn't copy the aircraft, you still have another shot at his position if you go on to copy COL's relay to Moscow.
- Russian Language Place names are given by the aircraft for their positions reports:
 Limu = Lima
 Sajbl = Sable Island
 Monrealx = Montreal
 Gawana = Havana
 Kubana = Cuba
- On this net, you'll find the word BORT preceding the aircraft registration number such as BORT 86522. Also REJS will precede the flight number such as REJS 331.
- Latitude and Longitude The northern coordinate is usually given first: for example, 21/71 would mean 21 North and 71 West. Sometimes abbreviations are used as 21 Sew and 71 Zap or it may be spelled out as 21 Sewera (North) and 71 Zapada (West).
- Voice Circuits While these aircraft are in the air, you may also hear them on the normal voice circuits usually working New York using the flight numbers. Try 6577, 5616, 5598, 5550, 3016, etc. I hear Czechoslovakian flights into Havana (OK577 and OK576) but I have never heard them on the CW net.

READING RTTY cont'd from page 37

- 9867.1 YIZ74 Baghdad 50/425r INA (TB&) Nx AA 1310. Very good copy. Wish Klingenfuss would expand his identification table of Arabic words so we could read more.
- 9885.3 NAU San Juan 75/850r Navy tfc 1640.
9909.25 ? Checking to see if S7Z Mahe is coming thru we find T425 A&B channels both idle at 1515 and also from 2200 thru 0130 when fading wiped him out.
- 9922.5 4US Nicosia, Cyprus 75/300r msgs EE to Geneva, United Nations 1625. Another day 75/265r ry at 1400.
9924.3 ? ? 75/85r meteo wx msgs 1230. Probably Arlington but we did not have time to verify at that sitting. This channel is one of several in a VFCT system 9923.5 to 9925.6. See next item.
- 9923.6 ? ? 50.95r This channel carries A.P. Metro Washington News Summary for AFRTS 1100. Local news around Arlington, Alexandria, Rockville.
9925.4 ? 50/85r U.P.I. Nx for AFRTS 1120
9944.4 ? ? Testing at 65 bauds! 65/100r ry, no ID 0200. Only rty stn registered for this freq is PVG2.
9960-61 AF? VFCT system with: 9960.2 57/85r tfc with privacy; on 9960.6 we find Carswell AFB, Texas KAWN, 75/95r with temperatures then wx at many US cities. This is from the Air Force Automatic Computer System. On 9960.9 50/85r A.P. News-watch 1330, then U.P.I. World - 4th News Briefs, 1340.
9971.3 ? ? T425 Channels A&B idle 1200. See 9973.7
9972.3 YAK? T425 Channels A&B idle 1055. Off 1300. See 9973.7
9973.7 YAK Kabul T425A (Circuit indicator AFM, with one or two msgs Cct.Ind. of AFM-AFG) Msgs all in EE! 1050. Kabul T425B, at 1110 msg EE to Hamburg, Germany. Which probably accounts for the AFG Cct.Ind. on some msg. Moscow referred to as MSK. Msgs to India had circuit indicator of KB - probably signifying Kabul, Bombay.
- 10065.3 and 10075.3 Both channels carrying 150 baud transmissions, 150/425 at 1040. Seemingly computer to computer.
10127.5 Cologne DFK24L1 "10127.4 DW" // DFH23L2 8130.5 50/425n Telex msgs in GG - some EE, to Deutsche-Welle relay station, Malta 1100. At 1115 GMT reception better on 8130.6 than here! Must have been beamed thru darkness.
10116.5 N? ? 50/850n A.P. & U.P.I. news for AFRTS 1100 to 1230. A real good news program in EE.
10480.9 ? ? T375 A&B idle 1030. Strong here. Off 1300.
10867.2 FKN St. Denis, Reunion Is. T375B (PIA) msg FF to M'Djamena. RFQP says he controls the circuit. Off 0235.
11100.4 CAK Santiago 50/810n (SIA) wx msgs 1320
11494.1 SOL249 Warsaw 50/425r PAP Nx Polish now runs to 1240 signoff.
11676.3 TJK Douala 50/425n ry for Kano, Nigeria 2030
12079.0 9KT292 Kuwait 50/350n KUNA (TNB) Nx AA 1335
12188.8 FZ? St. Denis, Reunion Is. T850B msg FF RFVIP to RFHIA Tontouta, copies to various offices in France 1530
12248.8 50/500n Five digit code msgs, switched to CW at 1355 while other end sent msgs. On every day. Maybe you can ID. 500 cycle shift common for embassy traffic.
12255.8 Embassy of Asian country 50/495n Long msg, a typical line "...deulesou dailo bute geewi 30 nyoni zinageasseumye i gigamei uli..." Msg ends 1312 with QRU KTCU, then to CW while other party sends. You tell me.
12285.8 ? ? T345 idle 1800-2020 then fade out of sync.
13081.0 LGB Rogaland FEC Tune in around 1700. Shortly you copy Norge Radio Presse in EE, then in Norwegian. After 1715 tfc list in EE
13278.7 ARQ at 1430 strong coded msg
13442.2 FKO Djibouti T452A (APA) RFVIDCF de RFQPM, coded msg 1600. Djibouti RFQP controls this channel to Le Port.
13609.8 3VF40 Tunis T.A.P. Nx FF now continues pas 1625.
13681.4 US Navy 75/850r testing a new frequency with pages of ..very quick brown fox jumped... and the nrk... string. 1111.
13745.1 AAA6USA Ft. Sam Houston, Texass 45/170r MARS msgs EE to folks at home 1700
16424.9 CLP1 Havana 50/500n msgs SS and some in code to African Embacubas 1330
18697.7 DFS70-L3 Hamburg 50/425n DPA Nx EE now runs beyond 1555. Correct record.
20.384.7 FKO? Djibouti T415A (QPB) msg to RFFP to say RFQP controls this channel 1626. Chan.B (QPB also) msg RFQVX de RFQP, then RFQP controls 1610

Notice Something Different?

As we continue to add more pages, more advertisers, new columns, new ideas, MT will continue to "try on" some "new looks" to make articles easier to read and more pleasing to the eye. This month we have changed the column headers for greater simplicity and standarization.

And there probably will be more format changes throughout the coming year. Although we don't anticipate any radical changes--and the changes concern format only, not content--we do appreciate reader feedback as we experiment to find what suits us all best.

Soviets Launch Two Man Crew to MIR

Two Soviet cosmonauts have completed a rendezvous with the MIR (Salyut 8) space station following their night launch from Tyuratam, February 6, on board the new Soyuz TM-2 spacecraft.

The launch of cosmonauts Yuri Romanenko and Alexander Laveykin occurred at 12:38 am Moscow Time (2138 UTC) on board an A-2 booster rocket. The launch was carried live by Soviet television and Cable Network News (CNN).

These two cosmonauts comprise the first crew to pilot the new TM version of the Soyuz which appears identical to the 20-year-old Soyuz design but has more advanced systems. Unlike the older Soyuz, the TM version can complete its rendezvous with the MIR by approaching from any angle, saving station fuel by avoiding the need to maneuver the MIR continually during the rendezvous.

The new Soyuz TM also has a lighter launch escape system allowing the

launch of more payload and a new end-of-mission descent parachute that permits more payload to be returned to Earth from station flights. The TM spacecraft also carries upgraded computer systems and a new rendezvous and docking system.

MT's intrepid reporter John Biro probably caught the first North American transmissions from MIR on February 8 between 2037-2045 UTC during MIR orbit number 5575. The FM voice transmissions were heard over John's R-7000 on 143.625 MHz.

There are indications now that in addition to the clear voice channel on 143.625 MHz, an encrypted channel (possibly 143.825) and an unknown RTTY channel (VHF range) are being used. Listeners who routinely monitor MIR might want to search the 138-144 spectrum for this RTTY channel.

Additional MT notables to monitor MIR transmissions at deadline

include Larry Miller in Pennsylvania and Jim Smith in Battle Creek, Michigan. Jim caught about a 30-second transmission from MIR on February 13 at 0857 UTC on his Bearcat 800 using a 1/4 wave ground plane.

I fully expect this crew to be aboard the MIR until at least July 1987, and also expect a crew to join them at that time. This crew will include a Syrian cosmonaut. I also expect that there might be a crew swap-out at that time with a fresh long-duration crew taking the TM-2 crew's place.

MT readers should be aware that an add-on module (Astrophysics Lab) will also be launched very soon. If this vehicle is of the class we believe, it should carry a 19.954 MHz HF beacon aboard. These beacons are usually on continuously and are great tracking aids for voice comms on VHF.

I invite all MT readers receiving transmissions from MIR to send your reports; please include

date/time and your receiving equipment to the Orange Park address. All reports will be reviewed in this column.

Fleetsatcom Clear Voice

My phone has been ringing off the hook lately from MT readers noting an increase in Fleetsatcom clear channel voice comms via the wide-band downlinks.

On the evening of February 2, activity really picked up on the birds when some Russian fighters decided to take a low, fast tour of Alaska! SAC Quebec (6761) came alive with all sorts of bombers, tankers, et al tripping over themselves on the frequency. It would appear that Air Force One was even made ready for flight as it was heard on the Whiskey bandplan (263.55-264.05 MHz) working Crown (the President was in bed according to the White House).

Denver Area Mil Aircraft Profile

MT would like to thank reader J. Pringle in Boulder, Colorado, for this excellent listing of VHF/UHF mil aircraft activity.

Freq	Use	Call Sign	Comments
32.45	Buckley A-7 Air/Air	Redeye	A-7 Pilot/Pilot
32.75	ANG Helicopter Ops	BKF,Outlaw	ANG Helicopter backup FM ops
32.85	Buckley A-7 Air/Air	Redeye	A-7 Pilot/Pilot
36.45	Buckley A-7 Air/Air	Redeye	A-7 Pilot/Pilot
41.45	Buckley A-7 Air/Air	Redeye	A-7 Pilot/Pilot
41.75	ANG Copter FM Ops	Outlaw	Buckley Army Copter Ops
142.400	Air/Air/Ground Ops	Outlaw	Buckley ANG Helos
148.035	Buckley ANG Base	India	Civil Engineers Net
148.215	Ramp Control Net	BKF	Tower/Field Ops
148.325	Buckley Repeater Net	BKF	Commanders net, input 149.250
148.450	Refueling	REX	Transient A/C Refueling/Maint.
148.515	A-7 Readiness Net	Blue	Maint Control Net Fitzsimmons Army Hospital
148.625	Buckley Security Police	Castle	DOD police assigned to entire base
149.115	Fitzsimmons Fire		Hospital Fire Dept
149.205	Buckley Transport.net	Tango	Base Ops/Transportation
150.225	Buckley M.P.	Cobra	USAF Security Police assigned to aerospace data fac.
163.5125	Buckley Medical Net	Medic	Amb/Paramedic Hosp
173.075	Buckley Crash Net	Echo	Fire and rescue
230.800	Air/Air/Ground Ops	Outlaw	ANG Helo Ops
238.600	UHF SAC Bomb Plot		Near Gillette, Wyoming
242.400	ANG Helo Tactical		Helo Tactical Pilot/Pilot
243.000	Mil Air Emergency	Denver	Also called Guard
253.625	Lowry AFB CP/Ft Carson	Lowry CP	VIP Inbd Lowry & Ft Carson Range Cntl
255.400	UHF FSS	FAA	Flight Service Sta 122.0 VHF

268.100	ANG A-7 Ops	BKF	Tactical Ops
269.300	Buckley GCA	FAA	No longer used as GCA
271.300	Buckley GCA	FAA	No longer used as GCA
271.900	IR 416 (Instrument Rte)	Beaver Dam	Pt.A west of Cheyenne
272.700	UHF ARTCC	FAA	Denver Center, VHF-125.95
275.800	Control Tower	BKF	Buckley Gnd Cntl, VHF 121.6
281.200	Kit Carson MOA Control	Blood Alley	Air Refueling/GCI
282.200	UHF ARTCC	Denver	SW Denver, VHF-128.2
284.000	Buckley GCA	Denver	No longer used as GCA
284.700	UHF ARTCC	Denver	Arr/Dep, VHF 124.8
287.300	ANG	BKF	Range Control, "Airburst Cntl"
288.100	UHF ARTCC	Denver	Approach, VHF 120.2
289.600	Buckley Control Tower	BKF	Buckley Tower, VHF 121.0
296.700	Buckley A-7 Tactical	Redeye	Statewide tactical
303.000	New Raymer MOA Ctrl	Spirit	Primary channel
306.300	UHF ARTCC	Denver	Colby, VHF 132.17
307.300	UHF/VHF ARTCC	FAA	UHF/VHF TCA East, VHF 119.3
314.200	New Raymer MOA Ctrl	Spirit	Secondary channel
317.500	UHF ARTCC	Denver	Denver, VHF 132.22
319.200	UHF ARTCC	Denver	Akron MOA A, VHF 127.5
323.100	UHF ARTCC	Denver	Arr/Dep SE Denver, VHF 125.8
335.500	UHF ARTCC	Denver	VHF 132.22
338.200	UHF ARTCC	Denver	Sydney, Nebraska
340.800	New Raymer MOA Ctrl	Spirit	Air Refueling
344.200	Kit Carson MOA Control	Blood Alley	Air Refueling/GCI
344.600	Buckley Metro Service	BKF Metro	Weather Info
350.300	UHF ARTCC	Denver	Cheyenne, VHF 134.2
351.800	UHF ARTCC	FAA	UHF/VHF Dep, VHF 128.05
362.300	UHF ARTCC	Denver	Arr/Dep, VHF 124.0
363.000	UHF ARTCC	Denver	Approach Control, VHF 120.8
363.400	Kit Carson MOA Control	Blood Alley	Air Refueling/GCI
372.200	Base Ops	BKF	
380.200	UHF ARTCC	FAA	Cos App Control, VHF 118.5
385.700	UHF SAC Bomb Plot		Near Little America, Wyoming

Celebrity Welcome to the Dayton Hamvention

When you arrive in Dayton, tune in the Fox Amateur Radio Group's 2-meter repeater on 146.985 MHz, or its 220 MHz system on 224.00 MHz, and receive a celebrity welcome! A different celebrity will be heard every ten minutes. Participants:

Dave Somner K1ZZ, ARRL
Tom Kneitel K2AES, Pop Com
Bob Grove WA4PYQ, Monitoring Times
Chet Atkins WA4CZD, Nashville
Bill Leonard W2SKE, CBS News
Fred Maia W5YI, W5YI Report
Roy Neal K6DUE, NBC News
Tony England W0ORE, NASA
Bill Pasternack WA6ITF, Westlink Reports
Mark Allen, Westlink Reports
Owen Garriott W5LFL, NASA
Wayne Greene W2NSD, W. G. Enterprises
Jonathan Marks G8WGN/PE,R.Netherlnds
Richard Celeste, Governor of Ohio
Gordon West WB6NOA, G.W. Radio School
Phil Thomas KA8KEJ, Amateur Week
Leo Kessler, Pres. of Fox Technologies

If you have any interest in getting into ham radio, Read This Month's Column!

Novice Enhancement Approved!

The Past

If you've been reading the history of amateur radio in this column for the past several months, you must be aware by now that the main interest most hams have in amateur radio is the social side of it. It's important to understand this fact if you are to understand the results of the past 20 years of incentive licensing.

From the end of World War II to 1967, amateur radio saw steady growth, doubling the number of hams three times during that period (since 1967 we haven't even doubled them once!). And the great majority of the newcomers were teenagers, most 14 and 15 years old. Then in 1967, incentive licensing was proposed and instituted...and it killed amateur radio growth...dead!

Within the next few years most American ham radio manufacturers changed business or closed their doors. During the year following the activation of incentive licensing, their business fell 85%. The reason for this was very simple. Novices not only lost their 2 meter 'phone privileges, but they suddenly had to operate on CW for two years before they could upgrade and all those who didn't have an Advanced (Class A) or Extra Class license lost their 'phone privileges, too!

Thousands and thousands of hams who loved 'phone work (and CW work), and who lost the best band segments for that work, put their rigs away or sold them and took up bowling or other activities where they could talk to their friends. All across America, many club and school stations ceased to operate and/or exist. Their numbers dropped regularly for several years. Incentive licensing was, to put it mildly, one hell of a mistake!

What everyone forgot was that during the first quarter of the 20th Century, technical advances and challenges in radio were all the rage and were in the eye of the public at large on a regular basis. The code was like a secret language and 'phone didn't exist in a practical manner.

But during the second quarter, hams settled down into a routine of operation-oriented activities and, while the technical aspects were still important (especially to the youth who became hams) and CW was fun, a major portion of the activities were

slowly switched to 'phone with emphasis on the social aspects of hamming.

During the third quarter of the century, especially with the technological advances and the tremendous amounts of ready-made equipment left over from WWII and Korea, the orientation became decidedly more 'phone and social and even less technical (with the exception of the younger hams who usually liked the technical challenges and knowledge).

That was the scene when the phone privileges for the majority of hams was limited and/or removed--and it made them mad! They quit the hobby in huge numbers.

It is the perfect example of the arrogance of the clique that ran ARRL at that time. It was their idea and they pushed it for all it wasn't worth. While the ARRL still has its problems, it is infinitely better these days by comparison and if you're not a member, you should be!

In the years that followed, considerable effort was expended to "fix" the situation, but because those efforts did not deal with the real issue, none of them made any real difference. Of today's 420,000 hams, two-thirds of them are over age 50 and only 3% of the remaining one-third are under age 30!

Incentive licensing therefore has been a real incentive to many former hams and would-be hams...to find another hobby. Up 'til now. At last, the FCC has overcome the typical "I've got mine and the hell with you!" attitude which the majority of the hams have (mostly in the 60 to 75 year old age group, but they currently are the majority), and enacted Novice Enhancement. HOORAY!!

As of March 21, 1987

Novices (and Technicians who already had all privileges about 50 MHz) are now authorized CW (Morse) and digital privileges from 28,100 to 28,300 kHz and CW and SSB privileges from 28,300 to 28,500 kHz with a maximum output power of 200 watts (General licensees and above are authorized a maximum output power of 1,500 watts on those frequencies).

Novices are authorized all amateur modes and emissions from 222.1 to

223.91 MHz with a maximum output power of 25 watts (all other licensees are authorized a maximum output power of 1,500 watts on those frequencies).

Novices are authorized all amateur modes and emissions from 1270 to 1295 MHz with a maximum output power of 5 watts (all other licensees are authorized a maximum output power of 1,500 watts on those frequencies).

Novices are authorized to use any repeater operating within the frequencies above, but may not be the station licensee or control operator of any repeater, beacon or auxiliary operation.

All Novices and Technicians who were licensed as of March 21, 1987, are authorized the above privileges without any additional testing; effective on that date, the Novice written test was increased by ten questions to a total of 30 and will require two examiners to administer the test and sign the 610 Form.

The exam for Technician will be reduced to 25 questions with emphasis on VHF and UHF. The exam for General will also be reduced to 25 questions with emphasis on HF. There will be no change in the code speeds required for each class of license. The effect of this is to make it easier to upgrade to Technician Class and get additional privileges, such as 2 meters!

If you are currently studying for your Novice license, just read up on the rules and the technical aspects of the new privileges. That is what the additional questions will cover. For Technicians, until the new question pool division is announced, just continue to study the current guides. The same questions will be used, but you won't be asked as many of them.

With the written exam credit now allowed, if you pass both Element 3A (Technician) and 3B (General) you will receive credit for that and have a whole year to get your code speed up to 13 WPM and become a General Class licensee! If you have a Technician license which you passed prior to March 21, 1987, you will only need to pass the 13 WPM code test to upgrade.

As you can see, we now have a Novice license that will let Novices "talk" to each other and will open up

SIGNALS FROM SPACE cont'd from page 41

While too numerous to mention all the activity, all the bandplans have been found active (all listed in *Communications Satellites* available from Grove Enterprises). Fleet monitor tip: Instead of trying narrowband FM throughout the Fleet spectrum, try SSB. I understand it really works great on the AFSATCOM transponders.

Contest Still On

So far no one has sent a tape of any voice activity in the 136-138 MHz range from ATS-3 (See January 1987 SFS). I have received some routine 135 MHz transponder stuff but these are the usual Malabar/South Pole transmissions. The first monitor to send a tape of voice comms in the 136-138 MHz range will receive an 8 x 10 color print of a shuttle astronaut working in space.

Send the cassette and the date/time/frequency and your receiving setup to "Voice Search, c/o Signals from Space," at the address below. The first correct entry verified as coming from the ATS-3 (105 West longitude-Geostationary) in the 136-138 MHz range will be awarded the pix. All entries become property of SFS (they cannot be returned) and the decision of the judge is final!

NEXT MONTH: The ARTCC information promised is on hold. Jean Baker will be presenting ARTCC sector charts in the next few months that will be even more valuable than the frequency list I planned. Watch Jean's "Plane Talk" column.

Remember to send your mil aircraft/satellite frequency information to Signals from Space, 160 Lester Drive, Orange Park, Florida 32073. ■

Larry Van Horn

digital hamming via packet, RTTY and CW (yes, CW is a digital mode, too!).

After 20 years, we have nearly progressed back to where we were in '67 although Novices also had 2 meters then. It seems that true progress is our most important problem! OK, let's all sing one chorus of "We Shall Overcome" and then discuss...

The Future

Many of the old timers I've talked to over the past year have been against the idea of Novice Enhancement. Most of their arguments against it seem to be based upon two premises: First, that the bands are crowded enough so who needs more hams anyway; and second, with all those new privileges, the Novices won't have any reason to upgrade. And both reasons are usually offered by the same people!

Looking at it logically, if they don't upgrade, they will be stuck on the Novice frequencies and won't add to the "crowd" on the bands used by the oldtimers. But then who said logic was part of their argument?

With over half of the ham population above age 60, if we don't get a lot of young people in our ranks soon, our hobby is going to literally "die out!" But with Novice Enhancement we now have the tool to do something about it.

With Novice Enhancement, I see a bright future of Amateur Radio. So bright, I am willing to make the following predictions:

▷ I predict that as soon as the

prospective and current Novices realize they can "talk" on 10 meters (with its propagation cycle on the upswing) and 1-1/4 meters (using repeaters), we will see a resurgence of interest in hamming, and in those two bands, the like of which we haven't seen since 1966.

▷ I predict that when many of the kids who today are into computers discover (thanks to advertising by ARRL and the ham radio manufacturers in computer magazines) that they can put their computers on the air (in packet and RTTY modes) over ham radio, that they will join the ham ranks in droves; and when they discover they can talk, too, many will develop into regular, all mode hams.

▷ I predict that thousands of SWLs and monitors will soon discover all the extra fun they can have as Novice or Technician class hams and will work to get their licenses, thereby expanding their communications hobbies and fun!

▷ I predict that the number of Novice classes given each year will grow like the dandelions in your back yard.

▷ I predict that when instructors discover how much easier it is to teach Technician and General classes separately and when Novices realize the ease of upgrading and adding 2 meters to their privileges, we will have a lot more Technician class amateurs than anyone ever expected or hoped for and "Novice Enhancement" will in fact become better known as "Technician Enhancement!"

The FCC Giveth, The FCC Taketh Away

Fresh on the heels of the new Novice enhancement rulemaking comes a thunderbolt: The FCC has issued a Notice of Proposed Rulemaking (NPR) to withdraw two megahertz of the amateur 220 MHz band for the commercial land mobile service!

The proposed action comes about after the FCC's determination that "the light loading of the 220 MHz band" constitutes "underutilization" of a band which is of prime interest to the growing land mobile service.

In an effort to sweeten the action, the FCC has offered to give the hams exclusive use of the remaining 222-

225 MHz band, formerly co-allocated to the land mobile service.

In a related recent action, the FCC reallocated the 421-430 MHz portion of the former amateur-only 420-450 MHz UHF band to the land mobile service north of "Line A", an imaginary zone running about 100 miles south of the Canadian border, and including major metropolitan areas like Detroit, Cleveland and Buffalo.

For some added insight, see last month's editorial comments, "The Selling of the Spectrum", on page 3 of MT.



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And there's more! Monthly columns by: Joe Carr, K4IPV on the ins and outs of repairing and troubleshooting your radio; Bill Orr, W6SAI on antennas and antenna technology plus a lot more; noted HF/VHF operator and DX'er Joe Reisert, W1JR's world of VHF and UHF technology; Ernie Guerri, W6MGI on new trends in electronic technology; our own investigative reporter, Joe Schroeder, W9JUV with Presstop, your inside view to what's going on in the world of Amateur Radio; and noted government propagation expert Garth Stonehocker, KØRYW on propagation.

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ON THE HAM BANDS
cont'd from page 43

▷ I predict that through the efforts OF ARRL, the ham publishers, the ham manufacturers, and, most importantly, the ham clubs, thousands of new school ham clubs will be formed at middle, junior, and high schools with each one having a station using rigs like the one described below and endowed with lots of excited new ham members.

▷ I predict that one or more small or large or new ham manufacturers will suddenly realize that the market for a simple (few bells and whistles except as modular add-ons), modular (with extra frequencies, modes, etc. added on later as plug-in modules), 'phone/ CW/ digital transmitter/ receiver (either separate units or as a transceiver) covering the 28, 50, 144, 220 and 440 MHz bands with 200 watts output on 28 MHz and 25 watts output on 5, 144, 220 and 400, and available in both kit form or wired, will be the biggest hit of the ham market since SSB and digital readouts. This should make those few manufacturers who build them well off, if not rich!

▷ I predict that many clubs and individuals will soon apply for 220 repeaters all across the U.S. to support the Novices and that 220 will become as popular as 2 meters for all sorts of usage such as ragchew, digital, emergency services, etc.

▷ And finally, I predict that if the ARRL, the ham publishers and the ham manufacturers (both current and those soon to be in business) will just for once get their act together, ignore the negatives (the oldtimers) and accentuate the positives, really working to get the word out to the 13- and 15-year-olds in the schools, and develop a comprehensive plan to put posters, books, equipment, and help (for school activities coordinators) into those schools, we will see not only the rebirth of youth and tremendous growth in amateur radio, but we may even hope to see a rebirth of engineering, math and science as careers and win back our huge technological losses to Japan and other countries!

Novice Enhancement my foot! This is nothing less than the Survival of Amateur Radio!!

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

The regular history segment and other features will return next month. Keep those cards and letters coming!

CONVENTION CALENDAR

Date	Location	Club/Contact Person
Mar 1	Winchester, IN	Randolph ARA/ Herb James WB9UZZ RR2 Box 90, Ridgeville, IN 47380
Mar 1	Newburgh, NY	Mt. Beacon ARC/ Steve Phillips K1EQ 10-B Plattekill Ave, New Paltz, NY 12561
Mar 7	Cave City, KY	Mammoth Cave ARC/ Joe Taylor, N4NAS Box 858, Glasgow, KY 42141
Mar 7	Ft. Myers, FL	Ft. Myers ARC/ Harry Arnold, K9ALX 5414 Brandy Circle, Ft. Myers, FL 33907
Mar 8	White Plns, NY	Westchester ECA/ Sal Lagonia N2EQM 3255 Poplar, Yorktown, NY 10598
Mar 8	Rostraver, PA	Two Rivers ARC/ Mike Kowalcheck Box 184, Zimmer Rd, Greenock, PA 15047
Mar 13-15	Orlando, FL	Southeastern Division, John Lenkard, W4DNU 1046 Turner Rd., Winter Park, FL 32789
Mar 14-15	Lafayette, LA	Acadiana ARA/ June Bodensteiner 129 Patricia Anne, Lafayette, LA 70508
Mar 15	Sterling, IL	Sterling-Rock Falls ARS/ Susan Peters, KA9GNR 511 8th Ave., Sterling, IL 61081
Mar 15	Apache Jct, AZ	Superstition ARC/ Margaret Glaze K1Y CZ 7809 E. Javalina, Mesa, AZ 85208
Mar 20-21	Muskegon, MI	Michigan State/ CANCELLED
Mar 21	Hermitage, PA	Mercer Co. ARC/ C.C. Claiborne KC3WJ 44 S. 6th St., Sharpsville, PA 16150
Mar 21-22	Mecklenburg, NC	Roanoke Division, Meck. ARS/ Gerald Hutchinson 2109 Princeton Ave., Charlotte, NC 28207
Mar 21-22	Ft. Walton, FL	Playground ARC/ William Lamb N4E ZU 151 Makron Dr., Mary Esther, FL 32569
Mar 22	Toledo, OH	Toledo Mobile Radio Assn/ Brian Harrington 4463 Holly Hill Dr., Toledo, OH 43614
Mar 22	Madison, OH	Lake Co. ARA/ Bob Liddy K8BL 7234 Enfield, Mentor, OH 44060
Mar 22	Trenton, NJ	Delaware Valley Radio Assn/ Harold Van Dyke 175 Penn-Harbourton Rd, Pennington, NJ 08534
Mar 28-29	Kearney, NE	Nebraska State/ Timothy Loewenstein, WA0IVW Box 998, Kearney, NE 68848-1231
Mar 28-29	Elizabethtown, KY	Kentucky State Convention/ Jack Polk, WB4VFW 66 Tall Oak Ct., Elizabethtown, KY 42701
Mar 28-29	Timonium, MD	Baltimore ARC/ James Green WB3DJU 36 Sunnyview Dr., Phoenix, MD 21131
Mar 28-29	Columbus, GA	Columbus ARC/ Hal Devaughn W4FIZ 3804 Conrad Dr, Columbus, GA 31904
Mar 29	Walla Walla, WA	Walla Walla Valley RAC/ Bernard Frazier 610 So First, Walla Walla, WA 99362
Mar 29	Grayslake, IL	Libertyville & Mundelein ARS/ Marc Abramson 1312 Millcreek Dr., Buffalo Grove, IL 60090
Apr 3-5	Visalia, CA	Cal State-Int'l DX Convention/Len Gerald K6ANP 9705 Old Redwood Hwy, Penngrove, CA 94951
Apr 4	Rochester, MN	Rochester ARC/ Bill McGurk WB0YEE 2253 Nordic Ct., NW Rochester, MN 55901
Apr 4-5	N.Little Rock, AR	Delta Division Conv/ Wayne Mahnker WA5LUY 8 Canyon, N.Little Rock, AR 72116
Apr 5	Charleston, WV	Charleston ARC/ William Kibler Jr K8WMX 182 Monterey Dr, St. Albans, WV 25177
Apr 5	Willingboro, NJ	Willingboro ARG/ Jose Alvarez K2KMO 1343 Thornwood Dr, Mt Laurel, NJ 08054
Apr 5	Grosse Pointe, MI	SE Michigan ARA/ Richard Ward KC8OH 22434 Melrose Ct, E.Detroit, MI 48021
Apr 10-12	Kansas City, MO	Missouri State/ Chuck Miller WA0KUH 7000 NE 120th St, Kansas City, MO 64166
Apr 11-12	Trenton, NJ	Trenton State College ARC/ Allen Katz Dept. Elect. Eng., Trenton State College ARC Trenton, NJ 08650-4760
Apr 11-12	Alexandria, LA	Central Los Angeles ARC/ Ed Crump KB5CX P.O. Box 31, Alexandria, LA 71309
Apr 12	Raleigh, NC	Raleigh ARS/ Chuck Littlewood K4HF 2005 Quail Ridge Rd, Raleigh, NC 27609
Apr 18	Marietta, GA	Kennehoochee ARC/ Dean Harris KD4BB 3478 Sabrina Ct, Marietta, GA 30066
Apr 24-26	Dayton, OH	Dayton Hamvention/ DARA Box 44, Dayton, OH 45041
Apr 25	Spokane, WA	Inland Empire VHF Rad Am/ Robt Spencer W. 3022 Francis, Spokane, WA 99205-7259

MONITORING TIMES IS HAPPY TO RUN ANNOUNCEMENTS OF RADIO EVENTS OPEN TO OUR READERS. Send your announcement at least 60 days before the event to: Monitoring Times Convention Calendar, P.O. Box 98, Brasstown, NC 28902.

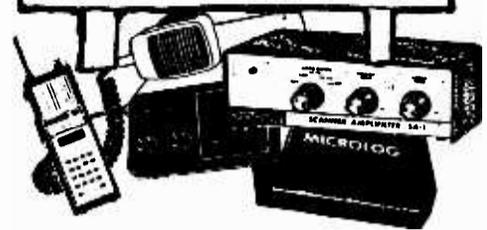
The North Area Repeater Association will sponsor the upper midwest's largest swapfest and exposition for amateur radio operators on Saturday and Sunday June 6 and 7 at the Minnesota State Fairgrounds in St. Paul.

Free overnight parking of self-contained campers on June 5 and 6. Call wide area repeaters 28/85 or 16/75 for directions.

Exhibits, commercial dealers, giant outdoor flea market, and prizes.

Amateur license exams will be given. Admission \$4 in advance, \$5 at Amateur Fair. For more information, dealer inquiries, and ticket orders, write: Amateur Fair, P.O. Box 857, Hopkins, MN 55343, or call (612) 566-4000.

Equipment Shelf



The Sony/Sangean/Realistic Radios

Without question, when the world thinks about a portable radio receiver, the name Sony immediately comes to mind. Now, a Korean company is looking for a piece of the action with its line of Sony look-alikes.

The Sangean model SG-789 bears a remarkable resemblance to the popular Sony ICF-4910 and is due to emerge shortly under the Emerson brand name. The top-of-the-line ATS-803, a follow-on of the immensely popular but discontinued Uniden CR-2021/Realistic DX-400, has already appeared under private labeling, including EEB's Ambassador 2020, and will soon be seen wearing another private label from a mass merchandiser.

Ten-Tec RX325 Cancelled

The industry awaited with great expectation the arrival of an American-made communications receiver, the RX-325 from Ten-Tec of Sevierville, Tennessee. Early models were somewhat disappointing, but production models were greatly improved.

Unfortunately, the final costs of the receiver were too great to be competitive in the Japanese-dominated marketplace and the entire first run of approximately 200 units was sold to an agency of the federal government and no further production is expected.

New Regency Scanners

The Informant

MT announced in a previous issue the impending release from Regency of a new series of scanners. One of these, the "Informant" (INF-5) is entirely pre-programmed with all

nationwide police, fire, medical, and weather frequencies so that the user merely selects the service(s) of interest and the state in which he is listening; the radio does the rest.

Just as innovative, the Informant boasts the fastest scan rate in the industry--50 channels per second. This newly-patented "Turboscan" technology allows coverage of 33-47, 150-163 and 450-464 MHz.

Functions include squelch and hold with channel callouts on a fluorescent display. The receiver comes equipped with an AC cord, telescoping antenna, instruction manual and has a one year warranty. Its suggested retail price is \$349.95 but mail order discounting should keep the typical price below \$300.

Turbo-Scan 800

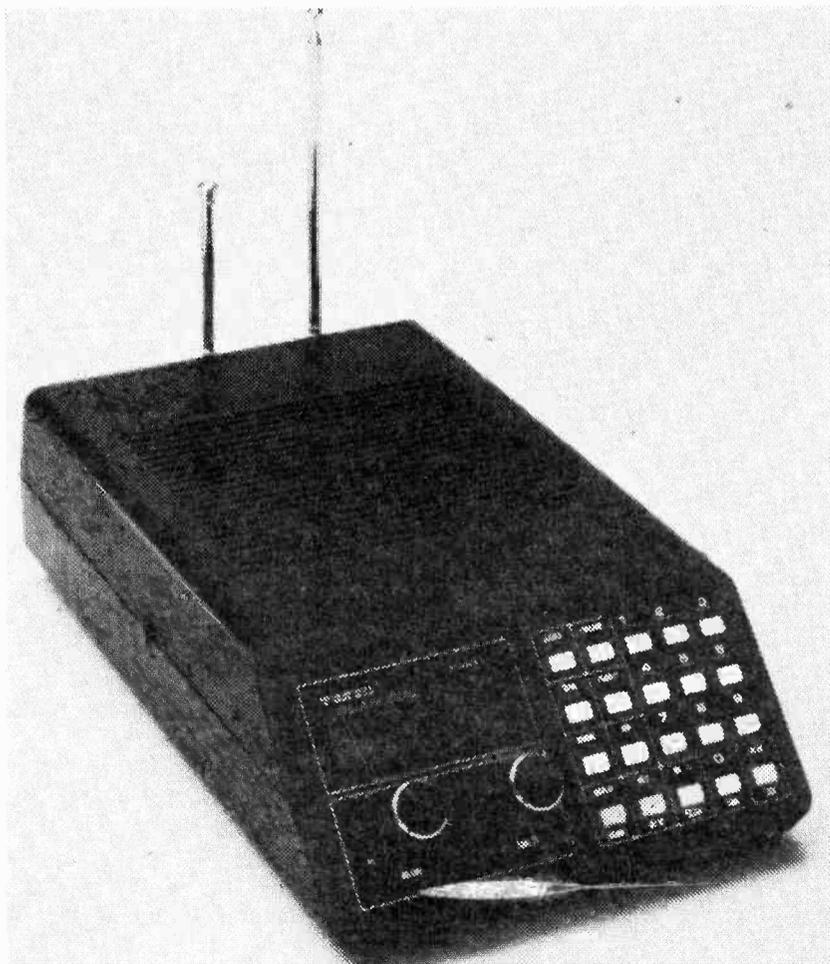
For those scanner buffs with a taste for more flexibility, the new Turbo-Scan 800 (TS-2) offers the 50-channel-per-second scan and search rate. Frequency coverage is 29-54, 118-174, 406-512, and 806-950 MHz. Six scan banks may store up to 75 memory channels, available sequentially or in groups; discrete frequencies are entered by a full-stroke, backlit rubber keypad.

A separate key provides instant weather channel access; other functions include priority, direct channel



Regency Informant

access and scan delay. With a suggested retail price of \$499.95, the TS-2 comes equipped with two telescopic antennas (separate 800 MHz), AC power supply, DC mobile cord, and mobile mounting bracket.



Regency Turbo-Scan

Regency Drop-in Charger

Regency Electronics is now delivering their new MA549 drop-in battery charger which is designed to accept their models HX1000, 1200 and 1500 programmable scanners as well as their hand-held marine radio.

We tested two of their new chargers here in preparation for listing in the Grove catalog and found them to work very effectively. A set of new (uncharged) NiCad batteries charged fully overnight (the manual says 8-10 hours) and a partially-charged set should reach full charge in half that time.

Charging with the Scanner on

It is possible to operate the scanner while its batteries are being charged; because of the added current drain,

(Please turn to page 47)

MONITOR



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MAGNE TESTS...

THE LOWE HF-125 RECEIVER

There's so much in the way of good world radio receivers coming out of Japan that it's easy to forget that European manufacturers are also alive and kicking. The receiver I've been putting through the paces this month is just one of these. It's the HF-125, which is designed and manufactured by the English firm of Lowe Electronics Limited. Lowe hardly fits the image of, say, a Panasonic or Philips...some giant electronics monolith with huge factories. In fact, Lowe has traditionally been a retailer of world radio and ham gear and is located in the charming town of Matlock in one of the most beautiful parts of rural northern England.

This isn't incidental, because the mind does tend to function differently in the serenity of small firm in rural England than it does in the pressure-cooker environment of a large industrial complex. The result is that the '125 is a unique set, and in many ways quite "British".

The first thing you'll notice is that it's quite compact and doesn't have many controls. There's only four knobs -- including the tuning knob -- and five pushbuttons, plus the signal-strength meter. That's only nine controls in all, as compared with the dozens found on many Japanese tabletop receivers.

If you're wondering where the keypad is hidden, it's not. The keypad is optional and comes as an outboard device...and does it ever work well! If you want to hear, say, Radio Canada International on 5960 kHz, you just tap in 5-9-6-0, and it appears. There's no fooling around with "enter" keys, leading zeroes, decimals, or any the other foolishness found on most other keypads. In fact, it's made even easier to use -- and handier, too -- because it lies flat on the table instead of setting vertically on the front panel. We found ourselves using the keypad instead of the knob or memories for a great many of our frequency changes.

Excellent Audio

The second thing you'll notice with the '125 is that, like Sony's discontinued ICF-6800W, it sounds unusually good for a communications receiver. If we look at the lab measurements we made for the unabridged *RDI White Paper* on the '125, we see that distortion is

uncommonly low -- almost on the level of hi-fi equipment. When you hook up a good speaker to this receiver, it really does sound nice, even though there is some "whine" from the set's digital circuitry that can sometimes be heard faintly in the background. Lowe's engineers tell me that they're working on this.

Another thing that helps this set sound so good is that it comes with no less than four voice bandwidths from which to choose. Most receivers come with only two, so this is a real plus. And they work quite well, thanks to some really innovative engineering on Lowe's part. Of the four bandwidths, the widest is good for listening to local mediumwave AM stations, while the other three work nicely for shortwave.

The third unusual characteristic of the '125 becomes apparent when you take the covers off. This set isn't built like a radio; it's built like a tank! Inside, we find a pair of thick cast-aluminum side panels that would take a .357 magnum to penetrate, and all the other panels and covers are made from heavy-gauge stamped aluminum. This is the sort of bulldog construction you find on costly professional communications receivers intended for use on battlefields. You just don't expect to find this on something selling for under \$600.

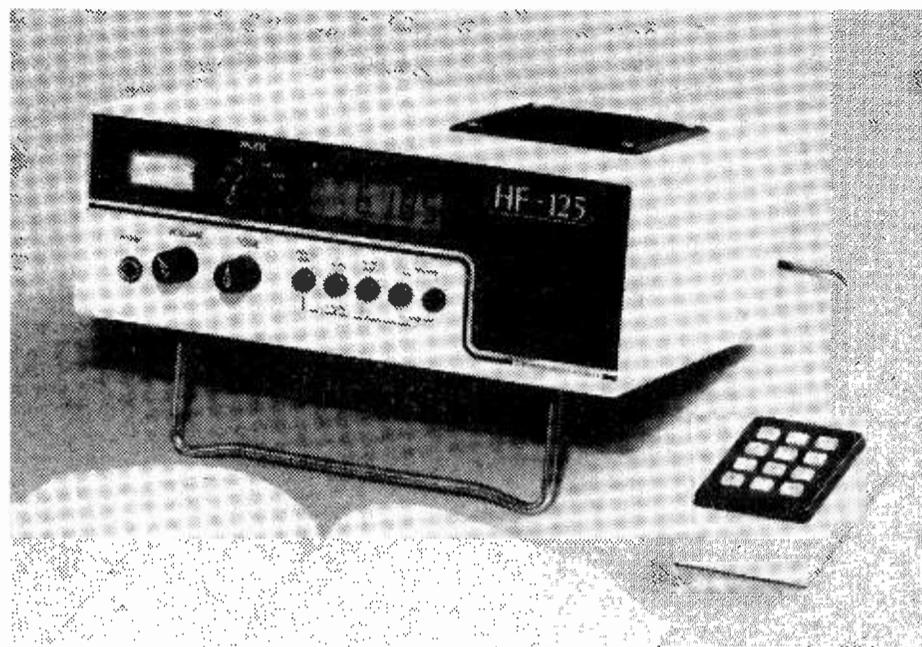
Something else, too, is that that front panel is protected by a sheet of plastic laminate. If you want to scratch it up, you'll have to pull out your pocket knife and hack away.

Drawbacks

That's at least the highlights of the good news. The bad news is that if you like "bells and whistles", you're not going to like the '125. It doesn't have any notch filter, passband tuning, scanner or things like that. And the frequency readout is only to the nearest kilohertz. Believe it or not, this paucity of controls can actually complicate things a bit if you're constantly switching modes and the like.

Avid DXer's also aren't going to care for the automatic gain control (AGC) decay rate in the AM mode. It's awfully slow, and there's no faster rate you can switch in. Also, the '125 isn't an ultrasensitive set. Sensitive, yes...but not like some of the Japanese DX supersets, such as the Kenwood R-5000 we reported on last month.

Another unusual aspect of the '125 is that you can get it with an optional synchronous detector, like



The Lowe HF-125 - Built like a tank for under \$600!

you find on Sony's excellent ICF-2010/ICF-2001D portable. Unfortunately, this is the one thing Lowe didn't do well. This option is hard to operate, doesn't lock properly, and you can't even select sidebands with it. But Lowe tells *RDI* they're aware of the problem and are working to correct at least some aspects of it.

Another option that's offered allows the '125 to be used as a portable. We couldn't obtain this unit in time for our broadcast, but Lowe tells me that it consists of a rechargeable NiCad battery pack and built-in active antenna. Eventually, they'll offer a carrying case with a shoulder strap, too. This should make the compact '125 appropriate for high-quality field portable applications, especially since the radio is so rugged.

So all in all, the '125 is unusually agreeable for listening to shortwave broadcasts. A not-inconsiderable bonus is that this tough little set is probably going to leave the Lowe service team with less to do than the Maytag repairman.

In the United Kingdom, the '125 sells for 375 pounds. In the U.S. and Canada, it will be distributed, starting around late April, by Universal Shortwave in Ohio. The North American price hasn't been announced at the time this issue of *Monitoring Times* goes to press, but I imagine it will probably be around 600 U.S. dollars. In Europe, where Japanese sets are fairly costly, the '125 is probably going to be warmly welcomed because of its considerable price advantage. In North America, where Japanese sets are relatively less costly, this unusual offering from Lowe will probably be judged more on its merits than on its price. Even

then, there's nothing comparable from Japan these days that's cheaper and only one model -- the reportedly trouble-prone Yaesu FRG-8800 -- that goes for about the same price.

You can hear Larry Magne's equipment reviews and news the first Saturday night of each month over Radio Canada International's "SWL Digest" at 8:10 PM Eastern Time on 5960 and 9755 kHz.

The complete RDI White Paper on the Lowe HF-125, as well as a new edition of the RDI White Paper on the Yaesu FRG-8800, are now available for \$4 postpaid in North America, or \$6 airmail worldwide, from RADIO DATABASE INTERNATIONAL, Box 300, Penn's Park PA 18943 USA. A complete list of all available RDI White Papers may be obtained by sending a self-addressed stamped envelope to the same address.

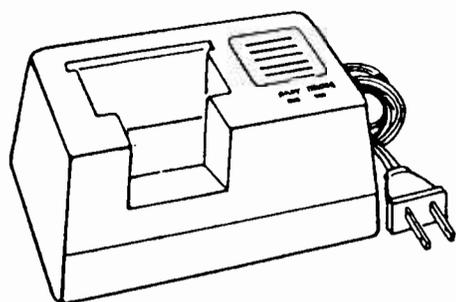
The Black Box Solution

(from page 27)

Answer: Inside the Black Box is a vibrator which alternately opens and shorts the circuit. When you have amps, no volts, and vice versa, W=IXE. Think of the vibrator operating at a rate slower than the time constant of the volt and amp meters and you will see the theory. It works!

Another Explanation: Inside the Black Box is a set of perfectly vibrating contacts, which alternately open and short-circuit (Black Box) terminals. If open and shorted times are equal, the voltmeter and ammeter will read the average of 0 and 2 or 1 unit. No electrical power will enter or leave the box, since at no time do voltage and current coexist. The chopping frequency is made high enough to prevent visible motion of the meter pointers.

NEW ARRIVALS
cont'd from page 45



Regency MA549 drop-in charger

normal scanner operation will add another 2-3 hours to the recharge time. If the scanner is receiving continuously with no interruption, the charger will simply maintain the existing charge level of the batteries.

A red "fast" charge LED grows dimmer as the batteries are brought up and will eventually dim to barely observable; the green "trickle" light remains on as long as the scanner is in place.

(Regency MA549 drop-in charger, \$92.50 from Grove Enterprises and other Regency dealers)

Multimode Terminal Includes Facsimile!

AEA, a prominent manufacturer of high tech accessories for hams and shortwave listeners, has just announced their revolutionary PK-232A multimode demodulator. Boasting an array of operating modes and an extremely low cost (\$319.95), the unit is presently being manufactured in preparation for delivery.

Intended to be connected between a general coverage shortwave receiver and any home computer that has an RS232 ASCII port, the PK-232A will decode facsimile news photos, weather maps, Morse code, radio-teletype, ASCII, TOR, and packet (heard on VHF/UHF).

The powerful demodulator comes with a cable to allow interconnection with any of a wide variety of graphics printers including the popular Epsoms. There is no provision for video display.

AEA includes an automatic fine-tuning scheme which they call "SIAAM" (signal identification and acquisition mode) which allows the user to get optimum results with minimum skill. A complete review of this new product will be presented in an upcoming issue of *MT*.



POLICE CALL RADIO GUIDE

by Gene Hughes; 1987 Edition (Nine volumes, 8-1/2" x 11", paperbound; 228,000 entries. \$6.95 per volume, available from Radio Shack stores or from Police Call, Dept. 1, Lebanon, NJ 08833. Add \$.90 book rate, \$2 first class mail).

The Police Call directory remains the leading source of scanner frequency information in the United States. Outside of the FCC microfiche files, the Police Call guide contains the largest quantity of data concerning public safety VHF/UHF communications in the country.

Additional short lists of railroads, aircraft, non-sensitive federal government and military are also contained as well as a very useful table of VHF/UHF frequency allocations.

Nine volumes are conveniently categorized by geographical regions, beginning with New England and concluding with the west coast. Entries are alphabetized by state, city and county and subgrouped by frequency. A separate frequency sort allows rapid identification of users on a particular frequency.

Data include frequency, call sign, agency, location, mobile/base identification, number of units, and service.

OFFICIAL NEW HAMPSHIRE SCANNER GUIDE

by Robert A. Coburn; second edition (8-1/2" x 11", 252 pages, paperbound; \$14.95 plus \$2.05 shipping from Official New Hampshire Scanner Guide, PO Box 712 Dept MT, Londonderry, NH 03053).

"Official" in the sense of being derived from FCC license records, this compendium of New Hampshire scanner frequencies contains over 6500 listings of public safety, business, industrial, amateur, conservation, railroads, aircraft, and many other popular targets for monitors including 800 MHz.

SHORTWAVE LISTENING HANDBOOK

by Harry Helms (243 pages, 6" x 9", \$17.95 paperback, \$26.67 hard cover; from Prentice Hall, Englewood Cliffs, NJ 07632)

The name Harry Helms is well

known to shortwave listeners; his previous magazine columns and full-length books for the hobbyist have pervaded the listening industry. Now, Helms has released his latest handbook and it's packed with useful information for the beginning listener.

The first half of the book is tutorial with an explanation of the various services to be heard, receiver and antenna basics, and radio wave propagation. Most of the remaining is international and domestic broadcast oriented, with a final section on "unusual, illegal and mysterious activity" -- pirates, clandestines, numbers stations, military, and airline chatter.

A few pages are included on amateur radio, pointing out some of the recent accomplishments of hams in space and disaster relief messages.

MORSUM MAGNIFICAT

(Quarterly journal; \$10 in banknotes from M. Hellemons,

Holleweg 187, 4623 XD Bergen op Zoom, Holland)

Truly, there are specialty magazines written for just about any area of interest, and *Morsum Magnificat* is a classic example. Published in Holland, it is written in English.

Nicely bound with 48 pages, many illustrations, *MM* is dedicated to the hard core Morse enthusiast and is loaded with historical insights, timely tidbits and newsy notes--all oriented around Morse code.

If you have an interest in joining a club or corresponding with a fellow "Morsecodian", there is no better way to make your contact than through the pages of this new quarterly magazine.

Photographs of early keys and Morse equipment are emphasized in the illustrations, along with friendly mug shots of the authors. It is easy to read and informative, but definitely for the telegraphy buff!



From Soup to Nuts...

Station News * DX Tips * Advance Program Details * Frequencies * Equipment News * Articles * and More

If you're a serious shortwave listener, you know the need for up-to-the minute information. And that's what *World Radio Report* is all about. From the world's most comprehensive station news section to advance program details to the latest equipment, *World Radio Report* has it all. From editors that know what they're doing -- Larry Magne on equipment, Gail Van Horn on loggings and Larry Miller on station news. Plus guest columnists from around the world.

If you're serious about your shortwave, you owe it to yourself -- and your radio -- to check out *World Radio Report*. One year of *World Radio Report* is just \$18.00. Sample copies are just \$2.50 in the U.S.; \$3.50 elsewhere in the world. Send check, money order or cash to World Press International Inc., 3 Lisa Drive, Thorndale, PA 19372. From the publishers of *International Radio*.

World Radio Report

It's nothing flashy. It's just the best.

Duckling or Swan?

A Look at the Yaesu FRG-9600



by Bruce R. Frederick, KAIFGY

The Yaesu 9600 is by far the oddest radio I have ever owned. While its frequency coverage is impressive, it has unusual and limiting boundaries.

Its sensitivity in some bands far surpasses other scanners, while in other bands it behaves like I've shorted my antenna to ground! It provides 100 scanning channels, yet you can only scan ten at a time. It provides a search function that can span the radio's entire frequency spectrum, yet it is so awkward to use that I generally ignore it.

And while the Yaesu 9600 is designed to be an advanced, microprocessor-controlled receiver, I find its manual tuning dial to be one of its better features.

But I have finally come to terms with this strange little radio and it now occupies a central position in my shack.

A MIXED BAG

The thing to remember about the Yaesu 9600 is that it is not really a scanner in the usual sense of the word. Yes, it does have 100 memory channels, and it does have scan and search capabilities of a sort, but this is not a radio for somebody who wants to plug in the local police and fire frequencies and keep up on the local news.

It *is* a radio for people who want to explore new bands, and the features make me think that the designers assumed that the radio would be used with the optional computer interface packages (to be reviewed in a future issue of *MT*).

For example, there is no way without the computer interface to make the radio stop for more than a couple of seconds on an active channel, even if somebody is transmitting; likewise, in search mode the radio will pause when it finds a signal, but only for five seconds. You cannot change the pause time.

The scan rate is slow--only 2-1/2 channels per second--and, out of the 100 channels, you can only scan a single bank of ten at any one time.

Frankly, I had initially ignored this radio when I first saw the ads. First of all, its frequency range starts at 60 MHz, a strange boundary that completely ignores the low VHF public service band and the 6-meter ham band.

Secondly, its high end terminates at 905 MHz which doesn't seem very state-of-the-art when other scanners now go up to 1 or 2 GHz.

Finally, the picture in the ads is deceiving and makes the 9600 appear as big and ugly as a 1960's boat anchor. In reality, the rig is small and neat and generally attractive.

So my first impressions were not positive and I gave no serious thought to adding this rig to my collection. My sights were set on the new ICOM-7000.

However, my purchase plans soon changed. I don't know about you, but I got awful tired of hearing, "No sir, the ICOM 7000 still hasn't come in yet." And when the 7000's did finally arrive, they came in with a \$100.00 price increase that made me decide to spend my money elsewhere.

That's when I re-examined the Yaesu ads. Yeah, it looked like an odd little radio, but it did seem to provide impressive frequency coverage for about half the ICOM 7000 price. And it was in stock.

A CONSUMER REPORTS

So I bought the darn thing, and since doing so, I have had a love/hate relationship with it unlike any other piece of equipment I've ever bought. I've had radios that irked me, and I've had radios that pleased me, but this radio does both every time I use it.

Once I got the radio home, I hooked it up to a Grove Scanner Beam and started exploring. I was pleased to find that the 9600 outperformed my Regency MX-7000 on the cellular frequencies (this was before passage of our favorite law) and seemed to at least equal it on the 220-400 MHz military aircraft band.

However, I noticed a disturbing drop in sensitivity in the UHF public service band; indeed, the sensitivity was almost nil at 460 MHz. Boston is about 12 miles from my QTH, and The Boston Police Department has a powerful 460 MHz repeater setup, but even with my Scanner Beam pointing right at the Boston P.D. transmitter, I couldn't pick up a thing. My Regency 7000 and Bearcat 220 both pick up Boston P.D. fine, even with their built-in antennas.

I decided to try an experiment, and hooked up a broadband TV antenna amplifier to the Yaesu 9600. Bingo! It was like flipping a switch. Where before there was nothing, now I was picking up a beautiful signal.

Now, I'm not a big fan of antenna amplifiers, and the fact that an "el cheapo" amp generated an S9 signal out of absolutely nothing makes me very suspicious of the 9600 front end.

Antenna amps can sometimes improve a weak signal, but they shouldn't perform miracles.

My next encounter with sensitivity problems developed when I took the rig along on vacation to Lake Champlain. I was scanning the VHF marine band and discovered that the bottom-of-the-line Bearcat scanner I had given my in-laws for Christmas was outperforming my new toy.

This was getting serious. A few hours later, I turned on the rig and it was totally dead. The audio was fine, the readout and the front panel controls all seemed to work, but the radio behaved like I had connected the antenna jack to ground. It came back to life for a couple of days, but then it repeated its dying act and never recovered.

I called the dealer and they were very pleasant. "Just ship it back to us--since you've only had it a short time, we'll probably just ship you a new one in a few days." Two weeks later, I phoned to find out where my replacement was, and I was told they would expedite it.

Another two weeks later, they informed me that they weren't replacing it, but instead had shipped it to Yaesu for repair. When Yaesu finally returned it after another couple of weeks, they had tweaked it, but had not fixed the main problem: the radio died again a few days later.

This time the distributor agreed to replace the rig, and I soon had a reliable 9600 on my shelf which had better sensitivity at 460 MHz than the first rig, but was still inferior to my other radios. The cheap antenna amp still made a much bigger

improvement than it should have. I note in the service manual that a couple of modules in the front end have a boundary at 460 MHz, and I am suspicious that a design flaw here might explain the sensitivity drop.

WOULD I RECOMMEND IT?

In fairness, I must repeat that the sensitivity on the other bands is equal or superior to my other scanners. Image rejection, particularly above 800 MHz, is very good, and I must confess that I just love finally having a VHF/UHF radio with a tuning dial. Scanners are great, but there are times when you just need that dial-twisting capability to quickly check out a band.

My only complaint here is that the front panel buttons are positioned so that they are very easy to accidentally press while using the tuning dial.

So the bottom line is this: the Yaesu 9600 is an alternative to the ICOM-7000 if you are on a budget and do not require all of the superb features and specifications of the 7000. Without the computer interface, the Yaesu 9600 is a good, sensitive (generally), full-coverage (almost), receiver that can be a lot of fun for exploring new bands. The tuning dial may make up for the limitations of the built-in, microprocessor-controlled features, depending on your needs.

And if you are confident in your technical and programming skills, you may find that the optional computer interface allows you to turn the 9600 from a duckling into a swan. That part of the story in Part II. ■

TABLE 1
Summary of Yaesu 9600 Pros & Cons

Pros

- Good frequency coverage
- Very sensitive on most bands
- Good image rejection
- Manual tuning dial
- Computer interface available
- Wide choice of step increments (5, 10, 12.5, 25 kHz)
- Wide choice of modes (AM-W, AM-N, FM-W, FM-N, USB, LSB)
- Signal strength meter
- Good audio stage
- Selectable af scan (squelch breaks only on voice, not carrier)
- 100 memory channels

Cons

- Strange frequency boundaries
- Limited and slow scan capability
- Limited and awkward search capability
- Sensitivity problems at some frequencies
- Awkward placement of front panel controls

MAINE

Home of Huge Antennas

by Daniel Simmons

They say things are big in Texas, but if you want to see big antennas, then the place to go is Maine. Being in the extreme northeast of the United States, it is the ideal location for antennas to cover the North Atlantic area.

Pictured below are antennas at three separate military installations in Maine.

Photo 1 is of the OTH-B (Over the Horizon Backscatter) antenna arrays being constructed near Moscow, Maine. This USAF project will be the equivalent of the USSR "woodpecker" which is known for its incessant rat-a-tat interference.

Photo 2 is of a shortwave direction-finding antenna near Corea, Maine. This facility is one of the sites operated by the USN Security Group at Winter Harbor.

Photos 3 and 4 are of the USN transmitter facility at Cutler, Maine (callsign NAA). Photo 3 is of one of the towers for the VLF (very low frequency) antennas. There are 26 towers supporting the identical VLF antennas.

Note the ice-guards on the building to protect it from falling ice. Presently the VLF transmitter is operating on 24.0 kHz.

This Naval installation also operates HF (shortwave) which is responsible for the encrypted 50 Bd radioteletype often heard on 7455, 10130, and 11688 kHz. It is also usually active with encrypted 75 Bd RTTY on 4528, 6439 and 7597 kHz. On occasion, other 75 Bd and multichannel broadcasts have also been noted.

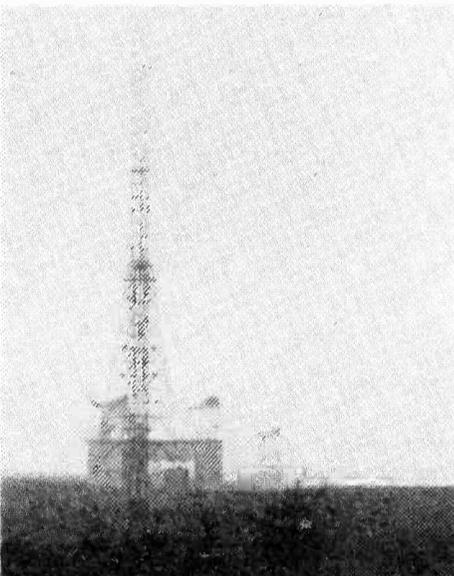


Photo 3: USN VLF tower at Cutler, Maine



Photo 4: The USN VLF transmitter facility at Cutler, Maine

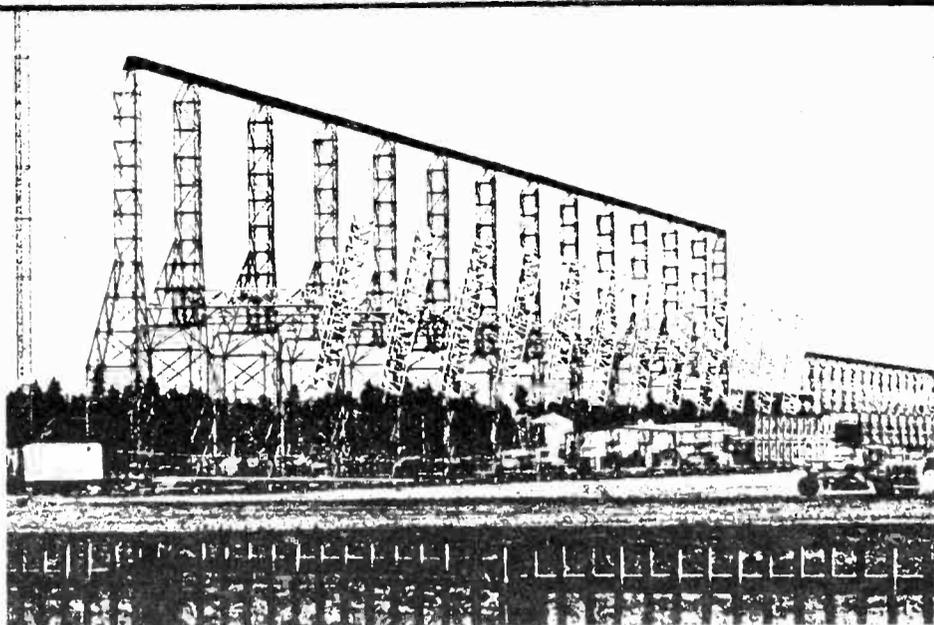


Photo 1: USAF OTH radar at Moscow, Maine

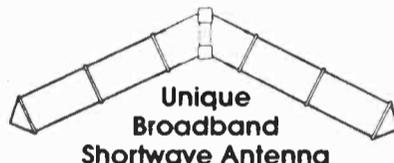


Photo 2: USN Security Group's shortwave direction-finding antenna near Corea, Maine

THREE GOOD REASONS FOR INSISTING ON B & W SHORTWAVE LISTENING ANTENNAS!

1 FOR TOTAL COVERAGE

Model ASW-90



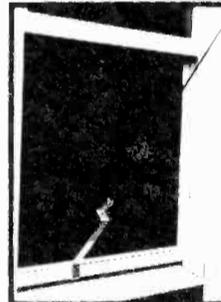
Utilizing the same principles as the B & W world-acclaimed transmitting antennas, this patented receiving antenna provides outstanding coverage of all the frequencies in the shortwave region. With coaxial cable feed, the SWR is less than 2:1 throughout the 3.5 to 30 MHz spectrum. Good MW and LW reception is also provided by this big antenna. Rugged construction with #14 stranded copperweld wire. SO-239 connector for coaxial cable. Only 90 feet long.

ONLY \$79.50

ADD \$4.00 SHIPPING AND HANDLING CHARGES

2 FOR PORTABILITY

Model ASW-5



Designed for APARTMENTS MOTELS VACATIONS

PRICE \$42.50

ADD \$2.00 SHIPPING & HANDLING

The turn of a thumbscrew will install and remove this sturdy antenna and give you outdoor reception where conventional antennas are restricted. This window-mount antenna extends from 22 in. to 58 in. to provide coverage from 5 MHz to 100 MHz. Its 10 ft. long coaxial cable connects to your shortwave or scanner receiver.

3 FOR PEAK RECEPTION WITHIN THE BROADCAST BANDS

B & W Model ASW-60* Dipole Antenna

Covers all shortwave broadcast bands from 11 through 60 meters. Resonant circuits automatically match antenna length to desired band.

FEATURES:

- Rugged weather-resistant construction
- Lightweight - Overall length only 35 feet
- Pure copper conductors - cannot rust
- Comes completely assembled - Not a kit

ONLY \$57.50 Either Model

ADD \$2.00 SHIPPING AND HANDLING CHARGES
Shipping Weight 2 lbs

- * Specify desired termination:
Model ASW-60C - RF Coaxial Connector
Model ASW-60L - 50 Ft. Twin-Lead Cable

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(215) 768-5581

FRG9600 FREQUENCY EXTENDERS

The Yaesu FRG9600 was initially designed for European and Asian markets; this is the reason that it offers an odd frequency range (60-905 MHz) rather than including the normal upper and lower limits of the North American land mobile bands (30 and 960 MHz).

A British company advertises an internally-mounted frequency converter for the 9600, but we have had no experience with the company and can only reflect their advertisements.

Apparently the units are custom installed at their offices and it is quite possible that the converter is unavailable for export.

Model RWC/Mk3 is a converter which allows continuous reception from 100 kHz through 950 MHz. Further information may be obtained by writing R. Withers Communications, Ltd., 584 Hagley Road West Oldbury, Warley, Birmingham B68 OBS, England.

Largest-Smallest Antenna Contest and the winners are...

The winners have now been determined in our "Largest and Smallest Antenna Ever" contest, and I want to thank everyone who submitted an entry. It has been interesting and entertaining sorting them out! The entries range from a tower antenna over four-tenths of a mile tall to antennas covering acres of ground, to a minuscule antenna in a swallowable capsule!

The biggest problem in deciding the winners was that there is more than one way to rate an antenna on how "big" it is! Should we say that the world's largest antenna is the tallest one, the one with the longest run of wire, or the one which covers the most area? Well, I took the coward's way out of this dilemma, and decided to name several winners in the "world's largest antenna" category!

The World's Tallest:

Surely a heavyweight contender for the world's largest antenna is the entry of *MT* reader Douglas Shinn. He suggested several antennas for this category, among them the guyed-mast antenna at Warzawa radio in Poland.

This monster is more than four-tenths of a mile in height (2,120.75 feet)! Such a mast will surely have its top frequently hidden by clouds. Just think of being the "steeplejack" responsible for climbing and changing the aircraft warning lights on this winning entry for the tallest antenna in the world.

But if Frank Lloyd Wright, the famous architect, had had his way, we might have had a different winner here. Wright proposed a building over a mile high! There was to be a broadcast antenna atop that building, which would surely have been the "highest" antenna erected by man.² OK, so "highest" doesn't necessarily mean "tallest," but either way, than antenna never got "off the ground" as far as I know. So we're stuck with "shorties" like the Warzawa mast!

Greatest Area Covered:

Reader Allen Easton wins in the "largest area covered" category with his entry of the very old antenna shown in figure 1. This antenna, pictured and described in Bill Orr's *CB antenna handbook*,¹ as well as in Loomis,³ is a mere 600 feet in height, yet, in 1917, it covered hundreds of acres of French countryside!

Antennas in the early days of radio were considered to be large capacitors, and the more earth area you could blanket with your antenna, the greater the capacity of your antenna. The frequencies used in those days

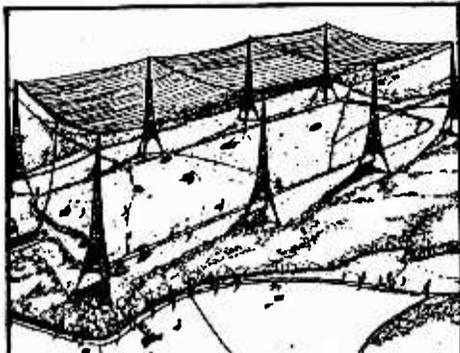


FIG. 1. ONE OF THE WORLD'S LARGEST ANTENNAS. (LOOMIS)

were quite low (in the LF and VLF bands) so the more capacity you could get the easier it was to make your antenna resonant. Giant antennas of the sort Allan submitted were highly prized in 1917!

It is interesting to note here a proposed "super antenna" which George Southworth reports in his *40 Years of Radio Research*,⁴ which was to cover 50 square miles, an area comparable to all of Manhattan Island! The crash of 1929 stopped this longwave monster in its design stages, and radio's move to the shortwaves occurred before the economy recovered sufficiently to begin construction.

Dishing It Out:

A number of readers cited the radio-telescope antenna at Arecibo, Puerto Rico, as the world's largest. This antenna, a 1000 foot diameter dish, carved in a natural depression, is truly large for a dish antenna, and is widely reported as the world's largest antenna.

The Arecibo antenna is the largest fixed reflector antenna; however, the world's largest fully steerable reflector antenna is the 100 meter diameter radio telescope at the Max Planck Institute for Radioastronomy at Effelsberg, German.⁵

We weren't looking for the world's heaviest antenna, but it is interesting to note here that the Arecibo antenna feedhorn alone weighs 500 tons! That is one heavy antenna! Actually, though, larger dishes have been proposed. One source indicates that: "Reflector antennas that would dwarf even the Arecibo instrument have been studied for use in the gravity-free environment of space."

World's Longest Antenna:

Now, what about the longest antenna in the world? Readers Debby Stark and Douglas Shinn both suggest the antennas of the U.S. government's project ELF as contenders for this category. And they're both winners!

This project touts antennas with runs of up to 56 miles of wire, though the antennas don't necessarily run in straight lines. These antennas, together with their powerful 76-Hz ELF transmitters, provide global communications with submerged submarines around the world!⁶

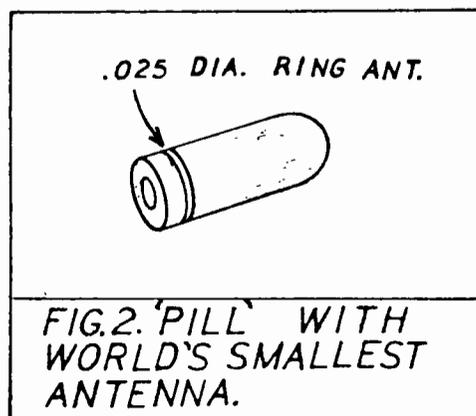
And Now for the World's Smallest:

Robert Fischer of Huntington, West Virginia, came up with what seems at first thought to be a shoo-in for the world's smallest antenna. As most of your readers know, many receivers will pick up signals with no antenna at all attached to them. You can't get an antenna much shorter than zero length! But as Fischer correctly pointed out, in such cases some component in the receiver is acting as an antenna. Usually it is the antenna coil, or some signal is coming in on the AC line cord.

Another intriguing entry came from Debby Stark, who suggested the antenna of a "swizzle stick" transmitter in a "James Bond cocktail" as the world's smallest. *Monitoring Times* is famous for reporting on secret uses of radio, but I don't think we've covered that one yet! But of course, radio systems of this general nature do exist, and come in even smaller sizes! (*A martini olive transmitter with a toothpick antenna was a real-life contender!...Bob*)

An electronic security specialist in the Maryland area (name withheld on request) sent in his company's catalog along with a figure displaying his winning entry for the smallest antenna ever: a tiny ring around a .25 inch diameter capsule (fig. 2) to be carried by executives or political figures who run some risk of being kidnapped.

When swallowed, the pill-transmitter's battery activates by action of the stomach's own acid and sends a signal from this mighty-mite of an antenna which is reported to allow tracking from three to five miles away!



Certainly we are getting down to the lower limits of antennas in practical use. But there is one smaller antenna of which I have heard--a cat whisker in a He-Ne laser. This whisker, although it is only a microscopic 22 μ m in length, lends itself to analysis by long-wire antenna theory.⁷ The cat-whisker is not really a long-wire antenna, or even an antenna at all, in the sense we usually think of one. But evidently it thinks that it is!

But Wait, Large is Actually Small!:

At this point it seems appropriate to consider the words of a well-known antenna pioneer, Harold A. Wheeler. In considering what is large and what is small in the world of antennas, he tells us: "The largest antenna in the world is a small antenna..."⁸ Here he refers to the fact that the monster antennas, such as the ELF antenna, and the old French antenna discussed above, are made for really low frequencies, where the wavelength is very long (check my last month's column for a discussion of size of wavelength).

This means that, in terms of wavelength, the monster antennas look quite small to the radio waves with which they must deal. And so, as with all other things, it's your perspective that determines just which is the largest or smallest antenna in the world. And that's what we're all looking for, isn't it, perspective?

So, congratulations to the winners, your prizes are on the way. And thanks again to each person who sent in an entry. I hope that everyone has enjoyed this trip through radio's antenna-land. It never gets boring there, that's for sure.

I told you last month that I'd finish the UHF/VHF antenna series this month, but there is just not room for the contest results and that series, too. Next month we'll get back to the second and final part of the series. No April fooling!

RADIO RIDDLES

Last Month's Radio Riddle: Last month we left you with talk of ghosts, specters, phantoms, spirits and the question: "What is a phantom antenna?"

Well, I have a confession. A phantom antenna has nothing to do with spirits or ghosts. It is actually a circuit, sometimes consisting of only a resistor, which is used to substitute for an antenna. It is used in transmitter tests in which no radiation is desired. Other names for this type of antenna are: "artificial antenna," "mock antenna," "mute antenna," "dumb aerial," and the more

Computer Logic Chips

This month we are going to take a look at several of the more common logic chips that are used quite extensively in the computer world. These chips will return in subsequent columns as we attempt to put together a universal interface adapter card that will allow our computer to control a radio receiver, a signal generator, or whatever device you may decide is to be computer controlled.

The accent is on simplicity so that most of the design work will be at the controlled device itself, thus minimizing the interface hardware and allowing more than one device to be attached to the same adapter.

The interface adapter will be designed for the IBM PC bus for two very good reasons: first, IBM or IBM clone machines are widespread; second, and most compelling, I have access to an IBM and not to any of the other popular machines!

The principles outlined in the interface adapter design should be of help should anyone wish to modify the adapter for another machine. The biggest problem will be getting access to the technical specs of the bus, providing the machine even has a bus accessible to the user.

The 74LS244 and 74LS245 Buffer Chips

Referring to Figure 1, the 74LS244 is a mainstay of the IBM and clone logic world. Just about any adapter made for this machine uses one or more of these chips.

The principal use of this chip is buffering; one of the bus rules of the PC is that no adapter card shall present more than two TTL loads to the bus on any pin. The easiest way to accomplish this is to buffer all the bus lines on the card.

If the line drives in one direction

only, such as an address line going to the adapter, the 244 is a good choice for the buffer. As we see from Figure 1, a line enters the 244 via one of the data lines and, after being buffered, exits the chip as data out with the ability to drive multiple chips on the adapter card. No matter how many chips the output is driving on the adapter, the bus sees only one TTL load at the input.

There are eight data buffers on one chip, making it handy in a byte-oriented machine. There are two other lines of concern to us--the gate lines. Gate 1 controls data 0 through 3 outputs, and gate 2 controls data 4 through 7.

If the gate line is low, the data out pin will be the same logical level as the corresponding data in pin; if the gate line is high, the input is unaffected but the output pin is left in a tri-state condition or floating. This serves as a way to "hook and un-

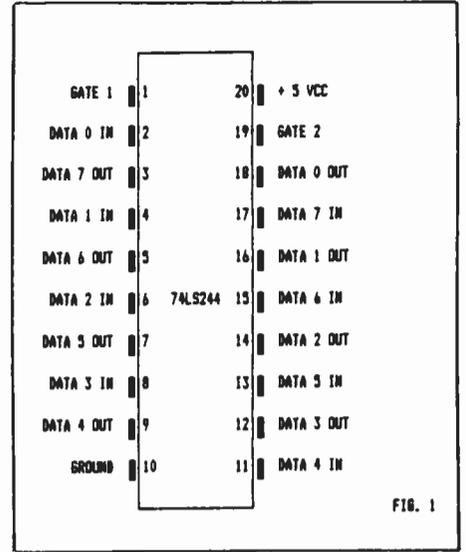


FIG. 1

hook" data lines to a bus, among other things.

The most common occurrence of this chip is in the address lines on most adapter cards, where the 244 is used to buffer the address circuitry from the bus.



FIG. 3. 'PHANTOM' ANTENNA.

commonly used "dummy load" as shown in figure three.^{9,10,11}

This Month's Radio Riddle: Well, now that we have just insulted the world of antennas by calling the mute antenna a "dummy," can you think of a way that we could make amends, and talk about a "smart antenna?" We'll try to answer that one next month. Hint: think "smart antenna system," rather than just "smart antenna."

In the meantime, drop me a line if you have any comments on the column, or suggestions for what we should cover in the future. ■

W.Clem Small
R.R.1, Box 181
Salisbury, VT 05769

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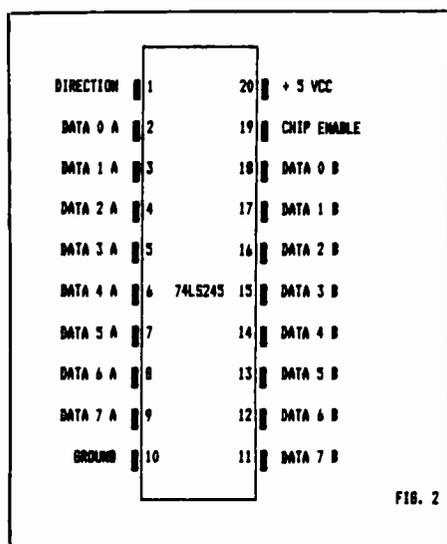


FIG. 2

COMPUTER CORNER cont'd from page 51

In Figure 2, the 74LS245 is similar in nature to the 244, but with one important addition - the direction line. The chip-enable pin works just like the gateline on the 244, except that one line controls all eight data lines.

With the direction line in the high state, data is transmitted from the data A input to the data B output provided, of course, that the chip enable is low. If the chip enable is high, all data B outputs are tri-stated.

Now the interesting part: if the direction line is made low, the data A inputs become outputs and the data B outputs become inputs! This direction switching ability is used where a data bus reads from and writes to an adapter card.

A primary example is again on the PC adapter card, this time on the data lines, where the data must be shipped to the adapter on a write operation and read from it on a read operation.

In addition to allowing direction switching, the data inputs present one TTL load to whatever is driving them, and the data outputs can drive multiple loads. As an example, data from the PC bus during a write operation is presented to the data A inputs and the direction line is high.

This allows the data A input to appear as one load to the bus and the data B outputs can drive multiple loads on the card.

When data is read from the card, the direction line is made low and the data A lines are now outputs and can drive the PC bus with its many TTL loads (Each adapter card appears as one TTL load, and the mother board circuitry will look like at least one TTL load to the adapter card that is being read).

Direction control is usually obtained on an adapter card by using either the read or write line to switch the 245. The chip enable is usually driven by the address decode circuitry that

the adapter has to decide if the address on the bus is its own. More about this later with Figure 4.

The 74LS273 Latch Chip

Figure 3 is the 74LS273, referred to as a latch chip or, more often, as a register. It contains eight data latches, each with an input and an output. This chip also has some special purpose pins, the clear and the clock pins.

The following description applies to each data latch as they all work identically. The clear pin does just as its name implies: it clears all the data registers when it is made low. By clear we mean that the eight data outputs are all latched low and will remain that way when the clear line is again made high.

Operation is simple--the data output for each latch will be frozen in the same state (high or low) as the corresponding data input state at the time the clock input is made high. Note that the clock line must be changed from low to high to cause this latch effect. Once this clock transition takes place, the data output is frozen and changes on the input will not change the output.

The clear pin is normally tied to the power-on reset line so that the latches are all cleared to a known off state at power-on. There are sometimes other ways to activate the clear line, such as a write operation to one of the adapter addresses.

The clock line can be activated in several ways also, the most common way is by the write line. Activating the write line when it is connected to a 273 clock line causes the data on the bus to be latched in the 273 data outputs. We will make use of this latching ability in the universal adapter card in columns to come.

A close cousin of the 273 is the 74LS373 which operates identically

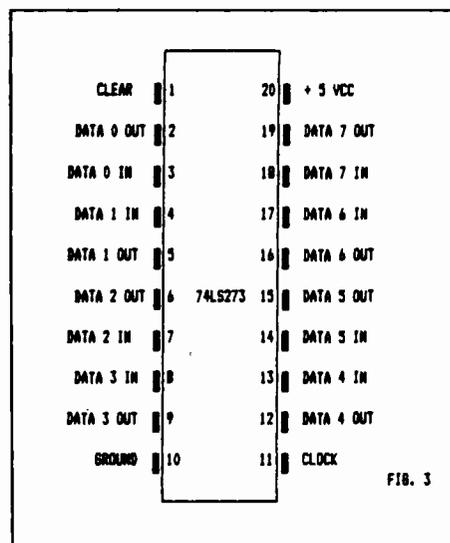


FIG. 3

except for the fact that there is no clear line; an output-enable line has been substituted. The register is cleared by writing to it rather than a direct clear. The 373 is useful where the output has to be tri-stated at times.

The 74LS138 Decoder

Finally we come to Figure 4, the 74LS138, referred to as a three-line to eight-line decoder and used primarily for address decoding on the adapter cards. Operation is fairly simple in that the three address bits ADD 1, 2, and 4 (or A, B, and C if you prefer) select one of the eight output lines. As an example: ADD line A=0, B=1, and C=1; in the 1-2-4 binary scale this totals 6 and the output decode 6 line will assume a low state.

There are several special lines--the enable lines. In order for the appropriate decode output to assume the low state, the enable lines must be at the states indicated; that is, pins 4 and 5 must be high and 6 low.

These enable pins are sometimes driven by address lines or by read or write lines, or even outputs of other 138 decodes where more than three address lines are to be decoded. We will make use of the 138 in several places on our upcoming adapter card for individual and block address decodes.

Anyone who may be interested in putting together one of the adapter cards for the IBM PC or clone should obtain a TTL handbook and read up on the above chips as they will be the predominant chips used.

PROGRAM DISKS

Before we wrap up the column for this month, I would like to mention several more programs of interest to hams, listeners and experimenters.

Lynn Gerig (WA9GFR) has a disk

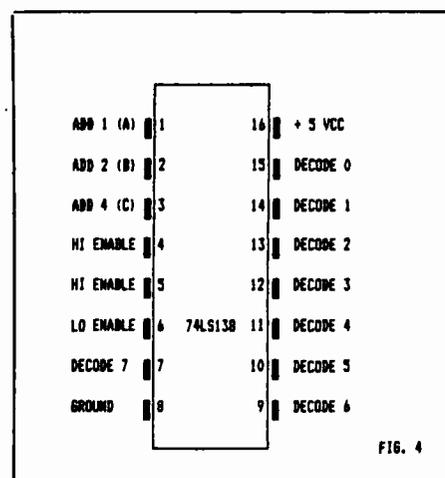


FIG. 4

OUTER LIMITS cont'd from page 33

lately. You may want to give them a try. Fairly easy to log is the African National Congress program "Radio Freedom" in French relayed via Africa Number 1. Look for it on 15475 kHz around 1900 UTC or 2000 UTC. The ANC opposes the white minority government of South Africa.

If you want a real challenge, then go after Radio Halgan, via Ethiopia, on 9590 kHz around 1700 UTC. This one opposes the government of Somalia and broadcasts in the Somali language.

That's it for another month, and to mi amigo Fernando -- asi es la vida, tango.

Dr. John Santosuosso
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Highland City, FL 33846

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

full of such things as VHF and UHF propagation programs and Smith Chart impedance matching programs. Called the WA9GFR Communications Disk, it's available at \$15.00 in C-64, C-128 and IBM/MS DOS format. If interested, write to Lynn at R.M.T. #1, Morgan Road, Monroeville, Indiana 46773. Be sure to mention which machine you have.

Also in the line of RF and ham interest, I have obtained a copy of a number of public domain programs written in Basic for the IBM/MS DOS machines that cover such areas as op-amp calculations, radiated power, satellite orbits, network and attenuator circuit calculations, etc. There are over 30 programs on the disk.

I will ship a copy to anyone interested for the same price as the previously offered disks, \$4.00 ea. Incidentally, the other disks--Murray TTY and Procomm--are still available at the \$4.00 price. The demand has been reasonably low so that there is not a great demand on my time to duplicate and ship disks; I will continue to do so for a while longer.

While we're on the subject of time--my mail box has started to pile up slightly, so if you have dropped me a line recently but haven't received an answer yet, it's because I am running slightly behind. Hopefully, I will have it all caught up by the time you read this. And don't forget, an SASE really helps!

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

Harness the Howl - Notch it out!

In the early '50s I was privy to a station that had a receiver with a "notch" control. Even though it took the fingers of a brain surgeon to work, it was up to then, the slickest thing I'd ever encountered (see fig. 1).

Until recently, this control was seldom seen on any piece of commercial gear; then it became common on ham equipment, but has yet to become a standard feature on most general coverage receivers.

I realize you don't want to drill a hole in the cabinet of your radio. Bad re-sale value. There is an easy way to do it, though, without messing up the front panel.

A radio with a single "tone" control has, in essence, a "treble cutter," i.e., it gives the illusion of increased bass by knocking off the high frequency component. If you have a favorite position on your tone control, it may be "fixed" (see fig. 2), leaving a hole for a notch control which otherwise would have to be mounted in a separate box.

How to use it:

All of the parts may be obtained at Radio Shack with the exceptions noted. Once installed, tune in a nearby broadcast station running about S7. Starting with the notch control fully clockwise, turn it slowly until the S meter (or audio) drops. At this point, tighten the knob pointing at 12:00; the knob is normally "parked" at 9:00 or 3:00 to keep the notch out of the received signal until it needs to be used.

The Circuit:

The circuit looks a little complicated, but all components except the "pot," Zener diode and two resistors are

mounted on a small P.C. board--and with this simple addition, you can knock those heterodynes in the ditch!

After locating your receiver's second IF grid or base/gate connection, mount the new P.C. board as close as possible and solder the top of L1 to that point and the ground connections to the nearest ground lead.

The critical component is the varactor diode. This device acts like a variable capacitor in proportion to voltage applied in a reverse biased condition. The Motorola MV1872, GE-90 and Japanese 1S2790 and 2888 are the only devices I've found that will work correctly in this application. Also, the "pot" must be linear - your log-taper tone control will "bunch up" at one end and will be very squirrely to tune otherwise.

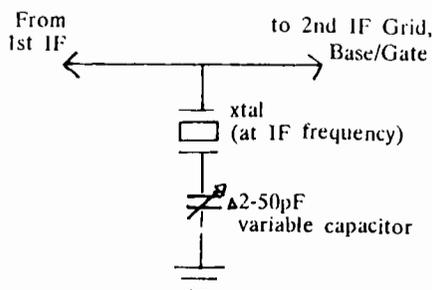
The crystal needs to be a general purpose, series resonant, 32 pF device in an HCE/U holder at the IF frequency (usually 455 kHz). It can be tuned over a range of approximately 4-6 kHz. Optional capacitor C2 is needed only if the "on-frequency notch" is substantially off 50/50 on the control. If needed, simply set the pot at 50/50 with a local BC station tuned in and adjust C2 until the signal drops on the "S" meter or the audio disappears.

For a very reasonable price (under \$15.00) I swear to you that you'll wonder how you ever got along without it! Enjoy. Any questions will be answered when an S.A.S.E. is provided.

Terry Staudt
716 N. Roosevelt
Loveland, CO 80537

Fig.1: Basic Circuit

(Not recommended due to critical tuning and shielding requirements of capacitor lead.)

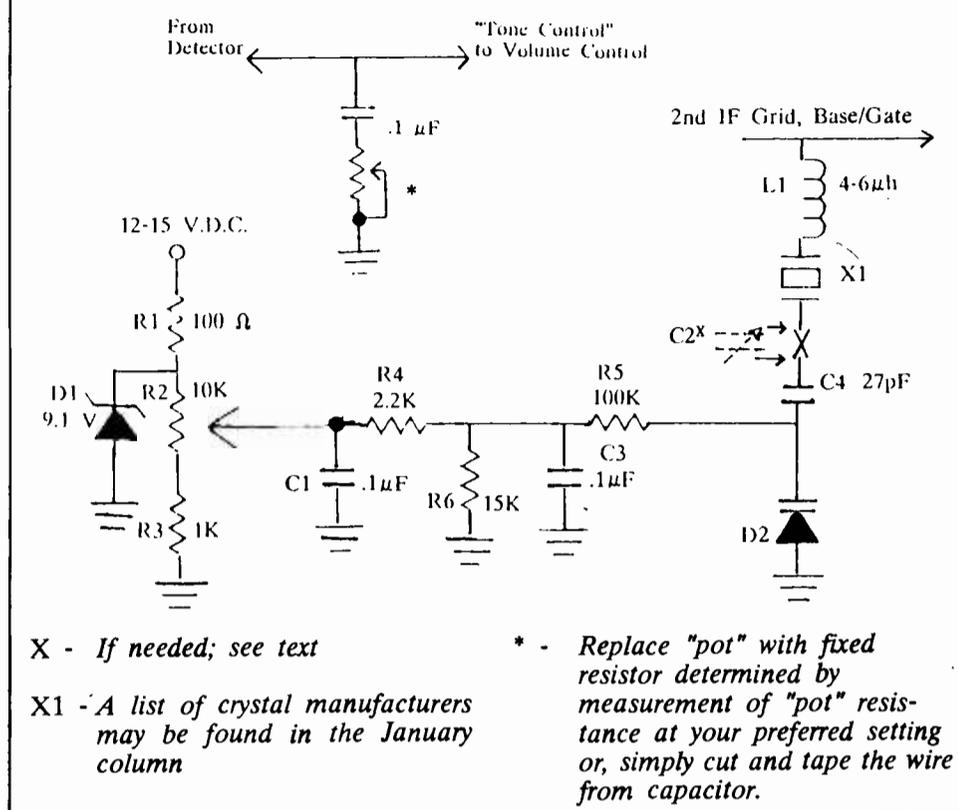


The simplified circuit, although workable, is very difficult to tune but is shown as a reference to cut through the multiple components to get to the basics. The principle reason for using the extra components (as in any circuit) is to refine it for ease of use and accuracy.

To go to extremes, the difference between a "crystal set and a double conversion super-heterodyne" will be pointed out in small increments in this column each month for the purpose of building a foundation of understanding of how electronic circuits behave.

Your comments on this will be appreciated and analyzed.

Fig. 2



X - If needed; see text

X1 - A list of crystal manufacturers may be found in the January column

* - Replace "pot" with fixed resistor determined by measurement of "pot" resistance at your preferred setting or, simply cut and tape the wire from capacitor.

PARTS LIST
(All #'s Radio Shack)

C1,C3	#272-135	D1	#276-562
C2	#272-1340	D2	As specified
C4	#272-121 (C2,C4 in series)	X1	As specified
R1	#271-152	L1	May be a Miller miniature choke of from 4-7μH or be constructed with 26 turns of #28-30 insulated wire on a 1K, 2 Watt resistor.
R2	#271-175		
R3	#271-023		
R4	#271-027		
R5	#271-045		
R6	#271-036		
		P.C. Board	#276-148

Preventive Maintenance -- Try it, you'll like it!

The biggest chestnut they drummed into us at electronic schools in the Navy (besides "if it moves, grease it - if it don't [sic], paint it"); was that heat and dirt were the biggest enemies of electronic apparatus. We all used to have a big laugh at cigarette breaks over the stupid idiots who had nothing better to do than pound away on this theme.

At sea, the air is relatively clean and so is the ship; taking this into consideration, you simply would not believe the crud that constantly accumulated in the filters and the gear itself!

At home we fry, smoke, use aerosol sprays for various purposes, sweep, and vacuum. If just a tiny proportion of all this daily pollution lands in your radio equipment, in a few months it's clogged! It's rather obvious to sweep away greasy dust that accumulates at the heat escape louvers on the cabinet; what we're going to do takes a bit more time and

catches problems before they happen!

You will need a very soft, one-inch-width paint brush from the local hardware and a can of "TV tuner spray" with no silicone lubricant.

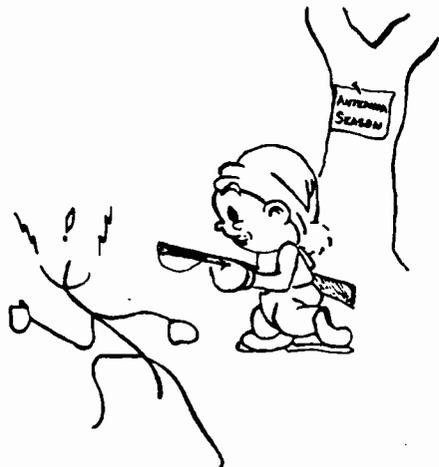
Step One

Take the unit out of its case, being careful not to burr the screw slots. With the possible exception of wires attached to a speaker, the case comes off easily removing the obvious, in-line screws. Place a newspaper under the unit and wash down the top and bottom of the chassis with the tuner wash.

Remove the tubes, marking those whose identifications are no longer visible (there may be a tube location diagram or you may have to draw one). Take the tubes to the best checker you can find, even if it's just the drug store. Look for shorts, gas and relative performance on the meter following the instructions. If a

ANTENNAMANIA ... Getting Set for the Season

WHAT KIND OF ANTENNA DO I NEED? by Bob Grove, WA4PYQ



Shortwave

It is true that any length of wire will pick up signals; it is equally true that a well-planned antenna installation will pick them up better.

IMPEDANCE AND SWR

While "impedance mismatch" and resultant "standing wave ratio" (SWR) are important considerations for transmitting, they are of virtually no concern to receiving installations. Of paramount importance is "capture," or "aperture," the actual size of the signal gathering portion of the antenna.

But the "bigger the better" misconception still has its drawbacks. While it may be true that a mile-long antenna can intercept a sizable amount of radio energy, other considerations such as height above ground and frequency band to be covered are equally important.

The greatest efficiency of an antenna is reached when the antenna is "resonant"; that is, its electrical length matches that of the incoming radio wave. Since wavelength varies with frequency this magical match to your antenna can only occur at one frequency (and harmonically related multiples).

It is the job of the designer to come up with an antenna that provides the best combination of features for the radio listener who wants wide frequency coverage.

There are many tricks of the trade which have been learned from trial and error; while antenna design is not really a "black art," it would appear so to many hobbyists and engineers alike due to the many interdependent considerations.

IS BIGGER ALWAYS BETTER?

A receiving antenna serves only one purpose: to intercept enough electrical energy to overcome losses and noises in the receiving system. Once that minimum has been reached, no amount of amplification will make the signal easier to copy...just louder.

Directional antennas can concentrate the incoming energy (called "gain"), rejecting noise from other directions for better signal-to-noise ratio. A large capture area ("aperture") can also compensate for poor receiver sensitivity (with higher internal noise) by providing greater signal levels to begin with.

An antenna should be as high as possible and away from large metal surfaces and electrical power lines.

Never run an antenna wire or transmission line over a power line and preferably not under one, either. Not only will it pick up electrical noise, but it is dangerous as well.

Indoor antennas are susceptible to electrical noise pickup from household appliances, although loop antennas may be rotated for minimum noise.

PREAMPLIFIERS

Modern receivers have excellent sensitivity when used with outdoor antennas of sufficient design. Since wideband preamps amplify all signals (including the strong), use one only in low-signal-strength environments like rural areas; otherwise, you may expect to aggravate the interference and desensitization by overloading the scanner with high-level, unwanted signals.

The use of wideband preamps in metropolitan areas is discouraged unless the antenna is so poorly located that all signals are low in strength.

FILTERS AND ATTENUATORS

The presence of strong signals can overload a receiver, producing desensitization, images and intermodulation. If the strength of those overpowering signals could be reduced, interference products can be similarly reduced or even eliminated. The following devices are placed between the antenna and the receiver.

Band-reject filters and wavetraps remove a swath of undesired spectrum; low-pass filters cut off signals above certain frequencies; high-pass

TECHNICAL TOPICS cont'd from page 53

tube falls in the yellow range, it's probably OK.

Push gently on the speaker cone, feeling for friction at some point. Also look for tears and a complete drying out of the paper. If the radio is over 25 years old, I'd say, "Just replace it."

Take the speaker to Radio Shack for proper sizing; get one with the largest magnet the mounting area will accommodate. Do Not get a speaker with a "whizzer" cone--they amplify hiss! Don't worry if your old one was 3.2 or 4 ohms--an 8 ohm replacement will work just fine.

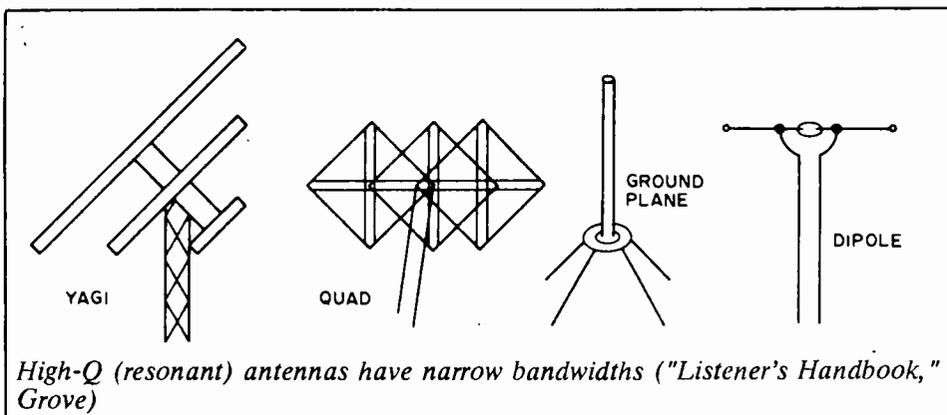
Brush out the dirt after the tuner wash has dried and look for "goo" coming out of any electrolytic (filter) capacitors. The "goo" is usually white and indicates the unit needs to be replaced. Cut the leads, marking them with a tape system you understand and take the unit to your local electronic supply store. Variations up to 30% are permitted on the capacity, but not the voltage; the physical size is what you're after.

Burned (charred or discolored) resistors can be easily replaced if you can still read the colors. If all the colors have turned brown, "lift" one end and check it with an ohmmeter. After you get a value, select the next standard value lower (burned resistors go high in value), i.e., if it reads 7000 ohms, use 6800 ohms to replace it.

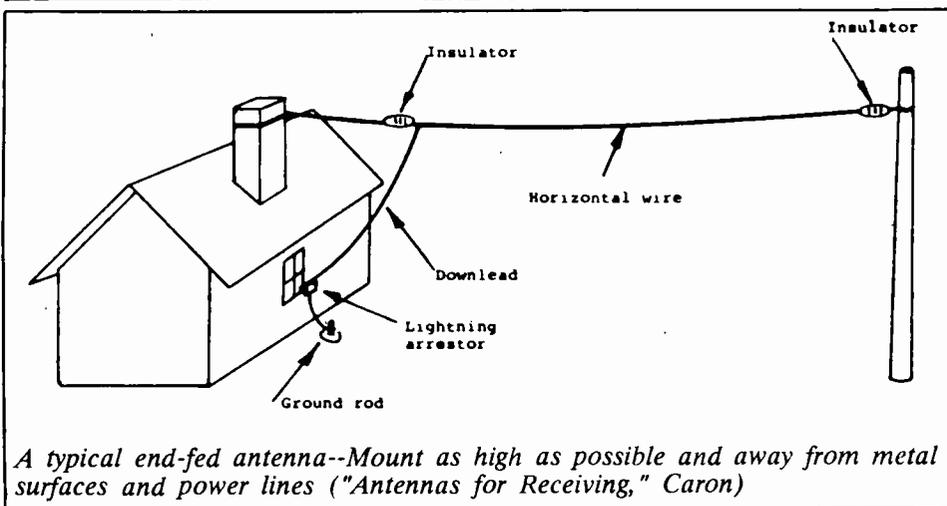
On some receivers the variable (tuning) capacitors have a screw and lock nut at the end. It's very important that the stator and rotor plates be equidistant from each other. With the plates totally meshed and a strong light, one can perceive a shift one way or the other. Usually no more than 1/8th of a turn will set things right.

"Why should I do this," I hear you cry. "Why not let it crust up like a friendly pipe?" The reason is simple.

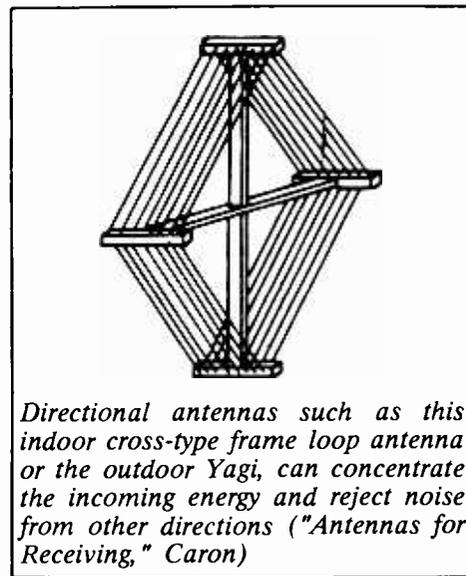
Dirt, grease and smoke residue have finite *resistance*! Slathered around a resistor or capacitor and its leads, such residue provides a leakage path that upsets the engineering calibration and locks in heat, degrading the unit's performance and shortening its life. They don't give 'em away, you know! ■



High-Q (resonant) antennas have narrow bandwidths ("Listener's Handbook," Grove)



A typical end-fed antenna--Mount as high as possible and away from metal surfaces and power lines ("Antennas for Receiving," Caron)



Directional antennas such as this indoor cross-type frame loop antenna or the outdoor Yagi, can concentrate the incoming energy and reject noise from other directions ("Antennas for Receiving," Caron)

filters cut off signals below a certain frequency; notch filters slice out a particular piece of spectrum in an effort to remove one frequency; and attenuators are resistor networks designed to reduce all signals equally.

TUNERS

A "transmatch" or "matchbox" is a transmission-line impedance matching device used with transmitters to prevent damage from high voltage generated by mismatch. No such conditions exist in receivers and, although a slightly higher S-meter reading may result by adjusting for better impedance match, the noise level will also rise. Impedance tuning devices are generally unnecessary with receivers.

PRESELECTORS

Passive (unamplified) preselectors are tunable to specific frequencies, attenuating the rest of the spectrum. They are useful for reducing or eliminating intermod and image interference produced by strong signals in economy receivers.

GROUNDING

A connection to earth ground rarely makes signals stronger, but will reduce electrical shock hazard and may also reduce electrical noise interference and AC hum.

An effective ground consists of a short length (a few feet long) of heavy gauge wire connected to a single metal pipe or rod driven eight feet into the moist soil. Dry sand is worthless as a ground.

Alternatively, a metal cold water pipe may be called into service; hot water pipes are usually insulated by their numerous joints at the water heater.

As a last resort, the metal screw holding the electrical wall plate in place may serve as a ground connection if the electrician was conscientious enough to ground the outlet box. Similarly, the round ground hole of a three-wire receptacle may serve as a worst-case ground reference.

Equipment chassis should be commonly strapped together by a ground wire and then grounded mutually at the same point to reduce common mode hum. Braided copper shielding from an old piece of coaxial cable makes ideal ground wire. Experiment with various grounding combinations to find out what works best for you.

A FEW FACTS

A receiving antenna may be made of any conductive material; thick or thin, gold or aluminum, stranded or solid, insulated or uninsulated, you will hear signals the same.

Once an antenna is large and high enough to hear signals in the clear, increasing the length only increases the noise as well. Thus, while a 150-foot antenna may show an S-meter reading of 9 or more and a 50-foot antenna may read only an 8, the clarity of both signals will probably be identical.

A WORD ABOUT TRAP DIPOLES

Trap dipoles are designed to respond to certain frequency ranges (international broadcast bands) while reducing signal strengths at other frequencies. Why buy a general coverage receiver, then erect an antenna designed to reject most of that receiver's frequency ranges?

TRANSMISSION LINE

While the practice of running one long wire from the antenna terminal on the receiver outdoors and up to a tree is very popular and may produce excellent reception, it is susceptible to household electrical noise pickup. The use of coaxial lead-in from the outdoor antenna is recommended due to its inherent shielding from electrical noise pickup.

For shortwave reception, virtually any type of coax is acceptable for runs of up to at least 100 feet.

(See page 28 for a treatment of Active Antennas)

Scanners

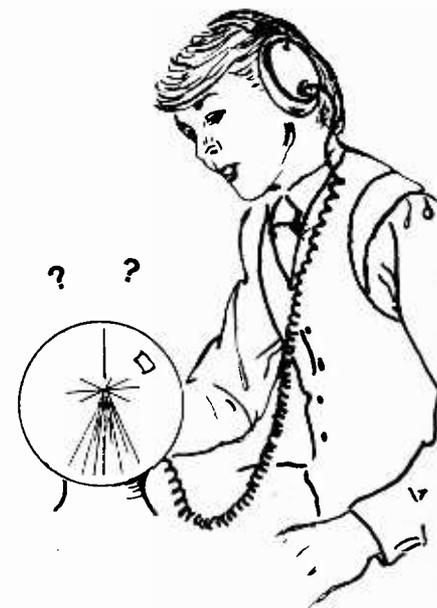
The whip antenna included with your scanner is fine for local reception of strong signals, but if you are interested in reaching out further, a larger external antenna is necessary. Hand held scanners need all the help they can get.

In mobile installations, a scanner's built-on whip is shielded from receiving by the metal vehicle body; an external antenna is required for adequate pulling power. Rooftop mounting is ideal since the wide metal surface below provides an excellent ground plane with uniform response in all directions. If mounted on a fender cowl or trunk lid, the pattern favors the direction of the car body. Modern magnetic-base antennas have strong holding power capable of withstanding road speeds well in excess of the legal limit.

Omni-directional (all-direction) multiband ground planes, available from a variety of manufacturers including Radio Shack and Antenna Specialists, provide good geographical coverage. Single-element vertical dipoles like the Grove Omni are also useful for general purpose applications. Vertical dipole clusters like the Channel Master 5094 are superior performers as are professional discons like the ICOM AH-7000.

Although government discone antennas are very efficient for broadband use, many low-cost scanner discons fall far short of their potential. Usually advertised for 30-500 MHz continuous coverage, they are poor performers under 80 MHz, thus compromising low band reception, and are variable in reception throughout the rest of the range.

Compact multi-element clusters like the WinnTenna Disco and Hustler



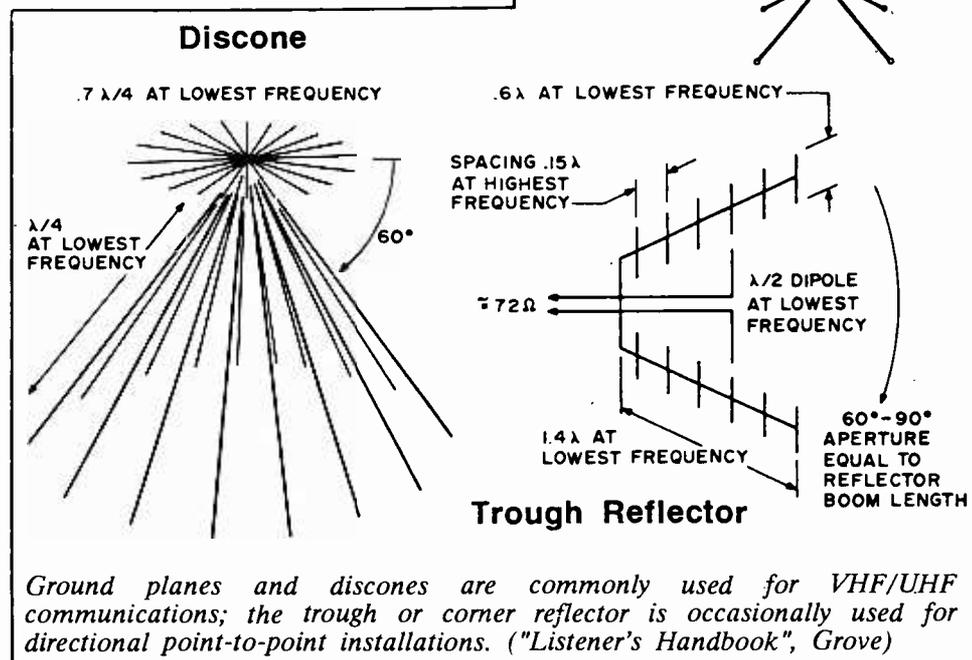
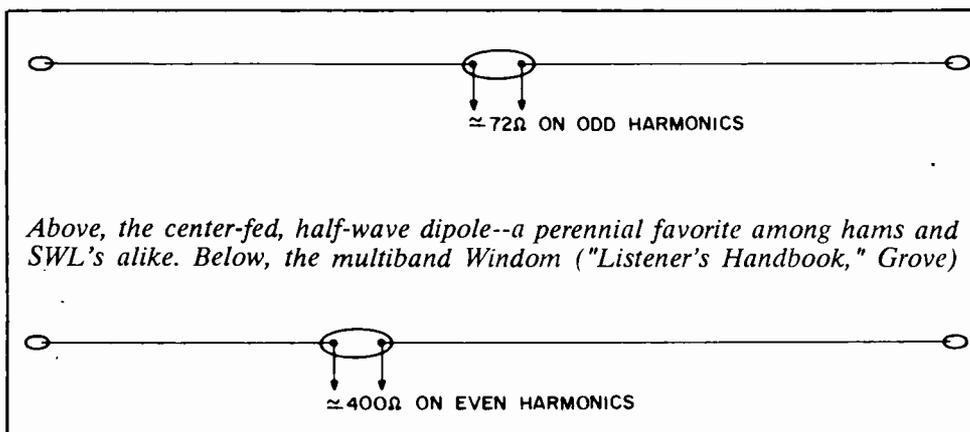
DCX are acceptable for local coverage, but will not perform as well as the larger arrays.

A directional array like the popular Grove Scanner Beam provides the greatest gain of all, but in its favored direction, so it should be rotated for optimum performance.

COAXIAL CABLE

At these higher frequencies, common coax can actually absorb signals. High cost premium cables (Belden 9913, Mercury RG-11/U mini) may be marginally superior in long lengths, but we recommend cable TV-type RG-6/U cable which has exceptional low loss, 100% shielding characteristics combined with small diameter, high flexibility and low cost.

Remember:
There is no substitute for a good antenna and coax



Outdoor Antennas

If you are a dedicated scanner or shortwave listener, chances are that you will sooner or later have a need for an outdoor antenna. There is a wide variety of antennas available and they have one thing in common; ... they have to be "installed"! This task may range from fun to very dangerous, so here are a few things to keep in mind *before* going out on the roof.

POWER LINES

Locate the antenna as far away from electrical utility wires as possible. Not only will this cut down on receiver noise but it reduces the risk of electrocution should the antenna blow down or fall toward them. If the antenna starts to fall toward power lines during installation, **let it go!** Do not attempt to remove it or the coax from the power lines should it make contact. Call your power company.

MOUNTING HARDWARE

Mounting hardware used to install TV antennas can be used or adapted to install your antenna. It can range from tripod antenna mounts to complete towers and antenna rotors.

Do not scrimp on parts for your installation; spend the extra bucks and buy quality mounting parts and fasteners. Use heavy-duty parts where applicable and metal parts which are coated or galvanized when possible.

Fasten all connections (mechanical and electrical) securely and double-check them all when you are done. If possible use PVC plastic pipe for antenna masts which run **parallel** to any antenna elements; this prevents altering its reception characteristics due to signal reflection.

Separate your antennas by more than 1/4 wavelength at the lowest operating frequency at which the antennas will be used.

Weatherproof *all* outdoor connections with coax sealant.

Use a single piece of coax from the antenna to the radio; spliced coax has terrible signal loss and does not survive the weather more than a few weeks.

LAST BUT NOT LEAST...

Plan everything in advance! Have tools close by and use the right tool for the right job! Make sure you have all the required items *before* you go up on the roof.

If possible, have someone assist you; you *can* fall off a roof and you may wait for help a long time if no one is

nearby to call for help. Your helper will be invaluable as well as saving you a trip down the ladder to get the tool you forgot to take up with you.

Ground all connections and lead-ins to reduce damage from nearby lightning strikes. **Nothing** will provide immunity from a direct strike. Disconnect your antenna from your equipment when it is left unattended during storm season.

This ground may also improve reception, reduce electrical noise interference, and bleed off static charges which are capable of destroying those expensive little integrated circuits so common to solid-state equipment in use today.

Finally, **Use Top Quality Coaxial Cable!** Though relatively expensive, its low-loss characteristics and longer life make the price seem marginal. Use good coax connectors and avoid the solderless variety.

Remember, if you don't do it right the first time you may have to do it again later, and a non-working antenna in the middle of winter or during a rainy weekend can sure spoil your day!

Attic Antennas

If you are one of the fortunate SWLs or scanner listeners with such an array of outdoor antennas, and you take the above precautions seriously, each descending storm system probably sends you scurrying about the house disconnecting those antennas to keep your radio equipment from becoming barbecued. But there are those times, whether it be an emergency, disaster, or even a weather alert situation, that an external antenna is needed to pull in a particular frequency that the radio's built-in whip just can't do!

Enter the attic antenna! Nothing special, just one or several good scanner or shortwave antennas mounted in the attic for situations like this. An attic-mounted antenna is much less susceptible to lightning strikes because it is lower than trees, TV antennas and other nearby "lightning rods."

Now don't go out and tear down all your outdoor antennas, yet! You may wish to retain them and merely add one or two attic-mount units as a "back-up" or, to be used in conjunction with the outdoor ones. Or maybe you live in a place where outdoor antennas are prohibited or impractical.

Attic antennas are also handy when primary outdoor antennas become

damaged in a storm. Because attic antennas reduce the chances of a lightning strike or damage due to exposure to a severe weather environment (corrosion, wind, ice loading), they carry with them an implicit lifetime warranty!

Granted, this setup will not produce as good results as the "ol reliable outdoor antenna will, but the cost is generally minimal and you don't have to climb a 50 foot tower or perch precariously on the peak of your roof.

THINGS TO CONSIDER

- Wooden houses, buildings, and structures are "invisible" to radio waves, and will not generally affect reception of such signals. Metal buildings, beams within buildings, and metal "insulated" walls, floors, ceilings, etc., **can** play havoc with radio signals and may require an outdoor antenna.

- When running coax through walls or ceilings, etc., keep in mind that there are live power lines in there that **could kill** you! Shut off that power where you are working, and test any outlets, etc., for live current if in doubt.

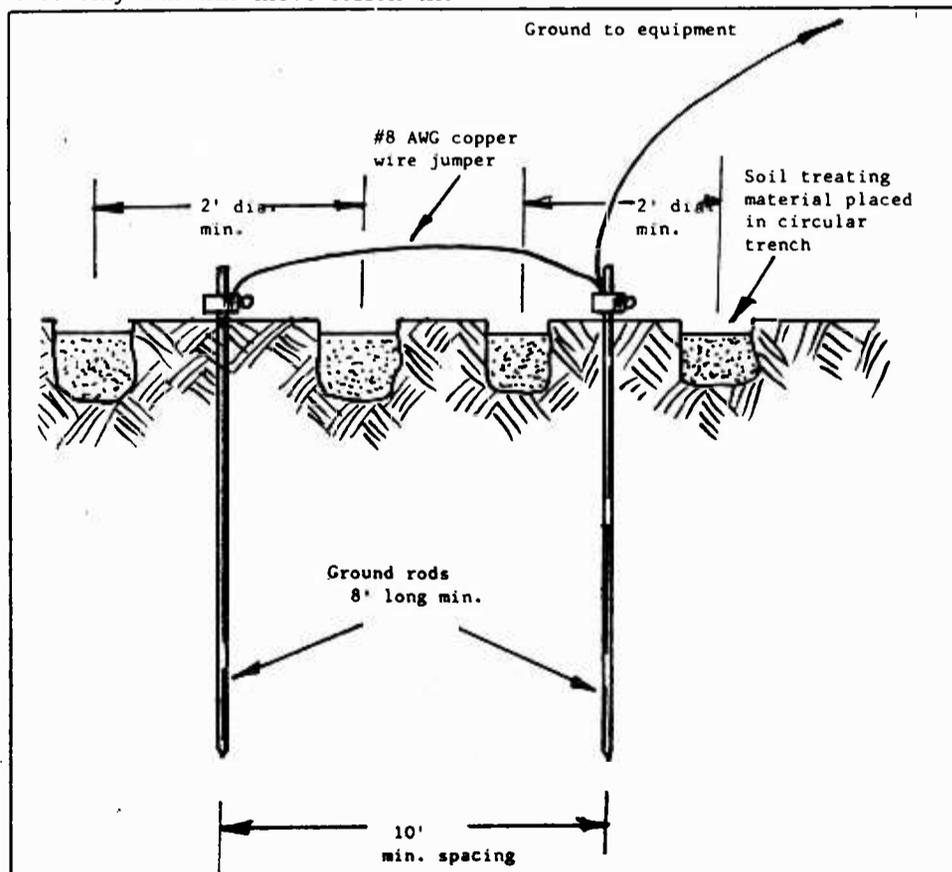
- Try to route coax and wiring as far away from any source of electrical current as possible (switches, lines, sockets in walls, light fixtures, etc.). Not only will this move lessen the

chances of being electrocuted, but it will also lessen the chance of RFI (radio frequency interference).

- As in outdoor installations, a good ground to the antenna and receiver is always a good idea. It prevents static buildup which can cause receiver damage, may reduce electrical interference in some cases, and reduces the possibility of electrical shock should something go amiss. An ounce of prevention is worth a pound of cure!

- Besides avoiding electrical wiring when drilling through walls, floors and ceilings, also take care to avoid water, gas pipes, drains and sewer pipes hidden throughout these areas which are subject to damage by an "unseeing" drill or saw. You'll never be forgiven by your spouse if you deactivate the bathroom shower by drilling holes in the plumbing!

- No matter whether you opt for indoor or outdoor antennas, it is still always a good idea to disconnect them when inclement weather is known to be in your area. Although nothing will protect you or your equipment from a direct lightning strike, you **do** have the potential to lessen the resulting damage from the steps you take in advance. Nothing will spoil your day more than to come home after work some stormy day to find your ICOM done "medium well."



An ideal ground rod installation with two 8' ground rods tied together with a copper jumper wire. Garden fertilizer or rock salt may be added in a circular trench around each rod to increase the conductivity of the soil ("Antennas for Receiving," Caron)

Passive AM Broadcast Booster

by Pete Haas

This inductively coupled booster requires no power and therefore introduces no noise of its own. It is easy to construct from common materials.

This construction article will assume the use of an 11"x14" plastic frame; however, a masonite board of the same dimensions with a nail driven in each corner could be used as a less expensive and equally effective substitute.

Drill a hole in the center of the frame to mount the 365 pF variable capacitor; put a point knob on its shaft. Drill two 1/16" holes as shown in photo #2. This is where the coil begins and ends.

Wind 17 turns of no.20 wire around the plastic frame—you don't have to be particularly neat here. If you happen to have an inductance bridge, you're shooting for 225 microhenries.

Secure the windings with a strip of electrical tape on each side and solder the ends of the coil to the tuning cap. Put some sticky paper or labels around the capacitor's shaft, then attach a pointer knob to make approximate calibration markings.

Trying it Out

The booster was designed to work with AM radios that have an internal ferrite bar antenna coil although it would work as well with a tube-type set that has an air coil of Litz wire on the back of the set.

First tune in a weak signal on your radio and rotate the radio for best reception. Then bring the booster 4"-6" away from the radio. The windings of the AM radio's internal antenna coil and the booster's coil should

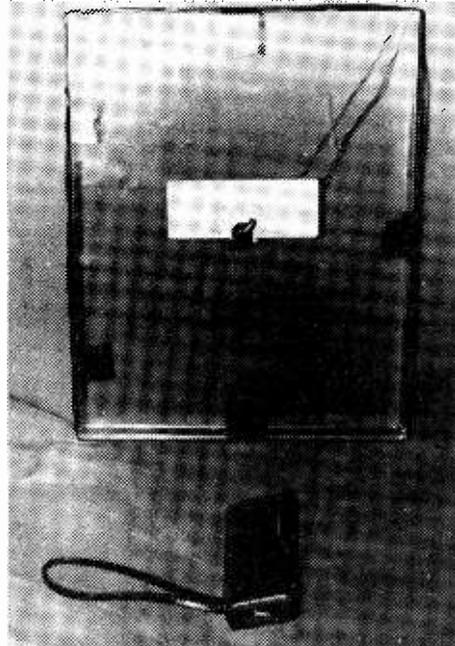


Photo #1. The finished AM booster in use.

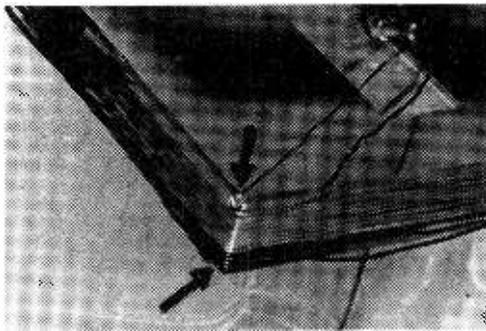


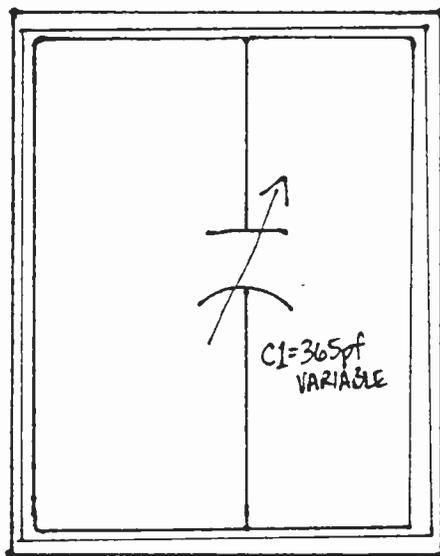
Photo #2. Drive two 1/16" holes in one corner of the frame. This is where the loop coil's windings begin and end.

parallel each other for maximum signal transfer.

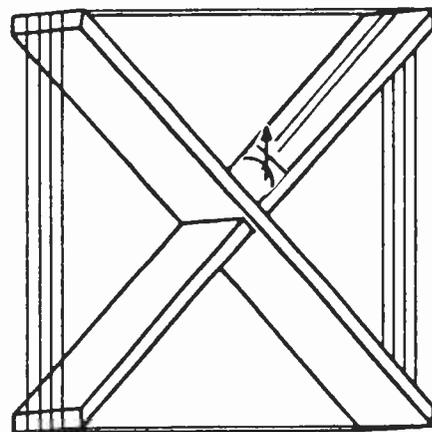
Performance

How much signal increase should you expect? I made tests on the AM section of a hi-fi receiver that had a movable antenna coil on the back of the set. Here in the Akron area I tuned in a weak Canadian signal from Toronto; using the booster it immediately jumped several S units. The improvement is most dramatic on weaker radio signals.

Give this booster a try—it's small compared to a longwire antenna, easy to build and you'll be amazed at how much signal increase such a simple device provides.



L1 = 17 turns #20 gauge wire on an 11"x14" frame



An alternate cross-piece frame

Got some scrap wire?...

by Larry Wiland

Build the "Scanna-Banana" Indoor, Space-Saver, Scanner Antenna

It will soon be thunderstorm season (gasp!) and your 80 foot tower with the 20 antennas will again be suspect as the neighborhood's largest known lightning rod!

What to do during stormy weather? Well, you can use the little whip antenna that came with your scanner or perhaps switch to several improvised attic-mounted homebrew antennas. But what if you cannot install additional auxiliary antennas? Well then, how does a multi-band, plug-in scanner antenna for about \$3 and 15 minutes of simple work sound?

To build the "Scanna-Banana" antenna, you will need one banana plug (Radio Shack 274-271); one SO-239-to-Motorola-plug adapter (Radio Shack 278-208); and approximately 6 feet of 20 or 22 gauge plastic insulated wire. Begin by first determining the scanner bands to which you wish to listen.

For VHF lowband (30-50 MHz) cut a piece of the insulated wire 36" long; for VHF-Hi and civilian air bands (118-174 MHz) cut another piece 19" long; for military air (225-400 MHz) a piece 10" long; for UHF (406-512 MHz) a section 6-1/2" in length; and for 800-900 MHz, a piece 3-1/2" long should suffice.

Next, remove the plastic insulated cover from the banana plug, exposing the metal plug core. Strip back approximately 1/8" of the plastic insulation from each piece of cut-to-

length wire and insert all of them into the banana plug, soldering them in place.

Now, plug the SO-239-to-Motorola adapter into your scanner's antenna input jack and plug the banana plug with the dangling "horse's tail" of wires into the centerhole of the SO-239. That's it!!

Let the wire hang freely behind and below (yes, below) the rear of the scanner. Each wire resonates at approximately the center of each band; you can try fewer wires than I've suggested, but this arrangement seems to work well.

The Proof is in the Pulling

As for performance, it will do slightly better than the whip antenna that the radio came with; it will work well on local stuff; it will allow the radio to be positioned in a small space which would not otherwise accommodate the whip; and it can be used during thunderstorms without fear of creating a path between you and the lightning bolt! You can even install a small preamp between it and the scanner for a bit more "horsepower" if you wish.

So, though you may laugh at something so ugly and simple, just remember next time your expensive outdoor antenna blows down in a storm, I will still be able to listen to the antenna repair company dispatch their truck to *your* house.

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VLF Antenna Design

by Jack Albert

Jack Albert is a research and development technician at Rockwell International in Downers Grove, IL

Antenna impedance is one of the most misunderstood theories when dealing with antenna design. If you understand antenna impedance, you can design an antenna to work at any frequency. The ohm is a measurement for resistance and impedance and the manufacturer "specs" show the input impedance in ohms.

Antenna impedance is determined by the element length, diameter, frequency, presence of nearby elements, and the feed point. The impedance can be matched to a transmitter or receiver loading coil or antenna tuner ("transmatch").

When you connect a random length antenna to a receiver, you will find that the antenna will work better at some frequencies than at others. This is because the antenna matches the receiver's impedance (typically 50 ohms) at the resonant frequency. If you plot the impedance of any antenna, you will find that it changes with frequency, becoming higher off-resonance.

A half-wave dipole antenna is bisected at the center and fed with a 75 ohm feed line. If the feedpoint is moved all the way to the end of the dipole, the impedance becomes 50 ohms at 1/2 the frequency and the length was never changed (see fig. 1).

If Ohm's Law applies to DC and AC circuits it should apply to antenna theory as well. Think of the antenna as a voltage source, the impedance as a series resistor (R1) and the receiver as a load resistor (R2). You can calculate the voltage at the receiver using Ohm's Law.

At the antenna's resonant frequency the impedance matches the impedance of the receiver, and virtually all of the signal voltage is transferred to the radio. At the VLF frequency the impedance of this antenna is so high it would be difficult to transfer any voltage to the receiver.

This is not true in the case of the end-fed dipole which has a lower

center frequency and, at the VLF range, the overall impedance is lower than the center-fed 80 meter dipole. One way to match the antenna to a 50 ohm receiver input is to use a VLF tuner in the feed line. Some loss can be tolerated if the receiver has very good sensitivity. A series LC network is what we will use to match the end fed antenna to a VLF receiver.

Figure 1 also shows the new frequency response when the series LC tuner is placed between the end-fed antenna and the receiver. The lowest impedance is 600 ohms at 100 kHz, the antenna impedance before the antenna tuner was installed. Even though the match is poor at 100 kHz, the antenna will transfer more voltage to the radio at its resonant frequency and good receiver sensitivity will make up for the poor match.

At VLF frequencies the feed line is so short it effectively does not appear electrically as a feed line at all, even up to several hundred feet. The VLF antenna tuner can be connected anywhere along the feed line.

I have used a "homebrew" VLF tuner with my Icom R70 receiver which receives VLF* using the same tuner and a 130 foot end-fed wire antenna. My antenna is only 25 feet high and I can copy VLF as low as 20 kHz. Figure 2 shows the schematic of my tuner.

The capacitors are silver micas and the inductors are high Q toroid-wound which were selected using very expensive test equipment. The inductors can be found at "hamfests" on scrap PC boards that are used in the telephone industry. The PC boards usually have several inductors on them along with precision 2% capacitors.

To measure the inductors, connect a .001 2% capacitor in series with the inductor and a 1K ohm resistor (see Fig.3). Connect one end of the resistor to ground and one end of the inductor to an audio generator.

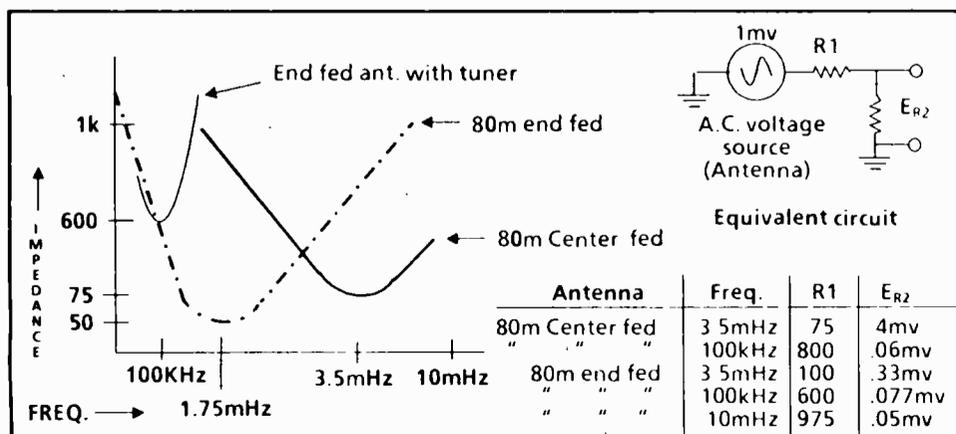


Fig. 1

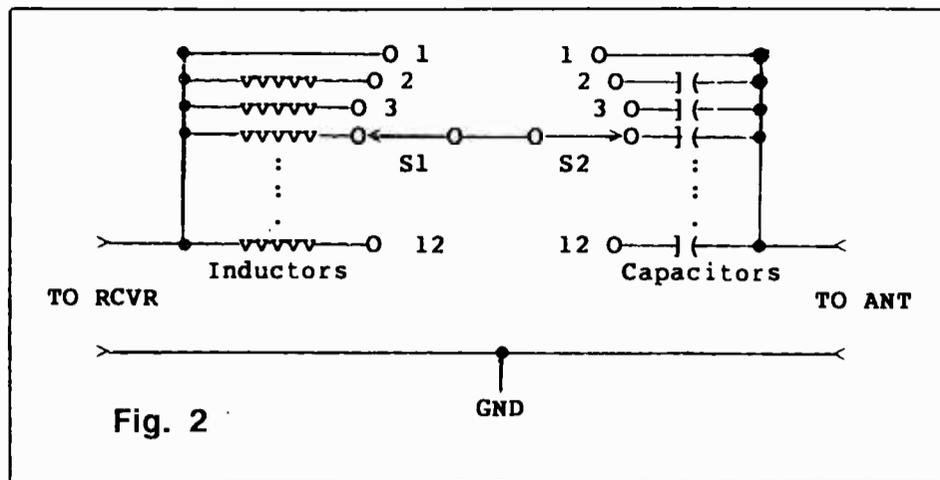


Fig. 2

PARTS LIST			
S1 and S2	Radio Shack #	275-1385	
J1 and J2	Radio Shack #	278-201 (SO-239)	
Chassis Box	" "	# 270-252	
Knobs	" "	# 274-415	
Switch Pos. #	Inductor	Range	Capacitors
1	none		none
2	31.6 mH	20 to 70 kHz	*100 to 500 pf
3	17.3 mH	30 to 100 kHz	150 pf
4	7 mH	38 to 150 kHz	300 pf
5	5.4 mH	48 to 170 kHz	500 pf
6	2.8 mH	65 to 220 kHz	680 mf
7	* 1.0 mH		.001 mf
8	* .5 mH		.0015 mf
9	* .25 mH		.002 mf
10	* .1 mH		.0047 mf
11	59 uH	550 to 3000 kHz	.0068 mf
12	21 uH	2 to 3 mHz	.01 mf

* These values are not installed in my tuner

Connect a voltmeter or oscilloscope across the resistor; tune the audio generator until you get a peak reading and mark down the frequency. Calculate the inductance using the formula $L = 1/2 \pi f c$. Before you know it you will have all of the inductors and capacitors needed to tune the VLF frequencies!

You don't have to have the values that are shown in the parts list. I have installed the particular components for experimentation only. Select the inductors that will slightly overlap in frequency with each switch position.

When tuning the VLF band set the tuner to the #1 inductance position,

then rotate the capacitance switch until noise or the received VLF signal is maximum. If you cannot peak the signal set the L switch to the position and repeat the last step. When you find the best combination of L and C log the frequency and switch settings.

Tuning the VLF will open new horizons. I have been able to copy unencrypted RTTY as low as 20 kHz and the Omega navigation system at 10 kHz.

* (The Icom R-71A can be "tricked" to receive clear down to 10 kHz; see April and July 1985 MT)

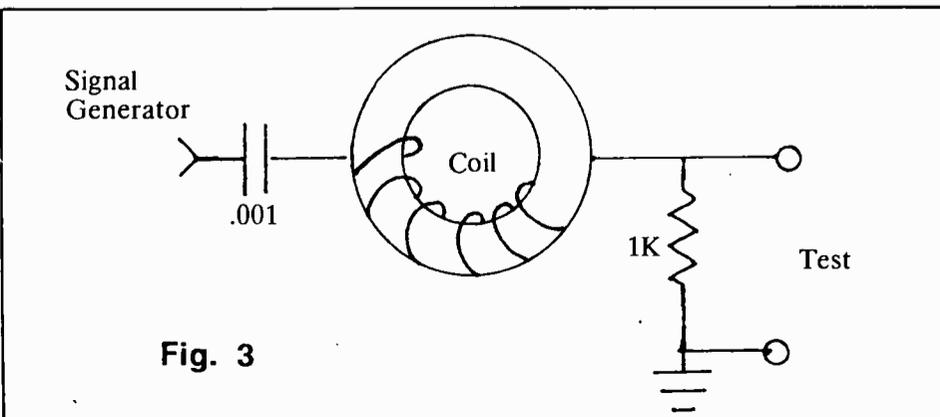


Fig. 3

Interested in military and satellite monitoring? Then build your own high performance antenna.

A Simple 200-500 MHz Antenna

by David Wilson

This simple UHF antenna is inexpensive and made from easily obtained parts. I use the one I made indoors in a wood frame house. If it is going to be used outdoors, it should be physically strengthened. A preamp can be used to improve performance.

Tools Needed:

Hack saw, wire cutter/stripper, small screwdriver

Parts list (RS indicates Radio Shack):

UHF Bow Tie (RS 15-234, \$2.19)

Terminal Strip (RS 274-678, \$1.89)

#12 solid wire (Most electrical supply stores)

(An indoor/outdoor balun matching transformer may be needed, such as RS 15-1140, \$2.79 - see text)

The Procedure

We are going to lengthen the bow tie in order to lower its frequency coverage: Using the hacksaw, carefully cut off both ends of the bow tie as shown in Fig. 1.

Next, saw off four of the connection junctions from the terminal strip and mount one connector on each of the fresh cuts on the bow tie.

Trim two pieces of heavy gauge #12 wire so that when inserted in the connectors as shown in Fig. 2, the dimensions shown are obtained. To do this, you may wish to trace the shape on a large surface and bend the wire to fit the trace.

After cutting the wire to the right size, be sure to strip the ends before inserting them into the connectors.

The antenna is now completed. Note the output is 300 ohms. You can feed this directly into a 300 ohm preamp (such as RS 15-1124, \$34.95) or by using a matching transformer (such as RS 15-1140), you can feed it into a scanner preamplifier like the Grove PRE-3 Power Ant or directly into a receiver. If any splicing is to be done, it would be best to use a connector such as RS 15-1199, \$99, instead. The antenna should be mounted vertically as in the figures on a wood or PVC pipe.

Trying it out

Experiment with the antenna in

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A premium VHF/UHF scanning communications receiver.

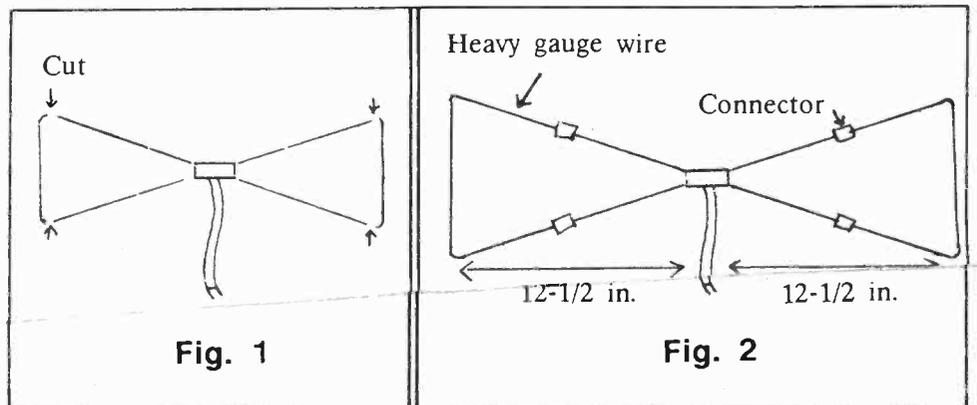
- The 9600 is no typical scanner. And it's easy to see why.
- You won't miss any local action with continuous coverage from 60 to 905 MHz.
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different positions, rotating it about the vertical axis. Some stations will be heard well in some positions but poorly in others.

I use the above set-up for 200-500 MHz monitoring; for its size, it outperforms anything else that I have tried. It has proved superior to discons in that frequency range and can be used to monitor FLTSAT/LEASAT satellites.



Youthful SWLing Goes in FBI File!

Soo...you had a visit also. In 1961 I was in 7th grade and SWL'd with my Allied kit radio. I was QSL'd by Radio Peking and sent them further reception reports.

They were kind enough to send me literature--"propaganda"--every three or four months. The best were "Chairman Mao's Letters to People on May Day." I used this literature in my social studies class and was an A student.

I received a card in the mail from the U.S. Post Office saying I was receiving Commie propaganda and did I wish to continue to do so? Of course I said I did. A few months went by, the literature kept coming, then a man from the Postal Service called.

My Dad answered; when asked if I wished to continue to receive R. Peking's literature he asked me and I said I did. About a month went by and a knock on the door...there were two FBI agents who wanted to talk to me!

They were surprised that I was 13 years old. They inspected my shack and my modest long wire. The agents asked if I wished to keep receiving the "Commie propaganda"; my father showed them my social studies reports and said, "Hell, yes! We both find them very informative."

A few months later the Radio Peking literature stopped coming even though I still sent them a reception report once a month.

Six years later, a senior in high school, I was denied being an usher at an Anniversary ceremony at the U.N. for the Red Cross because of my FBI file!

I am pleased to report that my 9 year old daughter, Molly, and I enjoy listening to shortwave together--BBC, Radio Canada, Radio Beijing, Radio Moscow, VOA, et al. I enjoy *Monitoring Times* and find it a valuable tool. Us "dangerous folks" must stick together or freedom of information means nothing.

Peter Henricks
Mill Valley, CA

FBI Story Jogs More Memories

Your article "The FBI Nails Bob Grove" in the January and February issues of *Monitoring Times* brings back memories of a similar incident which I had with the FBI during WWII in 1942.

At that time in my life, I was an enthusiastic young "DX'er" who had built my own shortwave receiver from a battery-operated three-tube Meissner kit. This three-tube receiver had plug-in coils and I was using for an antenna a 6' car whip mounted in the top of a nearby oak

tree.

Due to the fact that I was a stranger in the area, and anyone with a German name was looked upon with suspicion, my landlady reported me to the local office of the FBI in Charlotte as a "German spy." She no doubt heard me tuning in Berlin Radio in German and the clandestine "Deutsche Kurschweller Atlantick" broadcasts as well as Tokyo Radio in English and Japanese.

I was proud that I could tune in the world on this receiver which I had built myself. Purely a case of innocent pursuit of a hobby, nothing more. My father's great grandparents had emigrated to America in 1834, arriving at the Port of Baltimore to settle in the mountains of Western Maryland as farmers (long before that "jerk" Adolph Hitler was ever heard of).

Suddenly, I noticed that many of my neighbors and friends would shun me and not speak to me as they always had done. Returning home one afternoon soon afterwards, I found the local county sheriff and an FBI agent waiting for me.

The FBI agent wanted to see my transmitter which I was allegedly using to broadcast secret messages to the Germans. It took me all of five minutes to show the officers my three-tube Meissner kit receiver and explain to them that I had no transmitter and was only pursuing my hobby of shortwave DXing.

To say that I was terribly hurt about all this, and ashamed, was putting it mildly. The county sheriff, seeing that I was badly "shaken up" by this incident, afterwards gave me tickets and took me to see the local circus which happened to be in town at that time.

It bothered me to the extent that a few weeks later I hitch-hiked the 50-odd miles (not having a car) to visit the local office of the FBI. I then proceeded to give them the complete history of my life as best I could remember, including home addresses where I had lived during those years. Also pointing out that I was a loyal American citizen pursuing an innocent hobby.

My landlady, who was only doing her civic duty in reporting me to the FBI, in this case really did me a favor in that this ultimately led to my employment with the FCC's wartime Radio Intelligence Division!

In late 1944 I was recruited to their FBIS (Foreign Broadcast Intelligence Service) section as a cruising monitor where I regularly reported DX findings. In many cases I was "scooping" other reporters who were using Hallicrafter SX 28 receivers at their disposal.

Bob, do not feel badly about your encounter with the FBI. It's all part of their duty and is by no means

any reflection on your loyalty as an American citizen.

Norval Pagenhardt
Scotland, MD

Keep to Radio

Re your latest (January) editorial - "The FBI Nails Bob Grove!" Cut the political crap, would you, please? When I spent my money for a subscription to *MT*, I thought I was buying radio information, not political diatribe.

Larry Miller's liberal slant is bad enough to have to put up with without you getting into the act. Should I decide to take out a subscription to [*Russian characters*], I have their address, thank you. You just stick to radio news.

A good point is the article "The 'Censored' Ship" on pages 12-13 (February issue). Of what use is the article to a radio hobbyist?? If the article gave frequencies used by ELINT/COMINT agencies it would be quite interesting. But as it stands it seems to be nothing but an attempt to belittle our government for no reason. If you can't print something useful for radio enthusiasts, then print nothing; that is, reduce the number of pages to just useful stuff, and reduce the subscription price accordingly.

Thomas Marquardt
Sharpsville, IN

Getting Hooked

Just a short note to tell you that I enjoy *MT* very much, and since becoming a subscriber, have used much of the info contained therein almost every day in my SWL-scanner-ham radio activities. *MT* and my Kenwood R-5000 seems to be the perfect combination.

James Richards, WA2IGC
Hackettstown, NJ

I have been a SWL for only six months, and I must congratulate you and your crew with the outstanding job you do with *Monitoring Times*. I originally subscribed to *MT* because of my interest in scanning, but *MT* turned me on to the world of SWLing.

I thought I would just let you know how helpful and informative *MT* is to a person just starting out in SWLing.

James Michael
St. Clair Shores, MI

You trouble makers--Now I am stirred up and will re-activate my SWLing. I will have to get some order in my system, and keep records, and all that work!

Harold Bower
Sunbury, PA

Notes from a Winner

Thank you very much for informing me that I was a tied winner for "Longest Antenna" and sending me a certificate and the prize book *How to be a Ham*.

My father is a ham, so perhaps it is genetic, though presently I am still struggling along learning here and there about radios and electronics (they didn't teach that in Home Ec). *How to Be a Ham* looks like it will be very helpful.

It's nice to provide an answer that concerns my part of the country, particularly considering that people in the eastern part of the country often forget that New Mexico is actually a state of the United States and not of Mexico.

Speaking of Mexico, I am also attaching a listing of some stations I've picked up recently.

Debby Stark
Albuquerque, NM 87102

[You're welcome, Debbie--and congratulations on taking the prize! Debbie enclosed loggings heard on her Uniden CR2021 from XEQ, Mexico City (9680); XEU, Veracruz (6020); CBC, Montreal (9680); Radio Australia (9680); XEJ, Juarez (970); CBK, Saskatoon (540); and Radio New Zealand (15150, 17705)]

800 MHz Converter

In the March issue (page 12), you asked about others' experiences with 800 MHz converters. I use a Hamtronics 800 MHz converter with a Bearcat 250 scanner. I live about 7 miles northeast of Akron, Ohio. I use a 20" whip on the back of the converter for an antenna and power it off the scanner's power supply.

What kind of stuff can you expect to hear? Lost of guys making business deals, organized crime characters speaking in vague terms about "units," "parcel" pickups and arranging meetings at highway reststops in addition to the usual conversations between wives, their businessman husbands and their girlfriends. Occasionally a carphone user will give out his actual phone number of the unit he's talking from.

Pete Haas
Kent, OH

INFORMATION PLEASE

I would like readers living about 50 to 200 miles away from Williamsport, PA, to send me ARTCC VHF frequencies heard at their location since Feb. 12, 1987. Also info on handoffs of airplanes from frequency to frequency.

I would also like to receive info on business VHF/UHF frequencies heard in Williamsport and adjacent areas; and scanner loggings, or copies of local frequency sheets of scanner dealers within a 75 mile radius. William O. Dickerman, P.O. Box 1012, Williamsport, PA 17703-1012.

As usual, I am far, far behind in answering your mail. Those who know me are aware that I live in a constant state of confusion and that lack of immediate response does not indicate a corresponding lack of interest or appreciation; rather a deranged mind. Please forgive me.

Mail from DX Eck-spurts

Contributing to the mile-high pile of correspondence on my desk (and around it, behind it and in several boxes to my immediate left and right) are about a hundred spectrum occupancy charts from listeners who participated in the "DXing with the Eck-spurts" series.

Amazing is the level of expertise among readers. There is some really good stuff in there. Surprising, too, is how reader's logs differed from mine. But that doesn't mean you did anything wrong. It's all part of the thrill of shortwave. Something that's on the air one night might not be audible the next. Propagation, geography, equipment, and about a dozen other variables all effect what comes out of your speaker. So if our logs did not match, don't be discouraged or confused. It's all part of the game.

In any case, we've had a number of requests to repeat the bandscan exercise and we (and undoubtedly every other publication as well, now) will be doing so in a half dozen issues or so. As always, thanks for the support. It is genuinely appreciated. Look, too, for an excellent article by Theodore Brunner in next month's *MT* on his experience with the bandscan.

More than Broadcasts

Bill Giesbrecht of Manitoba, points out that he heard a good deal of non-broadcast material during his bandscan including Edmonton Air Force Base on 9005 kHz SSB talking with an Army Plane from Yellowknife with 36 soldiers aboard and a defective engine. On 9055 kHz SSB he heard a woman in Spanish giving instructions of some sort, "and every so often she would repeat the name of a certain day of the week and then break into laughter." On yet other frequencies, he heard military communications, what appeared to be drug runners and more.

Although I did not note such transmissions on the bandscan, they're certainly out there and, as Bill indicates, often very interesting.

New Wisconsin Radio Club

Kevin J. Klein is starting a club for Wisconsin radio hobbyists. Says Kevin, "The Badger State is fortunate to have a large number of

radio-enthusiasts, and a club serving their interests is long overdue." The new club, called the Wisconsin Listeners League, will cover all aspects of monitoring from long, medium and shortwave to FM, TV and related pursuits.

If you'd like to get involved with this hot, new club, drop Kevin a note at 1204 W. Packard St., Appleton, WI 54914 or call him at 414-734-2990. I've had the opportunity to chat with Kevin on a number of occasions and he's a real nice guy. So don't be shy.

SWL Call Signs?

Mike Bellmore of Oakland, California writes to comment on a recent article in *MT* about shortwave listening call signs. "I'm not sure I agree with the author on the importance of these so-called 'SWL call letters'. What's your feeling on the matter?"

Well, as you see from the byline at the top of the page, I too, have a call sign, KMILLER8847ABC0711. The "K" indicates my strong feelings for the letter "K", the next six letters are my last name, the four digits following that are the second, third, fourth and fifth (respectively) digits in my social security number, the next three letters are the initials of the network that produces my favorite network TV program, and the final four digits are the month and date of my birth. In short, I think they're meaningless, useless, pompous and silly.

Discovering Discovery

"What's the story on Jeff White's Radio Discovery?" writes Bill Ellever. "I really enjoyed Jeff when he was on Radio Earth and now I've been listening for him on Radio Discovery but no go. Is Discovery on the air?"

For the past couple of years, the charismatic White has been a mainstay in shortwave popularity polls. But the absence of the name "Jeff White" from the favorite broadcaster column of this year's survey is proof that you're not the only one having trouble hearing Radio Discovery.

When I met with Jeff at his office in St. Petersburg Beach a few weeks ago, he assured me that he was working very hard to improve the station's signal and that a recent test by station engineers showed that the ham-rig transmitter was now putting out over 4,000 watts -- a jump over the previous 1,000. Still, it's a shame that one of shortwave's most promising talents is now, effectively, missing from the shortwave bands. Listen for Discovery during the day

on Grenada's old frequency, 15045 kHz and in the evening around 6245 kHz.

New Transmitter for Clarin?

Norval Pagenhardt of Scotland, Maryland, writes in with a question about another station in the Dominican Republic, Radio Clarin. "Running through the 11 MHz band at 1130 UTC I find Santo Domingo in Spanish on 11700 kHz with a terrific signal. Do they have a new transmitter on the air?"

No, Clarin recently got a new set of owners who simply cleaned up the old one and replaced a few parts. And once they got it cleaned up, they sold all their air time to CID, the anti-Castro, "Cuba Independent and Democratic" Organization. In the past, more electricity was used by Clarin's transmitter in electrocuting

the bugs that lived inside than pumping out a signal.

Try Tahiti

Every time it gets really cold here in the States, we find a lot of people discover Radio Tahiti. There really is nothing like a dose of island music when it's brutally cold outside. Take a late-winter break from the grey-snow blahs with a night in Tahiti. Try for it up to about 0230 UTC on both 11825 and 15170 kHz and imagine yourself on a warm South Pacific beach at night, a roaring fire reflecting in the waves as they crash on the sand. The orange light illuminates the face of the young island girl sitting beside you and you feel the warmth of her body next to yours. She leans over slightly, kissing you several times on the back of the neck...

Try doing that with Radio Moscow.

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WANTED: ICOM 551 6-meter transceiver. WB8HWF, 1575 Ditmore-Stroll, Newark, OH 43055

ATARI P/D software for ham, SWL, and etc. For sale or trade. SASE for details. Jerry Callam, 10 Avalon Rd., Mount Vernon, OH 43050.

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: DRAKE SPR-4 receiver with crystal calibrator, noise blanker, AL-4 loop antenna and crystals for SW bands \$225.00. DRAKE R4-B receiver \$150.00. Jack WA6JYO (415) 897-3987.

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NRD-515, 3 Collins filters, speaker, mint, \$975. SONY 2010, \$225. Mark Gorden, (415)556-5116; (415)752-2013.

HAMMARLUND SP-600 \$150; Frederick 1500A, 10 cy to 29 meg, \$175; ROHDE & SCHWARZ UBM, 25 cy to 600 kC, \$180; NORDMENDE Galaxy 6606 10-band, \$125; EXXON Quip Fax \$60; ZENITH Transoceanic, late, \$50. Two-page list, SASE please. WA9DYE, 114 Lakeview, Milwaukee, WI 53217.

Wanted: HAMMARLUND SP-60. Must be tubed, aligned and reconditioned mint. For Sale: MJF 1020A Active Antenna, used once \$60 inc. shipping. Arden Evenson, 2803 W. Rockwell, Spokane, WA 99205.

For Sale: SONY ICF2010 - SW receiver 2 mo. old with original box and manual. \$275.00 shipping included. John Zidanich (716)693-5290.

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For Sale: ICOM R-71A, one year old. Perfect condition. \$635.00 including UPS. Contact D. Dotson (602)284-1220.

For Sale: PANASONIC RF4900 SW receiver excellent condition, \$225.00; REALISTIC DX-100 General Coverage Receiver \$85.00 in excellent condition. Will ship free. Mel Ragucci, 1430 Saturn, Merritt Island, FL (305)452-4706.

Wanted: SONY CRF-320A; Box 21941, Seattle, WA 98111.

Homebrew Projects List SASE. WB2EUF, Box 708, East Hampton, NY 11937

WANTED: Would someone from the Trenton, NJ, area please send me a list of police scanner numbers. Also are there any scanner clubs in my area. P.Hagen, 506 Prince St., Bordentown, NJ 08505.

FCC METHODS REVEALED! Commission tactics for suppressing unlicensed broadcasting have been exposed through the FOIA. Send a large SASE for pages released from the Field Operations Bureau Manual. Mark Pierce, 7516 Cartwright Avenue, Sun Valley, CA 91352.

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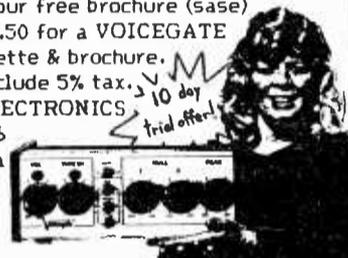
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ICOM introduces the IC-R7000 advanced technology 25-2000MHz* continuous coverage communications receiver. With 99 owner programmable memories, the IC-R7000 covers low band, aircraft, marine, business, FM broadcast, amateur radio, emergency services, government and television bands.

Keyboard Entry. For simplified operation and quick

tuning, the IC-R7000 features direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob.

99 Memories. The IC-R7000 has 99 memories available to store your favorite frequencies, including the operating mode. Memory channels may be called up by simply pressing the Memory switch, then rotating the memory channel knob, or by direct keyboard entry.

Scanning. A sophisticated scanning system provides instant access to most used frequencies. By depressing the Auto-M switch, the

IC-R7000 automatically memorizes frequencies in use while the unit is in the scan mode. This allows you to recall frequencies that were in use.

Other Outstanding Features:

- FM wide/FM narrow/AM/upper and lower SSB modes
- Six tuning speeds: 0.1, 1.0, 5, 10, 12.5 or 25KHz
- Dual color fluorescent display with memory channel readout and dimmer switch
- Compact Size: 4-3/8"H x 11 1/4"W x 10 7/8"D
- Dial lock, noise blanker, combined S-meter and center meter

- Optional RC-12 infrared remote controller
- Optional voice synthesizer. When recording, the voice synthesizer automatically announces the scanned signal frequency.

*Specifications guaranteed from 25-1000MHz and 1260-1300MHz. No coverage from 1000-1025MHz. No additional module required for coverage to approximately 2.0GHz.

See the IC-R7000 receiver at your local authorized ICOM dealer. Also available is the IC-R71A 0.1-30MHz general coverage receiver.

ALL THIS AT A PRICE YOU'LL APPRECIATE.



First in Communications

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. R7000985