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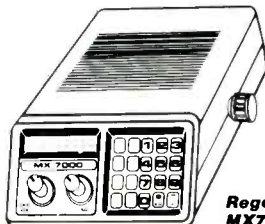
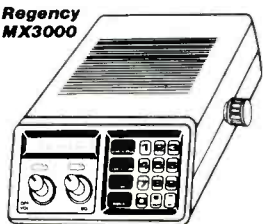
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POPULAR COMMUNICATIONS

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FEATURES**Cover Story: Paramilitary Radio**

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All sorts of strange paramilitary groups are now using two-way radio. Much of it isn't licensed. All of it is fascinating. Here's the inside story. *by Hector Esteban, KFL4MK*

Eavesdropping On International Airline Flights

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Rack up 150 countries (rare ones, too!) as you follow airliners of all nations along international routes. You've probably already heard some of these stations on a hit and miss basis, but here's the detailed information you'll need to hear many more of them. *by Charles R. Miller, Sr., KWV8DG*

Introducing 1750 Meters

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Here's how you can become active on this no-license two-way hobby band. With a relatively small investment of time and money, you can be on the air in short order. *by Michael Mideke, WB6EER*

The Outlaw Callbook

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Pirate broadcasters—sixty years of broadcasting that time has forgotten. Here's a listing of some of the more colorful pirate broadcasters going back into the historic days of radio. *by Tom Kneitel, K2AES*

The Secret Of Darby Island

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The Nazi U-boat base and radio station off of the Florida coast. One of WWII's most baffling mysteries now solved, complete with rare photos of the radio shack. *by Harry Cooper*

Central American Shortwave Survey

38

Central America is one of the world's hot spots today. You can tune in on what's happening before it turns up on TV or in your newspaper! *by Gerry L. Dexter*

High Seas Communications

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A listing of the long-range communications stations used around the world to communicate with ships at sea. *by Harry Helms, KR2H*

Locating Satellites

67

A handy computer program, included here in full, allows you to pinpoint the exact location of those high-flying TV "birds." *by Jeffrey Keating, WB4KDH*

This month's cover: Photo by Larry Mulvehill, WB2ZPL. Transceiver shown is the Model 10H/WP by International Telecommunications Systems Florida, Inc., Miami, Florida. This is a 15 watt (PEP) SSB transceiver operating in the 2 to 20 MHz band.

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BEAMING IN

AN EDITORIAL

“Minimally Regulated Radio Service”

If it comes to pass it will be a rather startling and revolutionary approach to communications and broadcasting. I'm talking about a recently released staff report by the FCC's Office of Plans and Policy which bears the interesting name "A Framework for a Decentralized Radio Service" by Alex Felker and Kenneth Gordon.

Felker and Gordon suggest that the FCC establish a totally new radio service "without any technical or operational restrictions beyond those necessary to control interference." In the exact words of the FCC, "Licensees in such a service would be free to offer entertainment programming, land mobile services, or other services."

The report concludes that a "flexible" radio service would offer a number of advantages, providing a "mechanism to take into account the fact that the value of spectrum varies across uses and locations." The FCC's concept here is that spectrum space allocated to the service could be custom tailored to each area's needs "without FCC involvement." This, it is claimed, would offer "the ability of the licensees to profit from using more efficient equipment" and "should encourage both its research and its implementation. Changes in usage, when appropriate, could occur without the need for a cumbersome hearing or rulemaking."

Using existing FCC assignment procedures as a foundation to build upon, interference problems would be controlled, at least according to the authors of the report. The authors recognize that there is a special interference potential relating to mobile stations (as opposed to the interference potentials of transmitters at fixed locations), and they still feel that mobile stations can be worked into such a proposed radio service.

Although the service is suggested to be introduced within the confines of the UHF-TV band, "alternative spectrum locations suitable for this service are considered."

From the way it appears, such a radio service could open the door to the operation of private homegrown broadcasting stations within the structure of FCC regulations—as long as the stations don't create any interference. It would also loosen up the ability of people to get on the air with private or business-oriented two-way communications stations (although the GMRS and CB services would already seem to approach those goals with ease).

It would seem that the entire concept of this possible new radio service is based upon several factors, including the FCC's continuing efforts to be concerned with battling interference as opposed to their former role of

establishing lengthy sets of seemingly arbitrary rules and operating regulations. These were difficult and expensive to enforce, and (ultimately) were often found to be not only pointless but also contrary to the wishes of the public. An example of this would be the CB service which, despite enormous FCC attempts to regulate and control the content and quality of the chatter, simply went merrily on its own way to the beat of a different drummer. Another example is the proliferation of pirate broadcasters.

At this point, the idea is in no way anything formalized that the FCC is on the verge of implementing. Right now it is merely a concept which the authors put forth for the agency to contemplate for a possible future approach. It is, however, a rather bold approach which seems to have as many possible snags as it does advantages. The whole thing could die, either of old age or by being summarily dismissed by the agency, or it could eventually come into being in a form which is vastly different than this original proposal. Certainly, even if it were to come into being in one form or another, it would be at least a few years down the road. I think what is especially interesting about it is that it does seem to recognize that, after all is said and done, there is a very healthy attitude being taken by the FCC towards more adequately meeting the rather unique demands of the public. This, alone, is no small blessing and we think it is to be applauded and encouraged.

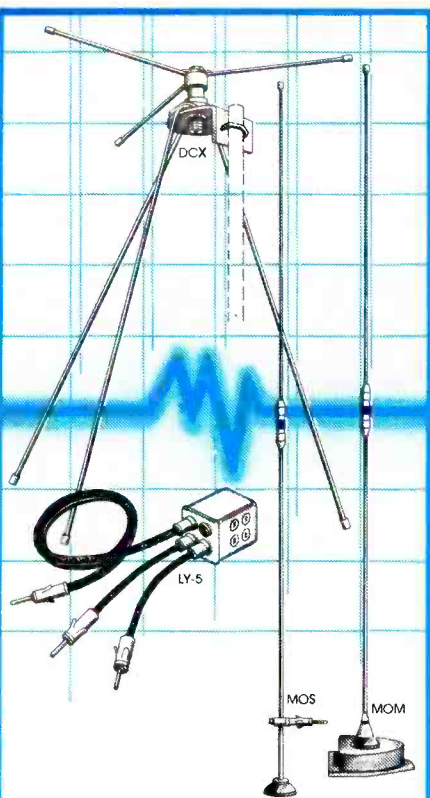


Personal computers have opened up a whole new world to "hackers."

"Hackers"

I've been sort of astounded by the recent and current uproar surrounding the teenage "hackers" who have used their desktop computers to plug into telephones and successfully access business and government

(Continued on page 74)



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The most interesting questions we receive will be answered here in each issue. Address your questions to: Tom Kneitel, Editor, Popular Communications magazine, 76 North Broadway, Hicksville, NY 11801.

Kind Words

By sheer coincidence I came across POP'COMM at a convenience store and found it was just what was needed to fill a particular void I had as an Amateur operator. As a former publishing and advertising photographer, I consider your efforts to be very attractive and well-balanced.

Guy Rivard, KA4YPI
Orlando, FL

I was glad to see POP'COMM come out last year. In my opinion it is the best publication for the hobby I've ever seen.

Bob Syphax, KA7DBW
Long Beach, CA

When I saw POP'COMM I was overjoyed. I was even happier after reading the issue I had from cover to cover. Since then I've bought two more copies but only because I couldn't locate any more. I've tried to buy it hereabouts but the only store which sells the magazine is 11 miles away and the owner tells that as soon as they come in they are immediately sold out. Luckily for me, my brother in Dallas has a complete set of POP'COMM's and has shared them with me. Enclosed is my subscription. I'd like to see more participation in POP'COMM from "us girls."

Mrs. Bob Neal
Keller, TX

Keep up the excellent work as evidenced by all POP'COMM articles. Having recently returned to the monitoring hobby after a 10+ year absence, I think that had there been a POP'COMM in the late 1960's I wouldn't have given up. An issue of POP'COMM loaned to me by a friend has brought me back to the fold.

Jeffrey R. Hollis
Martinsburg, WV

I'm a Washington, DC magazine and radio journalist who has just been introduced to your excellent publication. I was instantly dazzled by its editorial quality. I'm recommending it to other communications buffs without hesitation.

Tony K. Glaros
Washington, DC

Because of space limitations we don't normally get a chance to run any of the really enthusiastic letters that we receive. We had the space this month to share several of these letters with you and also to relay a special "thanks" to the many readers who have written to say they like what we are doing at POP'COMM. —Editor

27 MHz Identification

Recent changes in the FCC's regulations concerning 27 MHz communications no longer require the use of an FCC-assigned CB callsign. Of course, seldom were the FCC-assigned callsigns used on that band after about 1974 when it became widely used by the public. I am an operator who uses it on AM only (Channel 19) while in transit on the Interstates. I have, in my eight years on 27 MHz, resisted the temptation to use one of those cutesy "CB handles" to identify my station, and have always used a "real" CB callsign. Now that such callsigns are no longer required, I'm in a quandry. It was suggested that I might use my Amateur Radio callsign since there doesn't seem to be any CB regulation forbidding me from doing so. Is this legal?

M.L.B.
Gallup, New Mexico

There does not seem to be anything in the CB regulations which would actually prohibit such use of your ham callsign, although it would probably raise the hackles of other hams who would overhear you using it on CB Channel 19. My gut feeling, however, is that since the FCC specifies the frequencies upon which ham stations may operate (and 27 MHz isn't included), you could run afoul of the FCC regs relating to Amateur operation by (in the eyes of the FCC) operating your a ham station on an unauthorized frequency, communicating with unauthorized stations, etc. Actually, there's no reason why you couldn't continue to simply use your old CB callsign on Channel 19. Less complicated, less provocative, less confusing all around. Because of this strange "Catch 22" in the FCC regulations, someone else could decide to use your ham callsign on CB and (if they weren't a ham licensee) they'd probably have no hassle from the FCC. The FCC should have specified that CB identifications should not consist of any callsign which is created with an American prefix or in the format of an actual callsign assignable in any FCC governed radio service. —Editor

An Open Mind— And Garage Door

Recently I bought a digital garage door controller with programmable security codes. I was surprised to discover the operating frequency to be 303.0 MHz. Further research revealed that my brother's unit operates on 320.0 MHz. What gives? Is it actually possible to have radio controlled devices in the middle of the military aeronautical band? Hasn't the FCC considered the possibilities of someone hooking up one of these to an amplifier and/or phased yagi and buzzing a B-52? Could be interesting.

Jon S. Van Allen, WB7OWL
West Jordan, UT

Probably no less interesting than your garage door opening or closing every time a B-52 flew over your house. Actually, I can't find anything in the FCC regulations which would permit a company to establish a garage door opener on the frequencies which you mention, but I suppose that anything's possible. My own garage door opener is a Chamberlain and although there is nothing at all in the unit's instruction book which discusses the frequency upon which it operates, the gizmo's receiving antenna is a 5 1/2-inch whip. Could well be in the UHF aero band. I thought that manufacturers were supposed to list the operating frequency somewhere in the book or on the equipment. —Editor

A Real Problem

My next door neighbor is a ham. He has been running a 250 watt SSB transceiver which creates havoc with my shortwave monitoring whenever he is on the air. Yesterday he told me that he is buying a linear amplifier which will be running 2,000 watts PEP. Since I'm only a few feet away from this band blaster, please advise me of the best method to use to restrain the impact of the withering signal which this is going to produce. Will anything help? What steps should be taken?

Burt L. McMasters
Scarsdale, NY

Your best bet would be to make the steps long ones, and in the opposite direction of the dreaded linear. The best talents we know of suggest taking the following defensive measures:

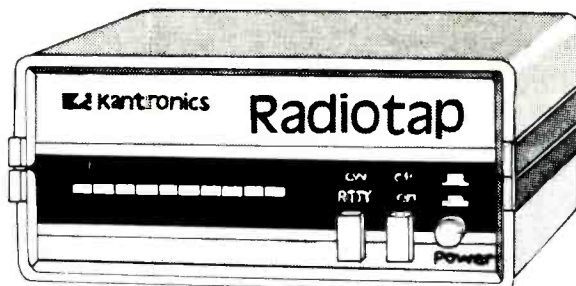
1. Relocate your operating position to the cellar.
2. Bolt your receiver to a very rigid table which, in turn, is bolted firmly to the floor.
3. If your antenna is supported by guy wires, tighten the turnbuckles. If you have no guy wires, get some.
4. A barricade of 6-inch steel I-beams and sand bags should then be constructed for the purpose of absorbing the initial shock wave of the signal. A few bedsprings bolted to the face of the barricade and covered with 1-inch lead plates may help.
5. The speaker of the receiver should be mounted on Koni shock absorbers and then covered with heavy oak planking.
6. All wiring should be removed from the receiver and replaced with MIL spec wire having an extremely high melting point. Ground everything.
7. To prevent personal danger, you should wear a hardhat, lineman's gloves and stand on a thick rubber mat.
8. Place cotton wads in your ears, wear ear-muffs and ultra violet goggles. Coat exposed areas of the skin with strong sunshade cream.
9. IMPORTANT—All flammable liquids should be removed from the premises due to fire hazard. —Editor

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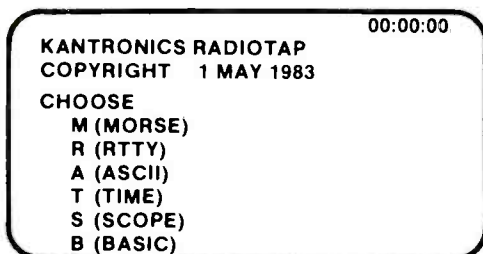
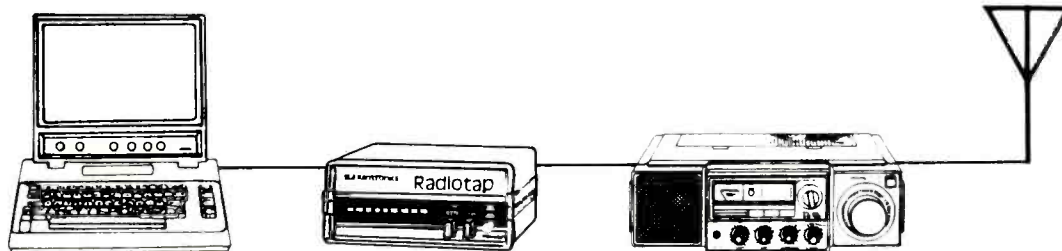
The RADIOTAP system is easy to set up. Simply connect the external speaker output of your receiver to the RADIOTAP tuning unit and connect the tuning unit to the computer. Then plug the RADIOTAP software cartridge into the computer and turn



on the power. All necessary cables are provided, and we have included the CONFIDENTIAL FREQUENCY LIST to help you find coded signal frequencies.

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Radiotap™ System Diagram



Main Menu

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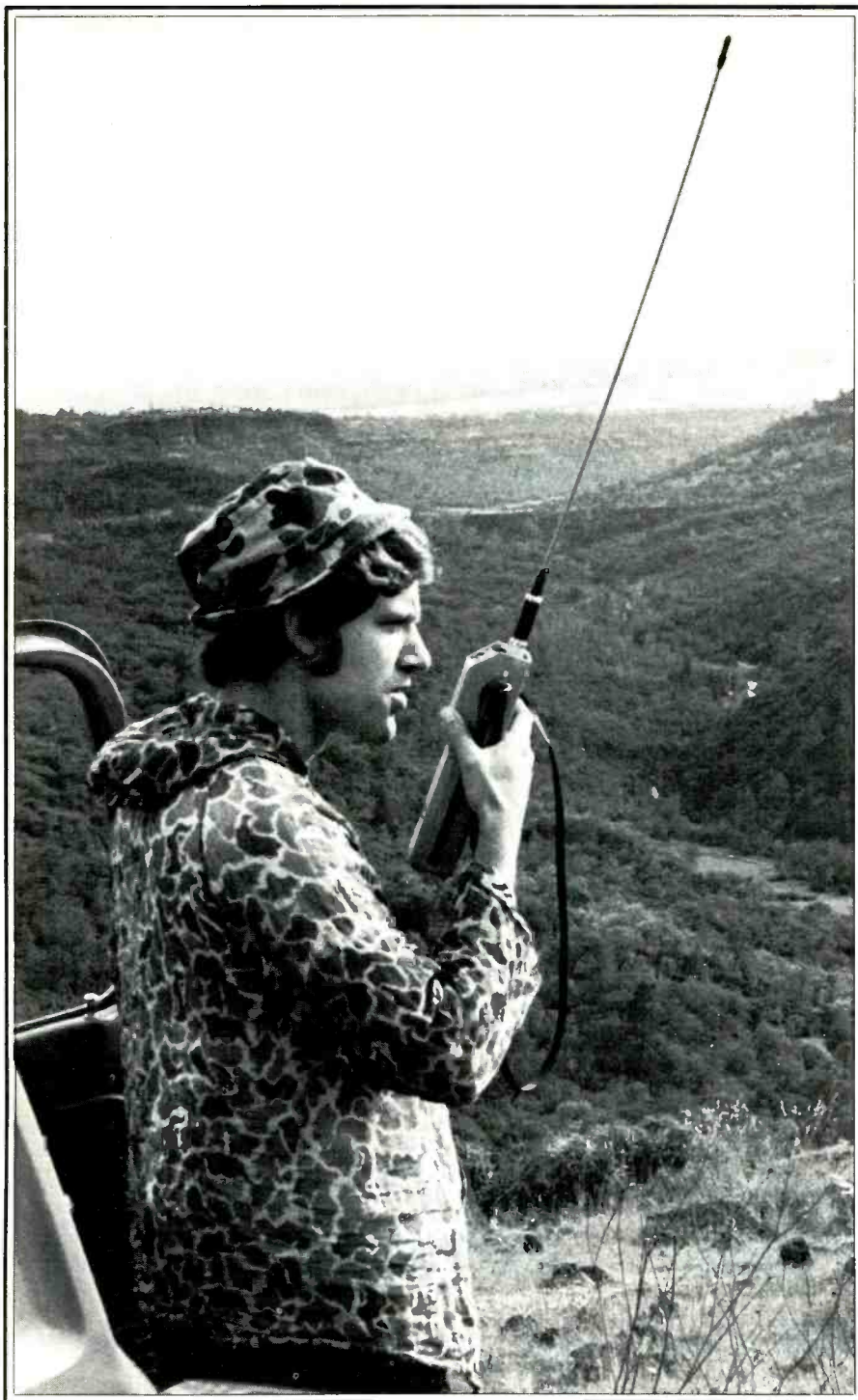
BY HECTOR ESTEBAN, KFL4MK

“Bravo Delta 1 from Bravo Delta 5. We have landed on the beach at grid coordinate Echo 12,” crackled the message from the transceiver.

“Roger, Lieutenant. Recon advises that an enemy encampment is 900 yards East North East of Echo 12,” came the reply.

These were not the communications of Special Forces troops. In fact, they weren't exchanged by forces of any nation. I was monitoring farmers, clerks, cops, attorneys, shopkeepers, engineers, airline pilots, and other folks who normally occupy themselves with civilian duties. But while some were dressed in rugged civilian “outdoor” clothing, most were in military-like camouflage fatigues. To the casual observer they would appear to be a strange mix of hunters and commandos. Well, maybe in a way they are commandos—*weekend* commandos in one of the hundreds of “sort-of” military-like groups which have sprung-up in quantity during the years since the war ended in Vietnam. Possibly it's most expedient to label them as “paramilitary” organizations, although some in and out of those groups would challenge such an appellation. But they've got guns, uniforms, radios, and they're organized and motivated along somewhat military lines, “Paramilitary” does seem appropriate under the circumstances.

Some of these groups were organized as a means of recreation—“war games” for those who want to recapture the derring-do of their youth. On the other hand, many are deadly serious and are strung out across a wide spectrum of political motivations—groups ranging from the KKK to the JDL. There are groups which go on weekend maneuvers in the hopes of triumphantly returning to the shores of a distant homeland and recapturing it from whomever it was that caused them to uproot. Still others train to maintain a state of readiness for a time they anticipate when the nation might come under enemy attack, or when society collapses due to wide-area natural disasters, or the long-term breakdown of law enforcement or government. It even seems that some train in order to protect themselves from other paramilitary groups! While some hold their training maneuvers in the open and even use the media to attract new members, oth-



No matter what the reason is for a person to be in the “wild,” radio communications usually plays an important role. For paramilitary groups, radio has special uses.

Paramilitary Radio

All Sorts Of “Paramilitary” Groups Use Radio Communications; Here’s Their Story!



Some groups have actually participated in search and rescue missions.



"... or even if you think that they're all a bunch of dangerous crazies who ought to be locked up as soon as possible."



CB is a popular means of paramilitary communications, but it has its drawbacks.

ers operate in an atmosphere of almost-paranoid secrecy. From time to time you can get a peek at them on TV news programs such as *60 Minutes* or *20/20*.

Perhaps they perceive themselves as vigilantes or freedom fighters, or may genuinely view their operations as being of value to the community at large. Indeed, some have actually functioned in search and rescue (SAR) missions. Those groups, however, are still a breed apart from the many rescue squads which normally function in close cooperation with (and often under the direction of) law enforcement and public safety agencies.

Structure

While some paramilitary groups are rather informal and haphazardly organized and run, more than a few are operated under the highly structured and well organized aegis of political groups (radical and otherwise). A number of groups are operated under the direction of "survival skills" or similar schools which charge fancy fees to impart their knowledge and techniques in marksmanship, weapons handling, combat medicine, demolition, foraging and other related proficiencies. One Florida school in the Miami area advertises its courses nationally and frankly admits in its ads that it teaches "Guerrilla Warfare" in classes run by former members of the Special Forces. Some of the things included in its curriculum include "escape, evasion, guerrilla training, weapons, tactics, enemy capabilities, support, area assessment, codes, intelligence, propaganda, observation, sanitation, map reading, comms, and first aid." Classes are taught in English or Spanish.

Paramilitary groups operate in the Appalachians, Sierra Nevadas, Rockies, and Adirondacks, the Florida Everglades and along that state's Gulf coast, the Okfenokee Swamp—actually anywhere from seacoast to mountains, swamp to desert.

Given the wide ranging motivation, depth of training, structure, and activity status of all such groups, they do make curious bedfellows when lumped together under any single label such as *paramilitary groups*. That they do rely upon communications may be one of the few things which they all have in common with one another. This means that persons having communications receivers and scanners can try to locate their frequencies in order to see what they're up to, and you can do this regardless of whether you agree with one or more of their reasons for being in existence or even if you think that they're all a bunch of dangerous crazies who ought to be locked up as soon as possible.

Communications

The communications needs of paramilitary groups parallel those of any military forces, including for tactical coordination, security, short/long range communications with near/distant points, reconnaissance (RECON), and comms training. In addition, there may be a need for training in direction

finding (DF), jamming (ECM), as well as communications intelligence (COMINT).

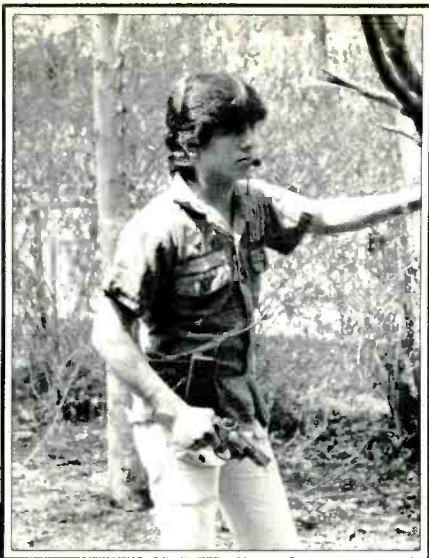
CB, of course, is often relied upon rather heavily. The equipment is inexpensive and plentiful and there is no longer any question as to whether it needs to be licensed (it doesn't). The problem with CB is the interference from other stations. On the other hand, one can conduct virtually any type of operation on these frequencies without raising very many eyebrows. Legal CB equipment operates on 40 channels in the band of 26.965 to 27.405 MHz. Several years ago, I witnessed a minor problem that took place between two paramilitary groups in the Florida panhandle. These groups were not especially friendly with one another, and when they happened to discover that each was going to be conducting its operations on the same frequency (27.115 MHz, a common frequency for single-channel handhelds of the era)—well, there was almost a *real* war over who had rights to use the frequency!

Legal unlicensed communications with authorized transceivers may now also be had on 49.83, 49.845, 49.86, 49.875, and 49.89 MHz. Units operating on these frequencies generally consist of low-power FM rigs which clip onto the belt of the person using one.

Operation on frequencies other than these would seem to require a license of some sort or other from the FCC. A few paramilitary groups actually do have licenses which were obtained under the guise of their being a business or a rescue squad. It does seem, however, that many of the paramilitary groups have no licenses for their radios. Some are not aware that licenses are required for operation other than 27 MHz CB or 49 MHz low-power. My guess is that they either don't care or would just prefer not to be licensed for their own reasons.

For instance, local tactical communications are often established on any of several specific VHF-FM marine channels since they are (apparently) unmonitored by the FCC or the Coast Guard. Therefore they are viewed as "open territory," being primarily occupied by pleasure boat owners for casual chit-chat. Many is the paramilitary group whose members have purchased inexpensive VHF marine hand-held transceivers (such as the Ray Jefferson 621, 6-channels, which can be bought new for about \$160) and set up shop on: 156.375, 156.40, 156.525, 156.625, and 157.425 MHz. Other frequencies often "borrowed" from authorized business and industrial radio services include 30.84, 33.12, 33.40, 35.02, 35.04, 42.98, 43.04, 151.49, 151.505, 151.625, 154.57, 154.60, 158.40, 457.525, 457.575, and 457.60 MHz.

New and used communications equipment that can operate on these frequencies isn't hard to locate, and with a bit of careful shopping this equipment can be purchased at reasonable prices by these groups. Several groups have purchased used commercial FM equipment from classified ads which sometimes run in daily newspapers. I recently had a conversation with the commu-



Hands-free FM communicators operate on 49 MHz and don't require an FCC license. That makes them especially useful.



Paramilitary groups generally have base stations "in the field" at temporary locations.

communications officer of a paramilitary group in Texas which is operating on the frequency 159.855 MHz, a channel ostensibly available only to trucking companies. He told me that the group purchased all of their radio gear used from a trucking company which went out of business—and the new owners of the radios never bothered to get off the frequency which once had been assigned to the trucking company!

The practice of usurping frequencies and/or operating without a license is most definitely frowned upon by the FCC—quite illegal in all respects. Those who might be caught would be subject to fines and/or imprisonment. Thusfar, no group known to be operating has actually been caught.

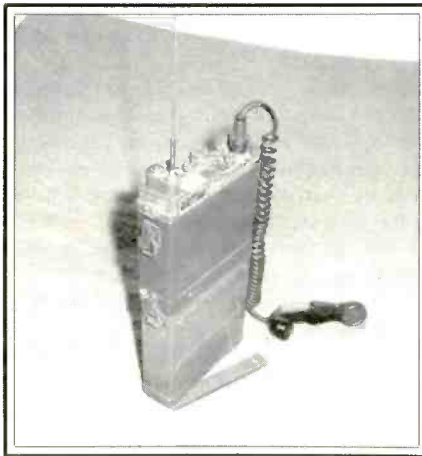
Where operating on ripped-off frequencies could get tacky is in the case of military frequencies. Military surplus transceivers are rugged, versatile, and highly adaptable to paramilitary operations. Moreover, they are easily obtainable and are usually a pretty good buy. While there would be no potential problem with using mil surplus gear for monitoring purposes, when transmitting with it there could be problems. Except for operation within the ham bands, it can't be licensed. When operating a military surplus transmitter outside of the ham bands, users may possibly be setting up on frequencies actively used somewhere by military forces.



Some paramilitary groups see the day when their training will be put to practical use during a natural disaster—such as a flood, severe storm, or earthquake.



Paramilitary radio has requirements which must be met, including size and versatility.



Paramilitary groups prefer the AN/PRC-8 (20 to 28 MHz) transceiver—a piece of Uncle Sam's military surplus electronics.

While some military equipment can be shifted-around frequency-wise, other units come equipped with crystals for operation on specific frequencies. One very popular military surplus transceiver within the paramilitary groups is the AN/URC-68, a Special Forces and CIA hand-held rig used extensively in Vietnam. These invariably come with crystals for operation on frequencies such as 38.90, 40.10, 40.50, and 41.00 MHz. So, in addition to still being in use by military forces, such frequencies are heavily used by paramilitary forces! There is

always a possibility for interference to military operations, and also for being tracked down and hassled by the military.

Other popular military surplus gear operating above 30 MHz used by paramilitary forces includes the following transceivers that are generally available from surplus dealers.

AN/PRC-6	47 to 55.4 MHz
AN/PRC-8	20 to 28 MHz
AN/PRC-9	27 to 39 MHz
AN/PRC-10	38 to 55 MHz
AN/PRC-25	30 to 76 MHz
AN/PRC-77	30 to 76 MHz
AN/PRT-4	47 to 57 MHz (tr. only)
AN/VRC-7	47 to 58 MHz

Another aspect of paramilitary use of governmental communications frequencies relates to the popular tactic of modifying CB equipment to force it out of the 26.965 to 27.405 MHz authorized band. Frequencies between 25.500 and 26.960 MHz and also 27.540 to 27.995 MHz are in heavy unauthorized use by so-called "free band" hobbyists and (to some extent) by paramilitary units. Frequencies within this band that seem to be most active with miscellaneous authorized federal operations include: 26.620, 26.800, 27.575, 27.585, 27.625, 27.785, and 27.980 MHz.

HF Operations

Operations below 25 MHz are used for long range communications. Use of these frequencies by paramilitary units is not as often encountered as is the communications above 25 or 30 MHz. Frequencies directly above and below the 40 meter ham band (7000 to 7300 kHz) and the 20 meter ham band (14000 to 14350 kHz) are probably most attractive to paramilitary groups due to the easy access of equipment, pre-tuned antennas, and good propagation conditions of the frequencies. Curiously, the band lying between 6620 and 6670 kHz has been noted in use by paramilitary units as well as for bootleg transmissions from European truckers as well as CB-type illegal hobbyists.

A couple of the popular military surplus rigs noted in use by paramilitary groups using the HF spectrum include: AN/PRC-47

(2 to 12 MHz), AN/PRC-64A (2 to 6 MHz), RT-380/AR (2 to 18 MHz), and AN/PRC-74 (2 to 12 MHz). As with the units operating above 30 MHz, such sets might only be legally used for transmitting within the confines of the ham bands, and only by licensed ham operators—and the transmissions would have to be within the scope of the Amateur Radio Service. It would be questionable if most of the transmissions required by paramilitary groups would be within the scope of this Service; probably not. Using military surplus for receiving purposes (on any frequency), however, is perfectly legal.

Some of the leading dealers in military surplus electronics include:

Western Wireless, Inc., 4840 Tahoe Circle, Martinez, CA 94553

Fair Radio Sales, P.O. Box 1105, Lima, OH 45802 (free catalog)

Michael P. Murphy, 11621 Valle Vista Rd., Lakeside, CA 92040 (send \$1 and an SASE for catalog)

Baytronics, dept. PC, Box 591, Sandusky, OH 44870

Davilyn Corp., 13406 Saticoy St., N. Hollywood, CA 91605

Slep Electronics, P.O. Box 100, Hwy. 441, Otto, NC 28763

Leeds Radio Co., 57 Warren St., New York, NY 10007

Atlantic Surplus, 3730 Nautilus Ave., Brooklyn, NY 11224

Paramilitary groups in parts of the United States do seem to have some occasional HF communications with one another. It's difficult to get a handle on the actual extent of such communications.

By tuning the HF and scanner bands, you're almost certain to hear some of this activity. Using the frequency data here, tune those bands and see if you can sort them out from the stations you'd normally expect to hear on those frequencies.



The AN/URC-68 usually comes with crystals for military frequencies, and most folks seem to take advantage of those channels when they use an AN/URC-68. The set is a paramilitary favorite.

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Many paramilitary groups are inspired by, or run under the aegis of, various survival and commando schools. Ads for such schools appear regularly in national publications.

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BY CHARLES R. MILLER, SR., KWV8DG

If you're a person who likes to count the countries you tune in on a communications receiver, just think about *finally* nailing places like the Comoros (Fed. Islamic Rep.), Rep. of Maldives, Nepal, or Easter Island and other places you never could connect with. It can be done! Forget about trying to strain your ears by listening for the feeble signals of Radio Comoro on 3331 kHz, or trying to figure out how to delight your ears to sounds from places such as

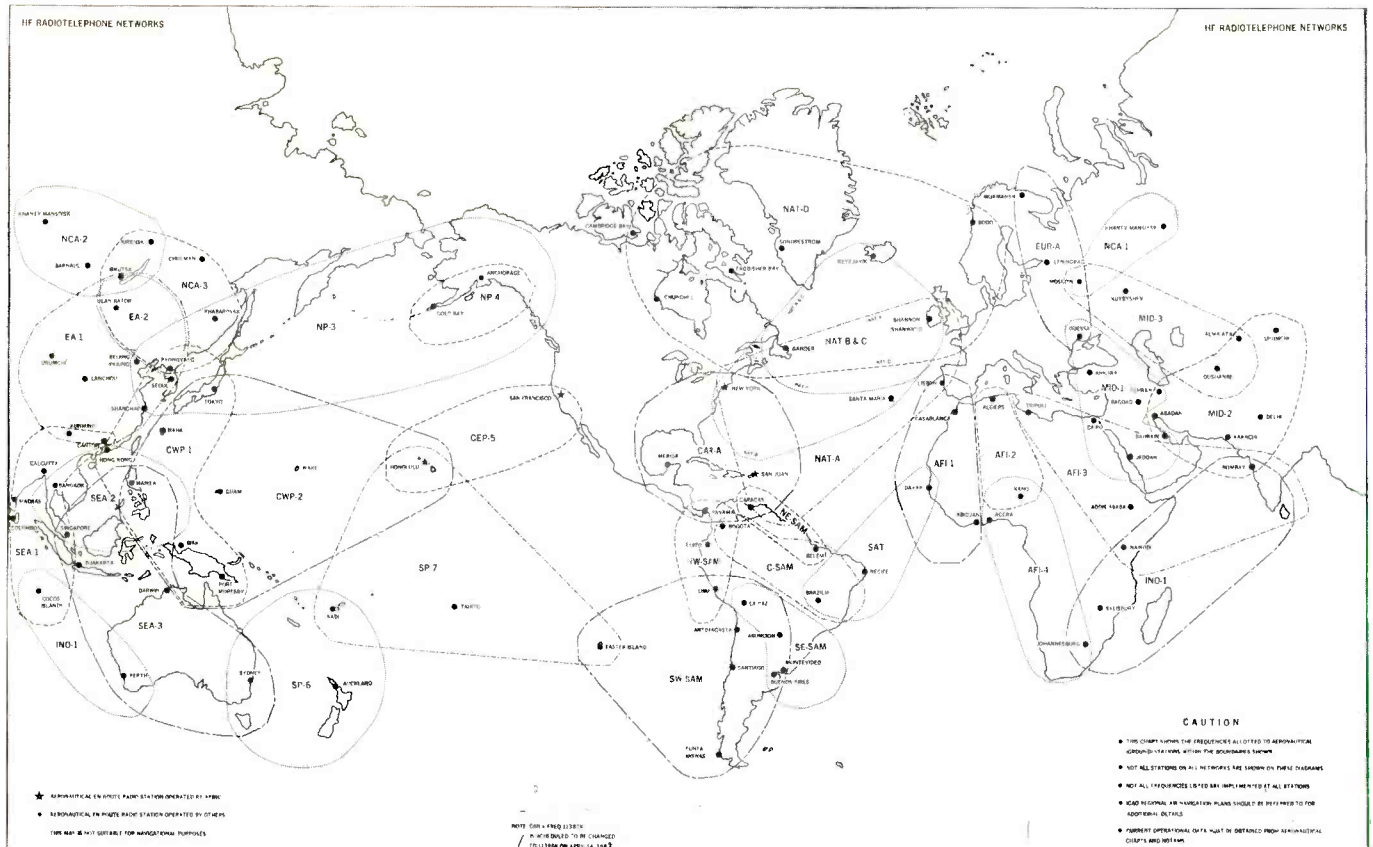
Easter Island or Bahrain, which have no shortwave broadcasters. You *might* tune the ham bands and possibly hear some of the world's out-of-the-way spots.

Here's another approach! It's one which can bring forth upon your receiver more than 250 stations in almost 150 nations operating in voice networks covering more than 100 frequencies ranging between 2 and 18 MHz. Look, all of these stations aren't going to pour out over you like Log

Cabin syrup on a stack of buckwheats. You're going to have to work at some of them. Unlike seeking out random ham stations, however, these stations can be pinpointed by your receiver with more regularity and accuracy.

This bountiful harvest of DX consists of the various networks of two-way voice communications used to contact the world's airliners on international flights. Not just a way of racking up new countries, these stations





The ARINC ICAO HF enroute frequencies are used as shown in this chart. (Thanks to Dick, W0SIR, for furnishing this chart)

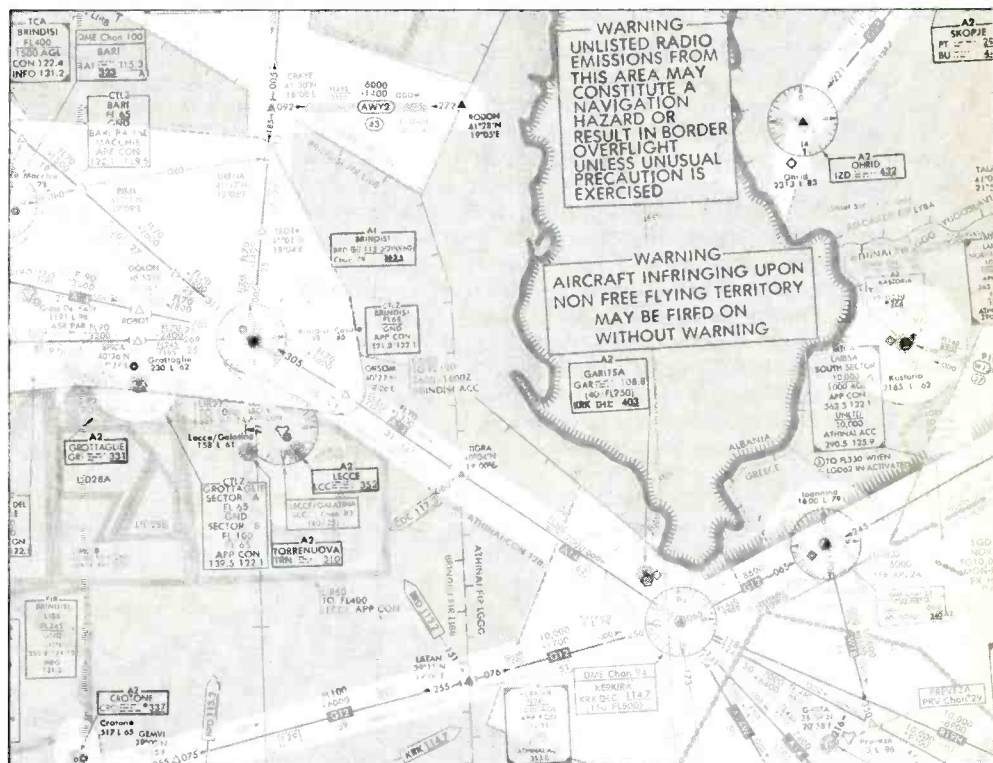
make for fine monitoring fare—interesting, often exciting! In fact, the last communications with Korean Airlines Flight 007 took place on these frequencies before the Soviets downed the plane last September 1.

What It's All About

High frequency (HF) single sideband (SSB) communications are used for maintaining continuous contact for purposes of exchanging air traffic control information during long overwater flights in areas where VHF communications aren't feasible because of the distances involved. HF frequencies are assigned to various areas of the world according to agreements worked out between the International Civil Aviation Organization (ICAO) and the International Telecommunications Union (ITU) and various national aviation authorities such as the FAA in the USA, the CAA in the United Kingdom, etc.

These agreements specify a certain family or network of HF frequencies for each area. A network consists of four or more frequencies. Aircraft making first contact with a ground station will normally be assigned two or three frequencies to use during the time it is transiting that control zone. One will be the primary frequency, the others will be secondary or backup frequencies to be used in the event primary frequency communication is lost due to frequency crowding, interference, equipment malfunction, deterioration of HF propagation, etc.

While the ground stations around the world may be operated by specific airlines or governmental authorities, in most areas

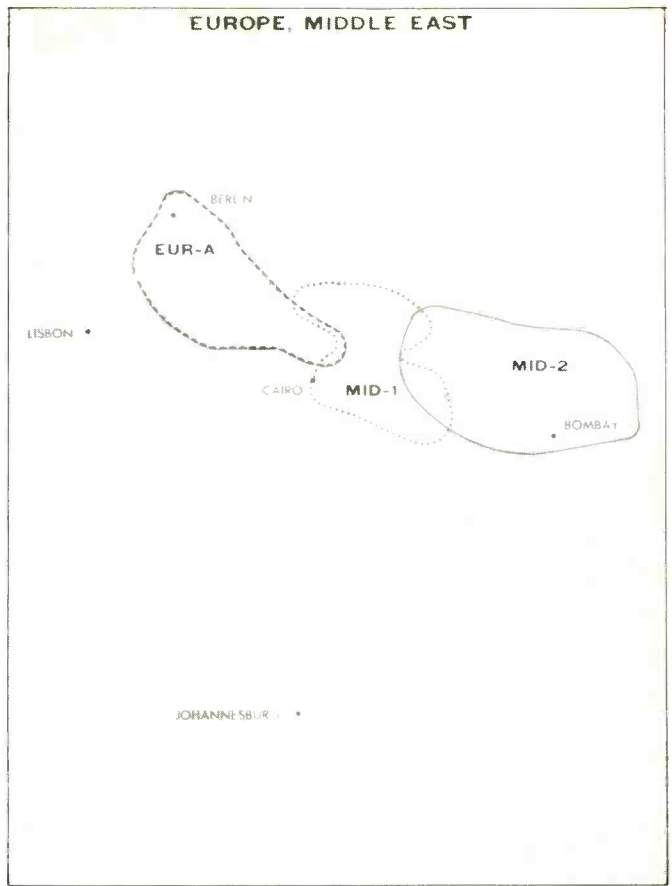
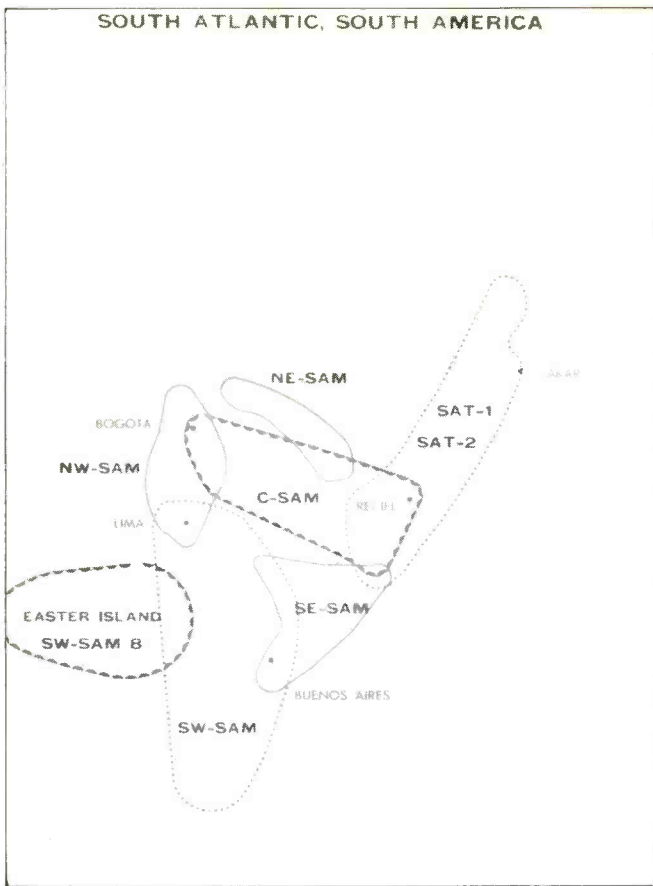


The importance of an aircraft to know exactly where it is at all times is pointed out most dramatically on this flight chart showing the borders of Yugoslavia, Greece, and Albania.

where the United States has been given such communication responsibility by the ICAO, the ground stations are licensed to Aeronautical Radio Inc. (2551 Riva Rd., Annapolis, MD 21401), a private, not-for-profit company. This is the same company which op-

erates almost all of the VHF enroute stations in the USA operating in the 128.825 to 132.00 MHz band.

Information usually exchanged between aircraft and ground stations generally relates to attitudes (flight levels), position reports,



fuel consumption, estimated flight times, destinations, and similar data. On an "official" basis, though, it is usually stated that English is the standard language used throughout the world for all air traffic control communications. For the majority of communications, this is essentially true and, at any rate, the ground stations may well be staffed by bilingual personnel who can speak English in addition to their own national language. From a practical standpoint, monitoring has shown that sometimes this English is so broken and heavily accented that it is impossible to understand on any level. Moreover, monitoring has also revealed that a considerable amount of communica-

tions in some networks is not in English at all. For instance, you'll hear plenty of French while you're listening to the AFI-2 network, lots of Spanish on the E-CAR network, and I've never heard any English at all on the SE-SAM or NCA-2 networks; doubtless there is little reason to use English when both the aircraft's pilot and the ground communicator share a common language other than English. While this can make it difficult for you to follow some of the meaning of the communications you may monitor in certain networks, the ground stations generally identify by their location name, and you should be able to figure those words out without much difficulty regardless of the language in use.

Monitoring Hints

Monitoring these networks is nothing new. Many people have been specializing in them for years now," and with the ICAO being prone to shifting and changing the frequencies used every couple of years, there's always something new to monitor. The last substantial change in the ICAO HF frequency allocations went into effect 1 February 1983, and it was a complete revamping of practically every network.

If you're seeking a specific station or country, your best bet would be to check our listings and then listen for the station you want, remembering that frequencies above about 15 MHz will probably be used primarily during daylight hours— not daylight hours at your location but in the area where the communications are taking place. Likewise, the frequencies below 8 MHz are mostly nighttime frequencies in the areas where they are in effect. So, if you're in a daylight area and trying to monitor stations on the other side of the world (where it's nighttime), you've got a bit of an extra challenge facing you. Try listening for communications on listed frequencies lying between 9 and 15 MHz and, with luck, you may just connect with the stations you're seeking!

Plan on checking out several frequencies, and when you find one that seems to be especially active at that time, just let your receiver "sit" on that frequency for a minimum of an hour or two or perhaps an entire evening. While you'll hear certain stations which seem to be operating every few minutes (such as Santa Maria in the Azores),

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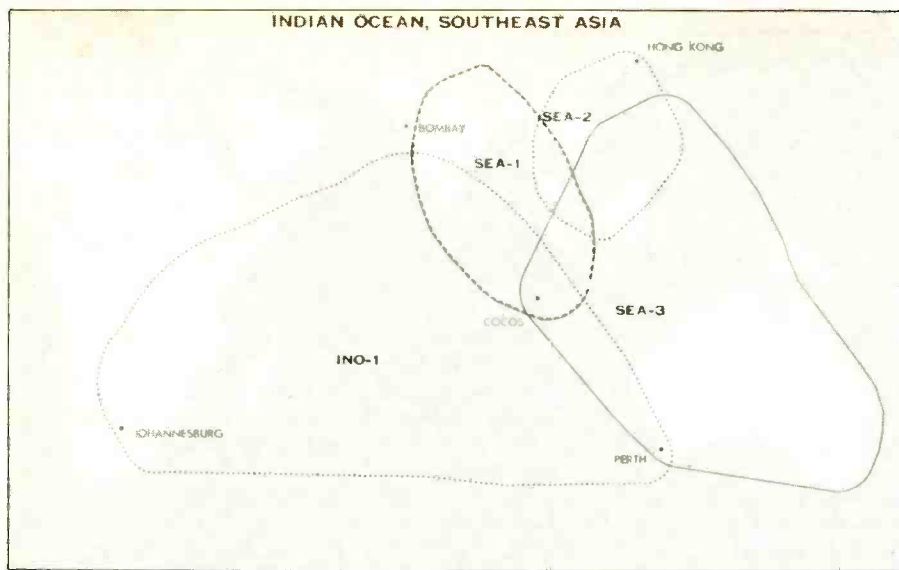
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Here's another aspect of monitoring which you may find adds to the enjoyment of listening to these frequencies. Try charting the location and progress being made by flights you're monitoring; as they periodically report their positions to the ground stations, you mark those positions on an aeronautical chart. Aeronautical charts (wall size) are relatively inexpensive and easy to obtain. You can mount one on your wall and then cover it with a sheet of clear plastic or celluloid. By using a red grease pencil, you can place marks on the plastic each time the aircraft checks in giving its latitude and longitude. This gives you a picture of the speed, direction, and route of the flight.

Aeronautical charts are sold by private suppliers at many airports, or you can obtain them by mail from the National Ocean Survey, NOAA, Department of Commerce, Rockville, MD 20852. Ask them to send you a free catalog of aeronautical charts that they sell. The grease pencil and a large piece of celluloid can be purchased at stores selling art supplies.

After you've written on the celluloid with the grease pencil, you can easily erase the writing by rubbing it with some tissue paper or a soft cloth. Comes off pronto.

Enjoy

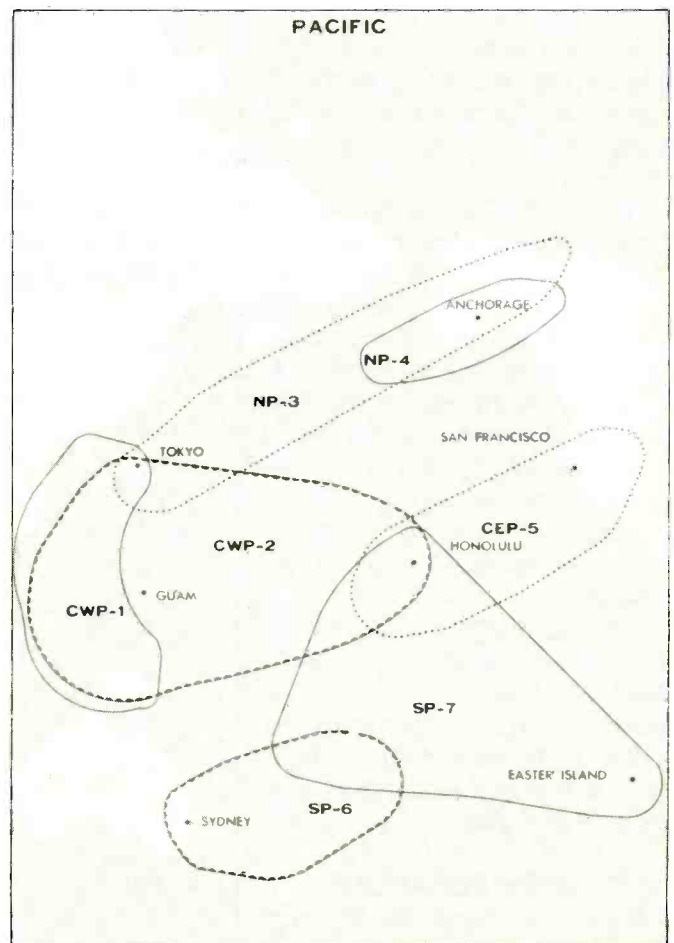
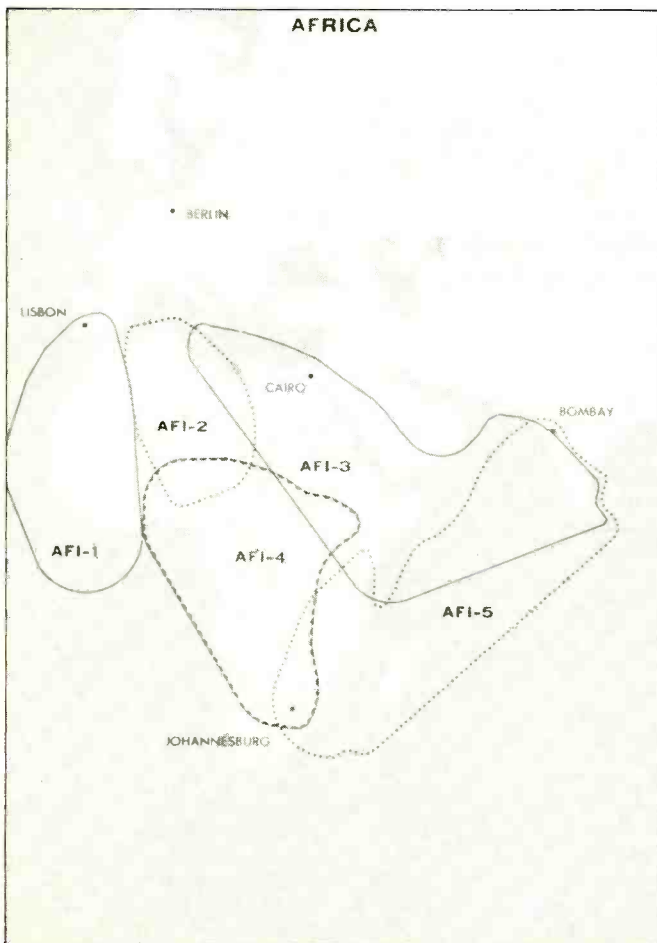
Listed here is enough information to give you plenty of listening enjoyment, at least until the next time they again shuffle around

some other stations may show up only once or twice in an evening.

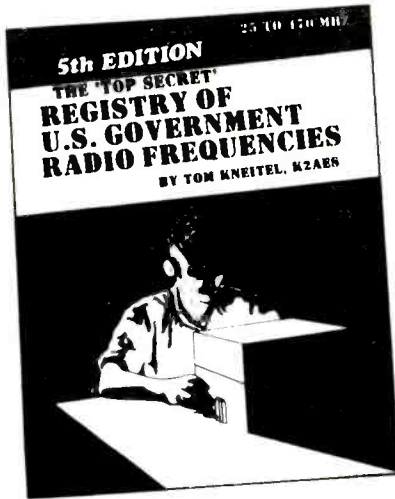
Some people have had luck sending reception reports to these stations and (by the grace of prepared reply cards) obtaining a verification. While this is an engaging and appealing aspect of monitoring these frequencies, it can also help you rack up some verifications from countries which you might have no other opportunity to confirm. The major obstacle here is finding the proper address to send your report; however, a letter addressed to the Chief Operator, Airways

Communication Station, (name of airport, city and country) will probably eventually find its way to the proper person.

If you're clever you can use various aids to pick out the right addresses. An example of this is finding the right address for QSLing the airways communication station on Easter Island. If you look up Easter Island in the *World Radio TV Handbook*, you'll note that the address of the local broadcasting station, Radio Manu Kena, is probably identical to that of the airways station — Aeropuerto Mataveri, Isla de Pascua (via Chile).



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ICAO Enroute Networks

Network "AFI-1"	3452, 6535, 8861, 13357, 17955 kHz
Network "AFI-2"	3419, 5652, 8894, 13273, 17961 kHz
Network "AFI-3"	3467, 5658, 10018, 11300, 13288, 17961 kHz
Network "AFI-4"	2878, 5493, 8903, 13294, 17961 kHz
Network "AFI-5"	2878, 3431, 3476, 3481, 5493, 5498, 5505, 5634, 6559, 6574, 8854, 8870, 8879, 10025, 13288, 13306, 13336 kHz
Network "CAR-A"	2887, 3455, 5520, 5550, 6577, 6586, 8846, 8918, 11396, 13297, 17907 kHz
Network "E-CAR"	2887, 5550, 6577, 8918, 11397, 13297, 17907 kHz
Network "W-CAR"	3455, 5520, 6586, 8846, 11396, 13297, 17907 kHz
Network "CEP-5"	2869, 3413, 5547, 5574, 8843, 11282, 13261, 13300, 13354, 17904 kHz
Networks "CWP-1" & "CWP-2"	2998, 4666, 5652, 6532, 8903, 11384, 13300, 17904 kHz
Network "EA-1"	3016, 6571, 8897, 10042, 13297 kHz
Network "EA-2"	3485, 5649, 5655, 8942, 11396, 13309, 17907 kHz
Network "EUR-A"	3479, 5661, 6598, 10084, 13288, 17961 kHz
Network "INO-1"	3476, 5634, 8879, 13306, 17961 kHz
Network "MID-1"	2992, 5667, 8918, 13312 kHz
Network "MID-2"	3467, 5658, 10018, 11300, 13288, 17961 kHz
Network "MID-3"	2944, 4669, 6631, 8951, 11375, 17961 kHz
Network "NAT-A"	3016, 5598, 8825, 13306, 17946 kHz
Network "NAT-B"	2899, 5616, 8864, 13291, 17964 kHz
Network "NAT-C"	2962, 5649, 8879, 13306, 17946 kHz
Network "NAT-D"	2971, 4675, 8891, 11279, 13291, 17946 kHz
Network "NCA-1"	3019, 5646, 13315, 17958 kHz
Network "NCA-2"	2851, 4678, 6592, 10096, 17958 kHz
Network "NCA-3"	3004, 5664, 10039, 13303, 17958 kHz
Networks "NP-3" & "NP-4"	2932, 5628, 10048, 13294, 13300, 17904 kHz
Networks "C-SAM" "NE-SAM" & "SE-SAM"	3479, 5526, 8855, 10096, 13297, 17907 kHz
Networks "NW-SAM" & "SW-SAM"	2944, 4669, 6649, 10024, 11360, 17907 kHz
Network "SW-SAM-8"	4669, 6649, 8667, 13300 kHz
Network "SAT-1"	3452, 6535, 8861, 13357, 17955 kHz
Network "SAT-2"	2854, 5565, 11291, 13315, 17955 kHz
Network "SEA-1"	3470, 6556, 10066, 13318, 17907 kHz
Network "SEA-2"	3485, 5649, 5655, 8942, 11396, 13309, 17907 kHz
Network "SEA-3"	3470, 6556, 11396, 13318, 17907 kHz
Networks "SP-6" & "SP-7"	3467, 5643, 8867, 11327, 13273, 17904 kHz

ICAO HF Aeronautical Stations & Selected Extended Range VHF Stations

Country	City	VHF	HF Net(s)
Afghanistan	Kabul	120.9	MID-2
	Kandahar		MID-2
Algeria	Algiers		AFI-2
	In Amenas		AFI-2
	Tamanrasset		AFI-2
Angola	Luanda	118.5	AFI-4
Argentina	Buenos Aires	127.1	SE-SAM, SW-SAM
	Cordoba	125.1	SW-SAM
	Mendoza	126.9	SW-SAM
	Resistencia	126.9	SW-SAM
	Salta	126.9	SW-SAM
Australia	Darwin		SEA-3
	Perth	120.7	INO-1, SEA-3
	Sydney	120.7	SP-6
	Santa Maria	127.9	NAT-A, NAT-B, NAT-C
Bahrain	Manama		MID-1, MID-2
Bangladesh	Dacca	121.3	SEA-1
Benin	Cotonou		AFI-4
Bolivia	La Paz	128.2	SE-SAM, SW-SAM
	Santa Cruz	127.1	SE-SAM, SW-SAM
Botswana	Francistown		AFI-4
Brazil	Belem	126.9	C-SAM, NE-SAM
	Brasilia	126.9	C-SAM, SAT-1, SAT-2
	Campo Grande	126.9	SE-SAM
	Manaus	126.9	S-SAM

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Country	City	VHF	HF Net(s)
	Porto Alegre	126.9	SE-SAM
	Porto Velho	126.9	E-SAM
	Recife	126.9	C-SAM, SAT-1, SAT-2
	Rio de Janiero	126.9	C-SAM, SAT-1, SAT-2
	Salvador	126.9	C-SAM, SAT-1, SAT-2
Bulgaria	Sofia		EUR-A
Burma	Rangoon		SEA-1
Burundi	Bujum Bura		AFI-3
Cameroon	Douala		AFI-4
	Garoua		AFI-4
	Maroua		AFI-4
	Yaounde		AFI-4
Canada	Cambridge Bay, NWT		NAT-D
	Churchill, Manitoba	126.9	NAT-D
	Frobisher, NWT	126.9	NAT-D
	Gander, Nfld.	126.9	NAT-A, NAT-B, NAT-C, NAT-D
	Winnipeg, Manitoba	126.9	NAT-D
Canary Is.	Las Palmas		NAT-A, SAT-1, SAT-2
Cape Verde	Sal		AFI-1, SAT-1, SAT-2
Cent. Afr. Rep.	Bangui		AFI-4
Chad	N'djamena	128.1	AFI-2, AFI-4
Chile	Antofagasta	126.9	SW-SAM
	Arica		SW-SAM
	Puerto Montt	126.9	SW-SAM
	Punta Arenas	126.9	SW-SAM
	Santiago	126.9	SW-SAM
China, PR	Beijing		CWP-1, EA-1, NP-3
	Canton		CWP-1, EA-1, SEA-1, SEA-2
	Kunming		EA-1, SEA-1, SEA-2
	Lanchow		EA-1
	Shanghai		EA-1, CWP-1, NP-3
	Shenyang		EA-1
	Urumchi		EA-1, MID-2
	Wuhan		EA-1
China, Rep.	Taipei	127.3	CWP-1
Cocos I.		118.1	AFI-3, INO-1, SEA-1
Colombia	Baranquilla		CAR-A
	Bogota		NW-SAM
	Cali		NW-SAM
	Leticia		C-SAM, NW-SAM
	San Andres I.		CAR-A, E-CAR, W-CAR
Comoros	Moroni		INO-2, AFI-5
Congo	Brazzaville	121.1	AFI-4
Cook Island	Raratonga		SP-7
Costa Rica	San Jose	126.9	CAR-A
Cuba	Havana	126.9	CAR-A
	Santiago de Cuba		CAR-A
Cyprus	Nicosia		EUR-A
Czechoslovakia	Prague		EUR-A
Djibouti	Djibouti	128.9	AFI-3
Dom. Rep.	Santo Domingo		E-CAR
Easter Island		126.9	SP-7, SW-SAM, SW-SAM-8
Ecuador	Guayaquil	126.9	NW-SAM
	Quito	126.9	NW-SAM
Egypt	Cairo	130.9	AFI-3, EUR-A, MID-1
Eire	Shanwick	127.9	NAT-A, NAT-B, NAT-C, NAT-D
Ethiopia	Addis Ababa	125.1	AFI-3
	Asmara		AFI-3
Fiji	Nandi		SP-6, SP-7
Fr. Guiana	Cayenne	126.9	CAR-A, NE-SAM
Fr. Polyn.	Bora Bora		SP-7
	Tahiti	126.7	SP-7
Gabon	Franceville		AFI-4
	Libreville		AFI-4
	Port Gentil		AFI-4
Germany, E.	Berlin		EUR-A
Germany, W.	Berlin		EUR-A
Ghana	Accra		AFI-4
Greece	Athens		EUR-A
Greenland	Sondrestrom		NAT-D
Guam	Agana	122.6	CWP-2
Guatemala	Guatemala City	126.9	CAR-A
Guinea	Conakry		AFI-1
Guyana	Georgetown	126.9	CAR-A, NE-SAM
Haiti	Port-au-Prince		E-CAR
Honduras	Tegucigalpa	126.9	CAR-A
Hong Kong	Hong Kong	127.1	CWP-1, SEA-2
Hungary	Budapest		EUR-A
Iceland	Reykjavik	127.9	NAT-A, NAT-B, NAT-C, NAT-D

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Country	City	VHF	HF Net(s)
India	Bombay	126.9	AFI-3, AFI-5, INO-1, MID-2, SEA-1
	Calcutta	127.3	MID-2, SEA-1
	Delhi	127.1	MID-1, SEA-1
	Madras	124.1	SEA-1
	New Delhi		MID-2, SEA-1
Indonesia	Bali		SEA-3
	Denpasar		SEA-3
	Djakarta		SEA-1, SEA-3
	Ujung Padang		SEA-3
	Abadan	127.3	MID-2
Iran	Tehran	126.9	MID-1, MID-2
	Basrah	125.9	MID-1
Iraq	Tel Aviv	126.7	MID-1
	Rome		EUR-A
Israel	Rome		EUR-A
	Abidjan	121.1	AFI-1
Ivory Coast	Bouake		AFI-1
	Kingston		CAR-A
Jamaica	Tokyo	126.7	CWP-1, CWP-2, NP-3
	Amman	128.5	MID-1
Japan	Phnom Penh		SEA-2
	Nairobi	118.5	AFI-3, AFI-4, AFI-5, INO-1
Jordan	Pyongyang		CWP-1, EA-1, EA-2, NCA-3, NP-3
	Seoul	127.1	CWP-1
Kampuchea	Kuwait	135.0	MID-1, MID-2
	Vientiane		SEA-2
Kenya	Beirut	119.3	EUR-A, MID-1
	Maseru		AFI-4
Korea, N.	Monrovia		AFI-1
	Benghazi		AFI-3
Korea, S.	Tripoli		AFI-2, AFI-3
	Antananarivo	125.1	AFI-5, INO-1
Kuwait	Majunga		AFI-5, INO-1
	Tamatave		INO-1
Laos	Blantyre		INO-1
	Kota Kinablu		SEA-2
Lebanon	Kuala Lumpur		SEA-1, SEA-2
	Male		AFI-3, SEA-1
Lesotho	Bamako		AFI-1
	Gao		AFI-2
Liberia	Ghardaia		AFI-2
	Valetta	129.1	EUR-A
Libya	Nouadhibou		AFI-1
	Nouachott		AFI-1
Madagascar	Port Louis		AFI-5, INO-1
	Merida	126.9	CAR-A
Malawi	Ulan Bator		EA-1, EA-2, NCA-3
	Casablanca		AFI-1
Malaysia	Beira	118.5	AFI-5, INO-1
	Maputo		INO-1
Maldives	Windhoek	124.7	AFI-4
	Kathmandu	124.7	MID-2, SEA-1
Mali	Curacao		E-CAR
	Auckland	118.5	SP-6
Malta	Niamey	126.1	AFI-1, AFI-2
	Kano	118.5	AFI-2, AFI-4
Mauretania	Lagos		AFI-4
	Bodo		NAT-D
Mauritius	Naha	126.9	CWP-1, CWP-2

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Country	City	VHF	HF Net(s)
Pakistan	Karachi	127.3	MID-2
	Lahore	124.1	MID-2
Panama	Panama City	126.9	CAR-A, NW-SAM
Papua New Guinea	Biak		CWP-1
	Port Moresby	120.9	CWP-1, CWP-2
Paraguay	Asuncion	126.9	SE-SAM, SW-SAM
Peru	Chiclayo	126.9	NW-SAM
	Iquitos	126.9	C-SAM, NW-SAM
	Lima	126.9	NW-SAM, SW-SAM
	Peru	126.9	SW-SAM
Philippines	Manila	124.9	CWP-1, CWP-2, SEA-2
Portugal	Lisbon	127.9	AFI-1, NAT-A
Puerto Rico	San Juan	126.9	CAR-A, NAT-A
Reunion	St. Denis		AFI-5, INO-1
Romania	Arad		EUR-A
	Bucharest		EUR-A
Rwanda	Kigali	124.3	AFI-3, AFI-5
Samoa, American	Pago Pago	126.9	SP-7
Sao Tome	Sao Tome		AFI-4
Saudi Arabia	Jeddah		AFI-3, MID-1
Senegal	Dakar	127.3	AFI-1, SAT-1, SAT-2
Sierra Leone	Freetown		AFI-1
Singapore	Singapore		SEA-1, SEA-2, SEA-3
Somalia	Hargesia	126.1	AFI-3
	Kisimayu		AFI-3
	Mogadiscio		AFI-3
Rep. South Africa	Johannesburg	126.7	AFI-4, AFI-5, INO-1
Seychelles	Mahe		AFI-5, INO-1, INO-3
Sudan	Khartoum	124.7	AFI-3
Suriname	Paramaribo		CAR-A, NAT-A, NE-SAM
Swaziland	Manzini		INO-1
Syria	Damascus	120.1	MID-1
Tanzania	Dar es Salaam		AFI-3
Thailand	Bangkok		SEA-1
Togo	Lome		AFI-4
	Niamtougou		AFI-4
Trinidad	Port of Spain ("Piarco")		CAR-A, NE-SAM
Tunisia	Tunia		AFI-2, EUR-A
Turkey	Ankara		MID-1
	Istanbul		EUR-A
	Entebbe		AFI-3, AFI-4
Uganda	Aktyubinsk, Kazakh SSR		MID-3
USSR	Alma Ata, Kazakh SSR		MID-2, MID-3
	Arkhangelsk		EUR-A
	Barnaul		NCA-2
	Chita		NCA-3
	Chulman		NCA-3
	Dushanbe, Tadjik SSR		MID-2, MID-3
	Ekimchan		NCA-3
	Erivan, Armenian SSR		MID-1, MID-2, MID-3
	Frunze, Kirgiz SSR		MID-2, MID-3
	Irkutsk		EA-1, EA-2, NCA-2, NCA-3
	Ivdel		NCA-1
	Khabarovsk		NCA-3, NP-3
	Khanty Mansiysk		NCA-1, NCA-2
	Kiev, Ukrainian SSR		EUR-A
	Kirensk		NCA-2, NCA-3
	Kolpashevo		NCA-2
	Krasnoyarsk		NCA-2
	Kuibyshev		MID-3
	Kyzl Orda, Kazakh SSR		MID-3
	Kyzyl, Tuvianian ASSR		EA-1, EA-2, NCA-2, NCA-3
	Leningrad		EUR-A
	Lvov, Ukrainian SSR		EUR-A
	Minsk, White Russ. SSR		EUR-A
	Moscow		EUR-A, MID-3, NCA-1
	Murmansk		EUR-A
	Novosibirsk		NCA-2
	Odessa, Ukrainian SSR		EUR-A, MID-1, MID-2
	Podkamennaya Tunguska		NCA-2
	Riga, Latvian SSR		EUR-A
	Samarkand, Uzbek SSR		MID-2, MID-3
	Simperopol		EUR-A, MID-1, MID-2
	Surgut		NCA-2
	Sverdlovsk		NCA-1
	Syktvykar, Komi ASSR		EUR-A, NCA-1
	Tashkent, Uzbek SSR		MID-2, MID-3
	Tblisi, Georgian SSR		MID-1, MID-2
	Ulan-Ude		NCA-3
	Uralsk, Kazakh SSR		MID-3

Country	City	VHF	HF Net(s)
USSR (cont.)	Velikie Luki		EUR-A
	Vilnyus, Lithuanian SSR		EUR-A
	Vologda		EUR-A, NCA-1
	Yeniseisk		NCA-2
USA	Anchorage AK	121.3	NP-3, NP-4
	Cold Bay AK	127.3	NP-3, NP-4
	Honolulu HI	131.95	CEP-5, CWP-2, SP-7
	New York NY	129.9	CAR-A, NAT-A, NAT-B, NAT-C
	San Francisco CA	131.95	CEP-5
Upper Volta	Bobo Dioulasso		AFI-1
	Ouagadougou		AFI-1
Uruguay	Montevideo	126.7	SE-SAM, SW-SAM
Venezuela	Barcelona		E-CAR
	Caracas	126.9	CAR-A, NE-SAM
Vietnam	Maracaibo		E-CAR
	Hanoi		SEA-2
	Ho Chi Minh Ville		SEA-2
Wake Island	Wake Island		CWP-2
Yemen, DR	Aden	119.7	AFI-3
Zaire	Goma		AFI-4
	Kinshasa		AFI-4
	Kisanagi		AFI-4
	Lumbumbashi		AFI-4
	Lusaka	120.5	AFI-4, AFI-5, INO-1
	N'djili		AFI-4
	Bulawayo		AFI-4
Zimbabwe	Salisbury		AFI-4, INO-1

all of the ICAO frequencies. We have presented the main list which consists of just about all of the HF airways stations you're liable to hear, and even included some VHF information for those of you who are collectors of that type of data (and, let's face it—when was the last time anybody presented you with VHF frequency information for Afghanistan or Djibouti?). And, naturally, we have also presented you with the frequen-

cies of the various HF SSB networks or families of frequencies.

Furthermore, we have also included some charts to give you a general idea of the major international air corridors. Ones such as EA-1 and 2, and the NCA-1, 2, and 3 are not indicated on these charts—however they are shown in our stations listings. These routes lie within Russia and mainland China and adjacent areas.

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Introducing 1750 Meters

A No License Two-Way CW Hobby Band!

BY MICHAEL MIDEKE, WB6EER

It was a June morning in 1977 when I heard my first low power experimental station on the 1750 meter band. I had been tuning back and forth through the wilderness of tones, clicks, buzzes, and static that seemed to be the only occupants of the 30 kHz segment between 160 and 190 kHz when one of the weakest tones abruptly vanished. I inched the dial carefully back and forth across the place where the signal had been. There it was again! A few seconds later it cut off, only to reappear after a long pause. The signal was a CW (International Morse Code) transmission but so extremely slow that I had to time the dots and dashes in order to finally understand the O V K that was being sent over and over.

That evening, a little guesswork followed by inquiries on the 160 Meter band led to contact with Tony Clarke, W6OVK, who was delighted to confirm that I had copied his transmissions from Long Beach, California, at a distance of 225 air miles. In the weeks that followed, Tony went to work improving his transmitting antenna while I began stringing wires in unlikely places and building antenna tuners, preamps, and audio filters. Our combined efforts made my copying his signal pretty much a sure thing as long as the static wasn't too bad. Another experimenter appeared within 25 miles of Tony and they began to have contacts, which I monitored but could not join. I went to work on a transmitter, not realizing that the receiving advantages I enjoyed thanks to my remote location in an isolated canyon bottom were to be a source of great difficulty in the transmitting department.

I began to lose interest in the easy contacts on the Ham bands. Where was the thrill of working Japan with a watt on 15 meters when all I wanted was to work Long Beach on 1750 meters? In fact, I was well on the way to becoming a Lowfer! Lowfer is an acronym coined by Ken Cornell, W2IMB, for LOW Frequency Experimental Radio. It seems to have taken hold.

Five years elapsed before I made my first contact on 1750 meters, but during that period more than 25 Lowfers were heard at distances as great as 830 miles. In the process I gained practical radio experience and became committed to one of the most fascinating and challenging of radio hobbies.

What is this experimental band? What is it good for? How do you get on? The absolutely essential information is to be found in the FCC Rules and Regulations, Sections 15:111 and 15:112. Anyone planning to use the band should be thoroughly familiar with these rules. In addition, it should be noted that these privileges exist only in the United States; persons in other countries must either restrict themselves to listening or



The author's radio shack. Mostly modified surplus and homebrew equipment. (All photos by Michael Mideke)

negotiate something with their own governments. The Lowfer is not licensed and he has NO privileges other than those outlined in the rules. He must accept interference from other services and if he produces harmful interference he must cease or modify operations. FCC calls are not to be used for unlicensed operations, so the Lowfer must devise his own identifier—typically his initials or the last few letters of his amateur call.

Before rushing to listen for a hotbed of 1750 meter activity, it is important to realize that Lowfers do not have exclusive use of 160-190 kHz. Depending upon location, anywhere from a dozen to well over a hun-

dred non-Lowfer signals can be heard on the band. A few of these are broadcast signals from Europe and Northeast Asia, any of which are fine catches for the DXer. The bulk of the QRM consists of steady unmodulated carriers which serve basic telemetry functions for the electrical power distribution grids. These are actually "carrier current" transmissions which travel the high lines right along with the power. Unfortunately, the power lines serve as reasonably effective antennas, radiating potent signals for considerable distances. On rare occasions this carrier current system is also used for voice communications, which may be either AM or SSB.

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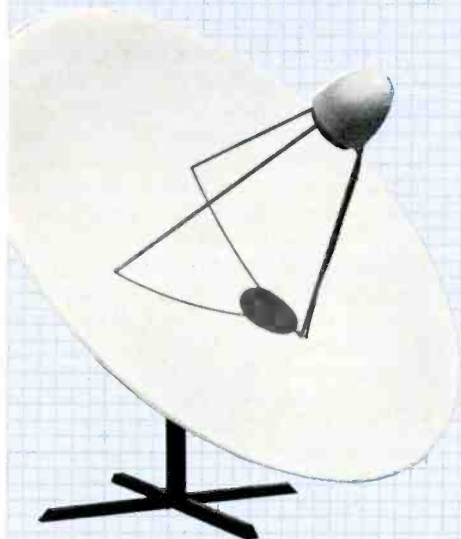
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Probably the strongest signals in the band are produced by the military, in particular a new experimental system known as Ground Wave Emergency Network or GWEN. Using 300 foot vertical antennas with extensive ground systems and 5 kw, the GWEN stations radiate ground wave signals capable of interfering with Lowfers out to 1000 miles in daytime. Nighttime coverage is much greater, even under the worst summer static conditions. Nine GWEN stations are operational and all signals are between 160 and 190 kHz. The Canadian government maintains a number of RTTY stations which can be heard on the band from time to time. In addition, very strong harmonics of military signals on lower frequencies are a problem in some parts of the country.

As if sharing a band with all of this high power activity weren't bad enough, the 1750 meter frequencies are particularly prone to problems with atmospheric and man-made noise. Atmospheric noise reaches prodigious levels, particularly during summer nights when it makes the band useless for all but the most local Lowfer work. Fortunately, this noise is largely cyclic and seasonal. During winter months there are a good percentage of static-free nights and even in summer the band is often quiet from dawn to at least 10 a.m. or later. Man-made noise is not nearly so obliging; it can appear at any time and can be so severe in some cases that the worst atmospheric noise cannot be heard! Leaky insulators and faulty grounds in power distribution systems, ignition systems, electric motors, light dimmers and other SCR controlled devices, and television horizontal oscillator harmonics are a few of the worst problems you can expect to hear on 1750 meters.

So perhaps it is not surprising that rela-

tively little use is being made of the privileges available on the band; the wonder is that anyone at all is working there. And the band is being used. The full extent and variety of use is probably impossible to determine. Communications oriented activity seems to be largely confined to the coasts, with concentrations of stations in the northeastern states and California and only a thin scattering in between. While a few stations are close enough together to work via SSB or even AM phone, effective range in these modes is severely limited and CW is the choice of most operators. Many Lowfers operate CW beacons which repeat their chosen identifier, sometimes including address or telephone number to facilitate listener reporting. Some beacons run 24 hours a day, others keep to a definite schedule, and still others appear as the mood strikes or for specific experiments. Activity tends to concentrate around the weekends and in summer it is predominately a daytime affair.

Listening for Lowfers is one of the ultimate challenges a receiving enthusiast can tackle. While signals are weak and elusive and interference problems are tremendous, serious work can produce surprising results and success under such circumstances never fails to be a source of great satisfaction. Those wishing to listen should try to find out if anyone is active in their area. The best source of information is the monthly publication of The Longwave Club of America—*The Lowdown*. Membership (including *Lowdown* subscription) is \$10 per year from Longwave Club of America, 45 Wildflower Rd., Levittown, PA 19057.

Before plunging into 1750 meter efforts, it is important to have some understanding of what can be expected of the band given power and antenna restrictions defined by

the rules. We are dealing with ground-wave coverage here, and on the frequencies of interest it is quite extensive. Field strength for ground-wave is inversely proportional to distance, which means if you are moving straight away from a signal source at a constant speed, the rate at which the signal becomes weaker will decrease with distance. So, on 1750 meters there is a relatively small zone in which signals will be perfectly readable under all conditions, a much larger zone in which they will be readable under most conditions, and a relatively enormous zone in which signals can be copied when conditions are good.

A reasonably good transmitting installation operating in CW mode should have an assured coverage radius of ten miles except under the very worst noise and static conditions. The same station on AM phone should cover a three or four mile radius and SSB should make seven miles. RTTY should equal CW coverage, while coherent CW and narrow band voice modulation techniques should greatly expand the primary coverage of the respective modes. The important thing to remember is that there is a zone of assured coverage. While some will find the limited range a disadvantage, to others it will be a great asset.

The secondary coverage zone is larger by far. If the signal is S9 at 10 miles it will be just 6 dB weaker or S8 at 20 miles, S7 at 40 miles and so forth. Our little CW signal should be copyable most of the time under most conditions at at least 30 miles—not far, but already we are talking about nearly 3,000 square miles! How many people are in the 3,000 square miles surrounding you? Further out we have the zone where signals are copyable some of the time on a predictable and reliable basis. For CW signals, this zone has a radius of at least 100 miles. From my reasonably quiet location I regularly copy several Lowfers at distances in excess of 200 miles. During recent experiments I experienced no difficulty copying signals from a station running 100 milliwatts input all though daylight hours on seven consecutive days at a distance of 125 air miles. When input power was reduced to 30 milliwatts, the signal was still copyable during the quietest part of the day. Distance can be had, but the further you reach the harder it gets.

Under quiet nighttime conditions in winter, Lowfer signals have several times been copied at distances in excess of 800 miles. Advanced techniques seem certain to extend the limits of reception to 1,000 miles and more. The opposite and perhaps more valuable face of this coin is that the same techniques will assure local communications with miniscule power levels and far less than optimum antennas.

In any case, practical results within the primary and secondary coverage zones are accessible to anyone. The band provides an excellent "workshop" for developing basic electronics and communications skills in beginners while offering the established amateur a whole new territory to explore. The best way to get started is to find an active Lowfer nearby to provide information, en-

May We Recommend

The Longwave Club of America, 45 Wildflower Rd., Levittown, PA 19057. Here's a club for those rugged enthusiasts interested in knowing what's happening below 540 kHz! Their monthly publication, *The Lowdown*, not only covers listings of stations operating between 10 and 540 kHz, but also has interesting coverage of the 1750 Meter (no license) low power communications band as conducted by Ken Cornell (W2IMB—well known "Lowfer" authority. Membership includes mailing of the publication by First Class Mail and costs \$10 per year (anywhere in the world). When writing to the above, please mention that you saw it in POP' COMM!

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couragement, and contacts. Active Lowfers being few and far between, the next best thing is to work in pairs or small groups to get functional systems on the air. The standard (and only) "textbook" for 1750 meter work is *The Low And Medium Frequency Radio Scrapbook 4th Edition*, by Ken Cornell, W2IMB. It is available for \$10 postpaid from Ken Cornell, 225 Baltimore Ave., Point Pleasant Beach, NJ 08742. With its 119 pages of practical information, including complete FCC Regulations for all aspects of license-free operation, the *Scrapbook* is the essential reference.

While 1750 meters is largely discounted as a survivalist medium, it does have some real potential in this area. Simple equipment and basic techniques will provide results. If necessary, working communications systems can be put together from scratch or scrap by relatively inexperienced personnel. Limited coverage and lack of significant skip propagation are a decided advantage from

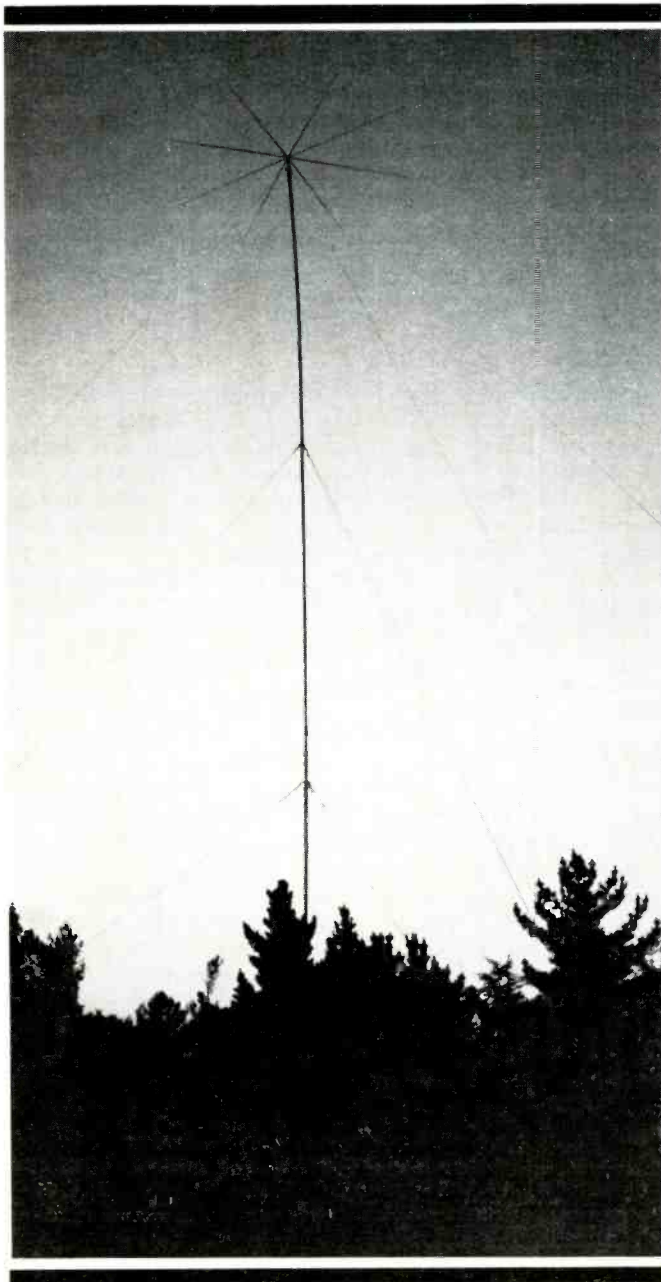
both security and interference standpoints. Above all, the band offers a place to obtain hands-on experience in the basics of radio communication.

Although broadcasting is perfectly legal on 1750 meters, very little has been done along these lines. Anyone not discouraged by the limited range is likely to give up upon realizing that practically nobody has a long-wave receiver. A good 1750 meter AM signal should cover 20 to 40 square miles most of the time. This is sufficient to cover any neighborhood and many entire communities. Given sufficiently basic objectives, simple, reliable, and inexpensive receivers could be constructed by interested groups for the purpose of receiving their own legal unlicensed broadcast station. Such efforts could open the way for truly community-based small scale broadcasting with potential for expansion into large scale open networks. Of all of the experiments to be performed on 1750 meters, this is one of the

most basic, and to my knowledge it has yet to be tried on a meaningful scale.

Other applications abound, limited only by the imagination of the experimenter. Remote control, monitoring, sensing, telemetry, and intercom functions over moderate distances will require nothing like one watt or a 15 meter antenna. If you do put a signal on the band, be sure to observe the rules and above all keep harmonic radiation to a bare minimum. Remember that a signal on 170 kHz has the potential of producing a harmonic every 170 kHz and some designs currently in use on 1750 meters are capable of producing harmful interference well into the VHF spectrum! With a little care there should be no problems.

Take a listen between 160 and 190 kHz every now and then; you may hear a signal that will make a Lowfer out of you. Perhaps if you listen very carefully on exactly 165.675 kHz, you will hear a series of Zs. That's me!



An evening view of Lowfer Brooke Clarke's transmitting antenna in Las Altos Hills, California. Author has copied transmissions at 30 milliwatts input at 125 air miles from this antenna.

FCC Rules That Apply To 160-190 kHz Operation

15.112: Operation below 1600 kHz.

A low power communication device may be operated on any frequency between 10 and 490 kHz or between 510 and 1600 kHz subject to the condition that the emission of RF energy on the fundamental frequency or any harmonic or other spurious frequency does not exceed the field strength in the following table.

Frequency (kilohertz)	Distance (meters)	Field Strength (microvolts per meter)
10 to 490	300	2400
		F (kHz)
510 to 1600	30	24,000
		F (kHz)

15.112: Alternative provisions for operation between 160 and 190 kHz.

In lieu of meeting the requirements of 15.111, a low power communication device may operate on any frequency in the band 160-190 kHz provided it meets the following conditions:

- The power input to the final radio frequency stage (exclusive of filament or heater power) does not exceed one watt.
- All emissions below 160 kHz or above 190 kHz are suppressed 20 dB below the unmodulated carrier.
- The total length of the transmission line plus the antenna does not exceed 15 meters.

Excerpt from 15.133: Certification and identification required for home built device.

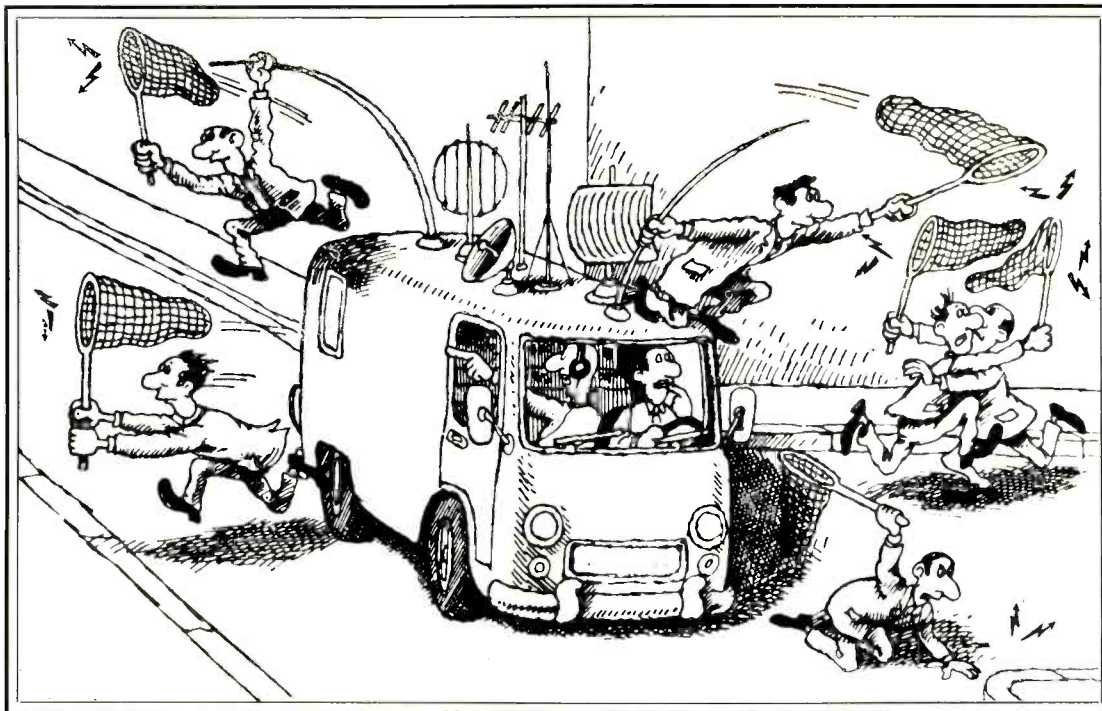
A person who constructs not more than five low power communication devices for his own use, and not for sale, . . . shall attach to each such device a signed and dated label that reads as follows:

I have constructed this device for my own use. I have tested it and certify that it complies with the applicable regulations of FCC Rules Part 15. A copy of my measurements is in my possession and is available for inspection.

Signature

Date

The Outlaw Callbook



Pirate Broadcasters: The Stations History Ignored

BY TOM KNEITEL, K2AES, EDITOR

When you look into the history of radio, you won't hear or read about station WUMS, or WGM, WBBQ, and many others which certainly played their part. They aren't listed in any of the official station rosters, yet they were on the air and they did provide news and entertainment for audiences throughout the nation.

These were unlicensed stations, the ones with call signs that were as homebrew as the equipment. In the early days they were known as outlaws, bootleggers, or pirates. Many listeners these days seem to think that, because of current media coverage and many active pirates, pirate broadcasting is mostly a phenomenon of the 1980's—but pirates seem to go back almost 60 years. Fifty years ago, in 1934, there were probably far more active pirates on the air than there are now, and there are quite a few differences between pirates of old and those who today fly the jolly roger.

Most pirates that have come into existence since the early 1950's seem to utilize modified ham radio equipment, while those prior to WWII were primarily homebuilt. Modern pirates seem to have primarily ensconced themselves around 1620 kHz and some frequencies in the 7 MHz band, while most of the stations in the early days operated on regular broadcasting frequencies in the standard AM broadcast band.

While modern day pirates wear their defiance of FCC regulations like a badge of honor, pioneer pirates seemed to like to attempt

to palm themselves off as licensed and duly authorized stations. Moreover, while most modern day North American pirates appear to be irregularly scheduled one person hobby operations, early pirates were often quite elaborate commercial or semi-commercial efforts providing many scheduled hours of live studio entertainment. Some of these stations were sponsored by hotels, movie theatres, and other local businesses. Nevertheless, as interesting and evident as these stations have been, pirate broadcasters are a lost piece of broadcasting history.

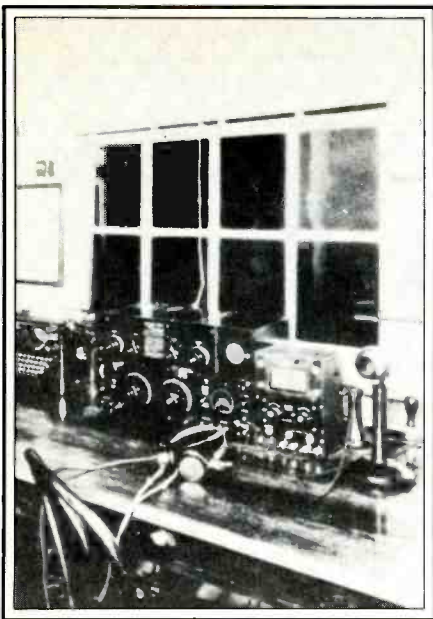
They Were There, Alright

By the early 1930's, listeners were well aware of broadcasting pirates and there was a strange mix of confusion, annoyance, and curiosity surrounding the existence of these stations on the airwaves. The Midsummer (1931) edition of *RADEX* (a popular hobby publication) noted that there were several stations being widely reported that were operating "in defiance of the Federal Radio Commission, which seems to be powerless to enforce its own rules. Certainly with the broad powers granted to the Commission by the Radio Act, it ought to be possible for that body to instantly stop any station from broadcasting without a license."

RADEX went on to complain, "In a recent issue we gave notice of a station giving the call of KMRF at Gretna, Nebraska, which was on the air regularly on 1490 kilocycles. They announced themselves openly as owned and

operated by the Sun Theatre of Gretna. A letter from the Commission brought the information that they knew nothing of such a station 'but would look into it.' It seems that with all the radio inspectors the Commission has, any station could do regular broadcasting without being noticed."

A reader wrote in to *RADEX* to comment: "About three weeks ago I wrote to you to ask for the frequency and power of a station calling itself KTFT and giving its location as Seymour, Texas. I had picked it up on about 1210 kilocycles in the early morning hours when it was testing. You informed me that you knew of no such station in Texas and suggested that I probably heard KTAT in Fort Worth. It happens that after I picked it up the first time, I told a friend of mine in Brooklyn of my catch. He is a member of the Newark News Radio Club and so he informed their program director. As a result, last Sunday morning, I again picked up KTFT broadcasting a special DX program for the above club in which they stated they were a new station on the air and requested letters or telegrams. Now comes a letter from the Radio Commission which says 'there is no station licensed to operate in Seymour, Texas.' It would seem that someone is sound asleep or else that the Commission lacks either the authority or backbone to proceed instantly and vigorously against outlaw stations. Surely it must realize that with every violation of its rules it is weakening its own power and standing."



Outlaw station WGM in Jeanette was on the air for several years and was a rather professional operation.



Listeners in the 1930's gave mixed reviews to the endless parade of pirate broadcasters who assailed their ears.

There is no information available on how long KTFT operated, but it is known that outlaw WGM was on for several years with a full and regular daily schedule. The pioneer pirate, WUMS in Ohio, was on for decades, commencing in 1925. Despite many efforts on the part of the government to silence WUMS, the station was operated very openly and its owner had "WUMS" on his Ohio license plates. The station was still active into the late 1970's and had issued a number of QSLs.

Hauled Into Court

The government wasn't at all unaware or indifferent to the so-called outlaws, it's just that the outlaws were not only plentiful but also doggedly determined to stay on the air as long as humanly possible. Although the outlaw operators were hassled by the government regularly, their standard defense tactic was to claim that their low-power daylight operations were of such limited coverage that the signals didn't cross state lines. As a result, such operations were not interstate in nature and were therefore outside the control of the federal government, at least that's what the broadcasters were

In September of 1979, CBS-TV presented its first show in the "California Fever" series. This program highlighted pirate radio by casting actor Jimmy McNichol as the operator of a station called "The Ghost of the Coast." The station was located in the back room of a teen hangout at an anonymous California beach.



claiming. Because Texas is so large, it was a prime area for outlaw operation in the early 1930's; broadcasters felt much more assured that their signals were not wandering off into other states.

When the operators of TEM-TEX, an outlaw in Temple, Texas, ran this defense up the flagpole, unfortunately the jury failed to salute. The operators of TEM-TEX were surprised to find themselves declared guilty and in 1934 the Radio Commission began a major crackdown in that state, moving through and yanking from the air as many outlaws as they could hear.

In commenting on the Radio Commission's attitude towards outlaws in 1934, Judge E. O. Sykes ignored the outlaws' claim that their operations were mostly in daylight hours when he noted, "Under the Radio Act, paramount consideration must be given to listeners. It is manifestly impossible to provide first-class reception from authorized stations, however modern their equipment or rigid the rules, if the signals of licensed stations are to be disturbed or distorted by signals from illegal stations. At the present state of the art it is not possible to erect a station for broadcasting purposes, operating at night, whose signals will not either extend beyond the borders of any state or be capable of causing interference with the reception of stations located outside that state, despite the use of low power. If the signals are not clear enough in an adjoining state to be heard by the general public, they will undoubtedly cause interference and play havoc with signals from authorized stations operating on the same or adjoining frequency."

A Lasting Tradition

Yes, outlaws were removed from the air but new ones have always seemed to replace those who fell in battle. The tradition has continued at varying levels of intensity, and with considerable changes in the orientation and nature of the stations involved. In the early 1960's, the tradition spread to Western Europe and spawned an influx of offshore pirates such as Radio Mercur, Radio London, Radio Caroline, Radio Veronica, and dozens of others.

Although you can't find any North American pirates written into the annals of broadcasting, certainly these stations have been in there plugging away for about 60 years. We thought it might be time to record here some of those pirates who operated between 1925 and 1979 and were discussed to one extent or other in the media.

Outlaw Callbook 1925-1979

KBIP: This was a station located by the FCC in the 1950's. It was operated by a 17-year-old who was (in the words of the FCC) "bright enough to be broadcasting but not bright enough to avoid detection by the FCC." KBIP was closed down by the FCC's Los Angeles office after being monitored by their Santa Ana facility. The operator said he had been "fooling around" and had selected a frequency which he thought would not cause interference.

KCBY: This seems to have been an alternate ID for King Kong Radio, 1203 kHz. 1969-era.

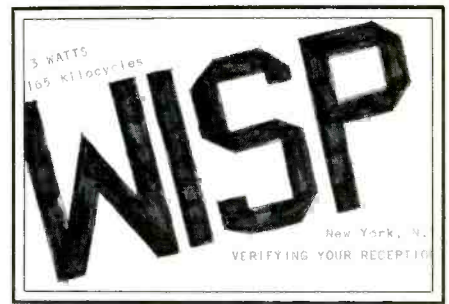
KDOR: Dick Dorwart, of Los Angeles, operated KDOR on 830 kHz. After being contacted by the FCC (in 1979), Dorwart voluntarily closed down KDOR, saying that he would apply for an "appropriate license."

KIDA: A pirate operating from Salida, Kan-



A radio publication of 1934 characterized the typical outlaw broadcaster in this cartoon. He was shown as an angry and wild-eyed fiend waving his arms around who was doggedly determined to jam licensed stations.

This flea-powered pirate sent out QSL cards to listeners as far away as Ohio. Both AM and CW were used for special broadcasts.



WDMC: This was a 7½-watt pirate operated by Willard G. Demuth from Uhrichsville, Ohio. In 1933 the station was on 800 kHz and sent out QSLs. Demuth claimed that the license application he had sent to the government had been denied but that he wanted to operate "in any event."

WDRF-FM: This is actually a licensed FM broadcaster in Hartford, Connecticut. For a few weeks, starting in December of 1974, and for reasons which were never understood, a former employee of WDRF-FM set up an unlicensed transmitter in his Meriden, CT home and rebroadcast WDRF-FM's signals on 1630 kHz—until the FCC closed down this relay station.

WFAT: See WGOR.

WFCC: See WGOR.

WFSR: See WDBX.

WGHP: In 1969 this station, announcing "With God's Help, Peace," operated regularly on 7285 kHz, carrying music, Mutual Network news, and "anti-establishment" commentary along with religious programming. Announced power as 50,000 watts. Unknown location.

WGM: Operated for many years from Jeanette, PA on 820, 840, and 860 kHz. In September '30 its owner, L. E. Spencer, was indicted on illegal broadcasting charges. The station shut down but soon came on again. In August '31 he was again indicted. In February '32 he was convicted and placed on parole for two years. WGM was on the air through the trial and didn't go off until February 17 when the judge handed down his decision. WGM later said it was filing for a license.

WGOR: Another well-known late 70's pirate. Also known as WFAT and WFCC, was operating on 1630 kHz. There was some sort of connection between WGOR and WCPU, and under the call sign WFAT (which issued QSLs), the station was heard from New York City into 1979 when it was shut down by the FCC after a 16 month hunt.

WH20: Heard during 1979 on 1620 kHz. New York City location.

WHBL: On for a brief period in early 1975. WHBL claimed that its 1620 kHz signals came from Bayonne, NJ.

WHGC: From late 1975 until March of 1976, this buccaner was in operation on 1610 kHz from Charlottesville, VA. The gospel music station claimed to be running 1/10th of a watt fed into the power lines for local-only reception. When the FCC located the station, it was using a 50 watt transmitter. Station was operated by a minister's son from a room in his father's church. Several QSLs were issued by WHGC.

WICE: See WDBX.

WINT: A 1968 shortwave broadcaster on 6205 kHz. Location unknown.

WIRE: A 1932 pirate located in Philadelphia, being reported as having a fickle taste in frequen-

cy, just prior to the U.S. entering WWII. An early 1941 DX magazine said that its owner, one C. W. Trueblood, was being held on \$1,000 bail.

KIFS: Station reported in 1934, was located in Port Klamath, Oregon, and operating on 1510 kHz. Reported by a listener in San Francisco as good quality signal, playing records and announcing the time between each song.

KMRF: Supposedly operated by the Sun Theatre, Gretna, Nebraska, during 1931. Frequency was 1490 kHz.

KPON: During the 1950's, the FCC office in Portland, Oregon, and the area monitoring station combined forces to locate KPON. They found the location without too much difficulty. The woman who answered the door announced that, "My son isn't here, but I can show you the broadcast station if you like." Whereupon she led the way to the basement where a transmitter was located, along with a broadcast-type console which was being fed pre-recorded material from a large reel of tape. All of this was going out via a 50 foot antenna in the backyard. The whole operation had been built and operated by two friends, aged 16 and 17. The FCC pulled the plug.

KTFT: A 1931-era pirate operating on 1210 kHz from Seymour, Texas.

RXKR: Fabulous floating pirate of 1933. Was located aboard the S. S. CITY OF PANAMA and operated on 815 kHz with several thousand watts. Its story was told in the August '83 POP'COMM.

WAIR: Located in New Philadelphia, Ohio, and using 850 kHz in the early 1930's. See WJM.

WARD: This was actually, at one time, a fully licensed station in Brooklyn. It was licensed to the United States Broadcasting Corp. and ran 500 watts on 1400 kHz. In early 1936, the government refused to renew the license of WARD and, instead, awarded the use of the frequency to a proposed station which was to use the call sign WEGL. For some reason WEGL never took to the air, and WARD (which had a large listening audience) continued broadcasting for quite some

time after its license had expired, thanks to various court appeals. It was still on in late 1937. See WLTH.

WBBH: Operated between March and May of 1966, the shortwave (4970 kHz) broadcaster was supposedly run by the so-called "Courtland School of Music" from Rutgers, NJ. It asked for reports and freely sent out QSLs. When the FCC finally caught up with it, the 50 watt transmitter was found to be in Fair Lawn, NJ and operated by a young man 19 years of age. The operator and his assistant were happy to get off with only a warning.

WBBQ: Located in Hubbell, WV, and running 25 watts into a vertical steel radiator, WBBQ was closed down by the FCC in January of 1941. The young man who operated WBBQ was charged with violation of several sections of the Communications Act after area hams complained that WBBQ was causing interference.

WBTC: Reported as an outlaw station on 800 kHz by a listener in Swissvale, PA. This was in early 1934.

WCBX: A 1979 New York City station on 1620 kHz. Lots of rock music and plenty of outdated political recordings.

WCPR: This station, operating from Brooklyn, NY was on in 1975 and 1976 (until it was located by the FCC). Running 100 watts, it was heard over a wide area, took on-the-air 'phone calls, and issued QSLs.

WCPU: Possibly an heir to the WCPR mantle, and apparently affiliated with other New York City pirates of the day. The station appeared as soon as WCPR shut down and it remained active until 1979 while the FCC was eagerly trying to track it down. WCPU was on 1630 kHz.

WDBX: also known as WPOT, WICE, and WFSR. This station was located in Brooklyn, NY during 1978 and operated on 1620. There was an affiliation with WCPU and WGOR. Under the call sign WPOT it was heard at times into 1979. The 2nd harmonic of this station was also widely reported.

cies. It was reported on 720, 770, 780, 790, and 830 kHz.

WISP: A 3 watt New York City station on 1165 kHz in the late 1940's. Heard as far away as Ohio during special tests. Played music and offered commentaries. No regular schedule.

WJAE: Brookville, PA, 1030 kHz, mid-1933.

WJM: In early 1934, WAIR moved to the Lincoln Hotel, Massillon, Ohio, and changed its call to WJM. The 10-watter was mostly on 860 kHz, but also noted at times on 830, 840, and 850 kHz. QSLs signed by E.C. Whitney. Station Manager was Ray Wilson.

WJMS: In late 1969 this station was noted on 7320 kHz giving its location as "Free State, USA." Programs consisted mostly of Beatles recordings, announced by a pre-teen.

WJN: Heard in 1939, supposedly located in either Passaic, NJ or Brooklyn, NY. This station kept insisting it was licensed but it didn't appear in government records.

WKEN: New Kensington, PA, 850 kHz, early 1934 pirate.

WKUM: WKUM operated (on FM broadcast frequencies) only on Sunday nights, and each week from a different location near the U. of South Florida (Tampa area). Although programs were directed towards USF students, they were heard over a five mile range (and by the FCC). Last program was in the Spring of 1978, "WKUM, FM 104 Underground" was no more.

WLTE: A New York City pirate heard during 1979 on 1620 kHz. Heard early in the year, WLTE went off after a few months but started up again later in the year.

WLTH: This station was at one time fully li-

censed to a legitimate broadcasting company called "The Voice of Brooklyn." Running 500 watts on 1400 kHz, it shared time with WARD, but also lost its bid for license renewal in 1936 when the FCC turned over 1400 kHz to a new station to be known as WEGL. By late 1937, WLTH was still on the air due to continuing court appeals, although its license had expired.

WMKR: A 1932 pirate using 840 kHz from McKees Rocks, PA.

WMMO: A mid-60's pirate running 100 watts on 1550 kHz from Indiana.

WMRR: A shortwave pirate (7450 kHz) heard in mid-1978.

WNK: New Kensington, PA, 810 kHz, early 1934. May have been operated by same folks who brought you WKEN.

WOHH: This was an 8 watt pirate in Oxon Hill, MD operated by 27-year-old Fred A. Cresce. Operating on the FM band. Cresce said that he intended to provide "high quality audio" programming, something he claimed was not being offered by local broadcasters. Taking telephone requests and using local "live" talent, he operated WOHH until one night in April '74 when the FCC appeared at the door. At that time there were 15 people at the WOHH studios, including a guitar playing vocalist.

WPGA: In early 1934, WPGA was on 800 kHz from Greensburg, PA: 100% pirate!

WPOT: See WDBX.

WRB: Station in Bridgeport, CT in 1933. Was on 1510 kHz from 2 to 8 p.m. daily.

WRT: An Indiana, PA, station of mid-1933, operated daily on 800 kHz.

WSLY: Operating on 1200 kHz from a rural

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Here's the operating position of pirate station K-SOFT in Oklahoma. A few years ago, this station was on the FM band every day playing mellow music. Although it operated practically in the open, nobody ever complained to the FCC about it, not even the operators of the local hard rock licensed broadcaster.



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location in West Virginia, this station operates daylight hours on Sundays for the benefit of folks who live in one of the "hollers." Running 5 watts, it's been in operation since at least the early 1960's. Its operator claims never to have been hassled by the FCC. Programming consists of religious music and talks provided "live" by area residents, also some recordings.

WSVS: A station on the air from Buffalo, NY in the early 1930's. It ran 50 watts on 1370 kHz.

WTRO: Sykesville, PA, operated 4 to 5:45 p.m. daily and at various other times on 935 kHz during 1934.

WUMS: The pioneer unlicensed station which started out in Proctorville, Ohio, in 1925. It was still in existence three years ago as a portable transmitter retained by its owner, David F. Thomas of Florida. WUMS operated rather openly and issued its own QSL cards. Thomas had the FCC spending a lot of time trying to remove the station from the air and it was in and out of court many times, but feisty old Thomas just wouldn't call it quits. Several frequencies were

used, as was AM and CW modes. Special DX tests were broadcast to give listeners a chance at getting a QSL. It was widely reported.

WWSP: A Pennsylvania pirate of 1934 on 840 kHz. Announcing as "The Voice of South Hills," it claimed to run 2½ watts. Location was Pittsburgh. This station was still on the air in 1937, but had changed frequencies to 820 kHz.

WXMZ: An alternate call used by King Kong Radio, 1203 kHz, 1969.

YOKM: "The Voice of Yoakum" was a pirate in Yoakum, Texas in 1934. Possibly located in or connected with the Globe Theatre in Yoakum. The station was on 660 kHz and asked listeners to call in for prizes and gifts (their local phone number was "33"). Station operated from 10 a.m. to 1 p.m.; was obviously interested in local coverage only.

XYZ: A station operating daily in DuBois, PA, during 1933. Frequency was 1010 kHz.

Capital X: This was a station on 980 kHz supposedly operating from the Alamo Hotel in Austin, Texas, 1933-era.

"Crew": This was on 1620 kHz and apparently in Halifax, Nova Scotia, circa 1979. Although they asked for letters and 'phone calls, they never announced an address or a 'phone number.

"DNTX": This station was on 980 kHz from the Southern Hotel, in Denton, Texas back in 1933. The owner was R. E. Turner, who insisted that they were running 5 watts but had the equipment to use 50 watts; low power was used to keep the signals within Texas. The station operated 8:30 a.m. to 5 p.m.

"Jolly Roger Radio": ID used by several stations prior to the most recent and well-known incarnation of the name. One of the earlier users was active in 1969 on 1580 kHz and announced a location of Cincinnati, Ohio. A fictitious telephone number was given out by the station.

"King Kong Radio": This is another popular callsign used by several different broadcasters at differing times, one as recently as 1974 on 6025 kHz. That one announced a location aboard a ship and may also have been calling itself "Radio Clandestine." An earlier version of KKR was in early 1969 when the station was also announcing itself as KCBY and WXMZ. Frequency announced was 1200 kHz (reported 1203 kHz), with a nice harmonic on 2400 kHz. The station was located in Massachusetts and operated by two high school students who, when caught, said they "weren't aware that they were operating in an illegal manner and promised to cease operations at once." The station was tracked down (and ultimately shut down) due to the repeated efforts of DXer Hank Bennett. He claimed that "One monitoring session revealed a recording supposedly made by a well-known night-club entertainer. This particular program can be classified only as obscene." Bennett said that he twice wrote to the FCC about KKR and when they refused to acknowledge his complaints, he tracked it down and complained to the principal of the school the KKR operators attended.

"Radio Clandestine": This station was on 6030 kHz in 1974 and claimed to be located aboard a ship. It was probably in a northeastern state, possibly identical to "King Kong Radio."

"Radio Liberation": A radio enthusiast in Oak Hill, FL, taped program materials from international broadcasters he heard and then rebroadcast them on 7426 kHz via his own transmitter, which he dubbed "Radio Liberation." In late April, 1979, the FCC liberated the station.

"TEM-TEX Radio": It was a 1934 bootlegger in Temple, Texas. The operators of the station, Fred Bitterman and Albert Cox, were found guilty in a jury trial. Their conviction upset the defense of many unlicensed stations in Texas that their low power kept their signals within the state and hence were not subject to interstate control. After their conviction, the Federal Radio Commission moved on dozens of pirates in Austin, Dallas, Houston, Fort Worth, and other cities.

W9ISH: This was a licensed ham station operated by Norman D. Sather of Minneapolis, Minnesota. In January of 1941, his license was suspended for six months because the FCC said he "used his station for broadcasting entertainment, addressed radio communications to the general public, solicited telephone calls from radio listeners, and made transmissions to points equipped only with receiving apparatus."

W9OCF: Operated by Cyril A. Streblov, St. Paul, Minnesota, this station had its ham license suspended in January 1941 for the same reasons as W9ISH, except that W9OCF was also charged with permitting "the emission of the unmodulated radio carrier wave thereof for extended periods of time when the radio station was not in actual communication with other radio stations."

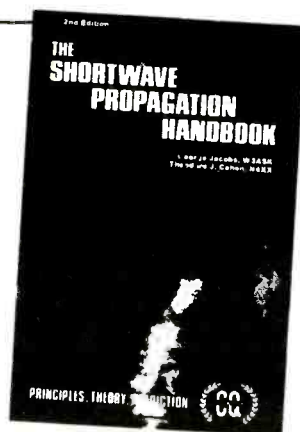
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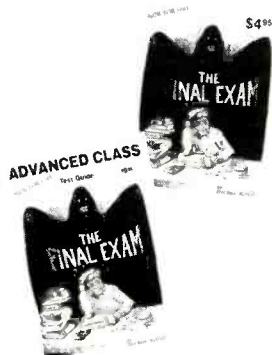
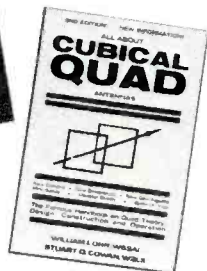
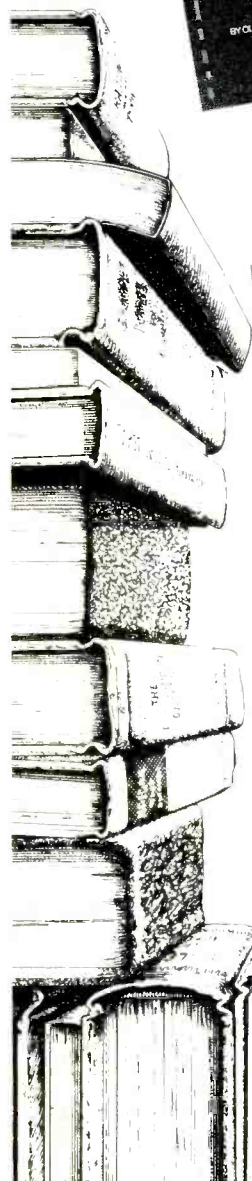
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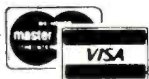
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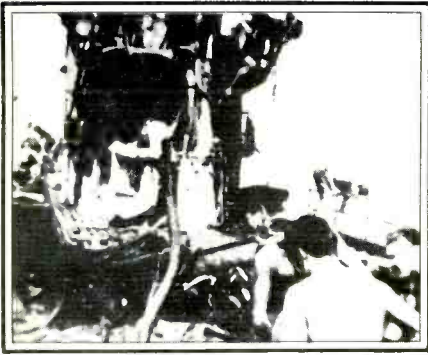
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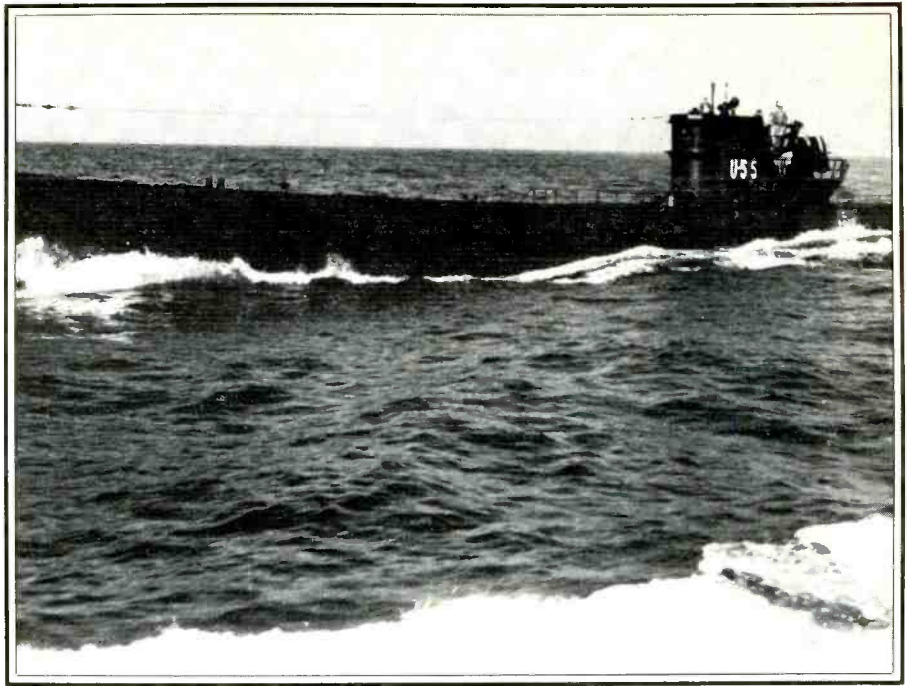


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Damage to U-505 conning tower prevented her from diving, as the entire back portion of the conning tower is blown away. She somehow made repair in the Caribbean to allow her to dive to 25 meters before heading home.



U-505 after her capture by USS GUADALCANAL task force. Note that the periscopes are missing, which were blown away during the fight.

The Secret Of Darby Island

The Nazi U-Boat & Radio Station Off The Florida Coast

BY HARRY COOPER

The brilliant tropical moon shines peacefully over the warm waters near Bimini, an island in the Bahamas, a British Crown Colony 45 miles to the east of Miami. The year is 1942.

A few men of the off-duty watch lounge at the rail of the tanker as she plods on through the Atlantic. She is loaded with high-octane gasoline from the refineries at Aruba. She is destined for England and the fighter planes of the Royal Air Force. The winking lights of Bimini are faintly seen to the east while the glow from Miami's lights illuminates the horizon to the west. The war in Europe seems very far away.

Other eyes are witnessing this tranquil scene. They are watching from the periscope of a prowling German U-boat. The periscope slithers smoothly and silently down in its tracks. Eager hands press the firing switch twice. Two torpedoes slice through the inky waters. The tanker erupts into a ball of brilliant orange flame and the silence is shattered by the sound of a violent explosion. Her cargo will never send one British pilot into the sky against the Luftwaffe.

The periscope again breaks the surface. The skipper nods his approval as the flaming remains of the tanker as it slips from sight beneath the burning water. The periscope slides from sight. The skipper is reminded by his Executive Officer that they are running dangerously low on fuel for the U-boat's

twin diesel engines. The Captain nods, then tells the Exec, "Plot a course to replenish fuel, then radio the supply base that we will arrive shortly to take on fresh water and food."

The Japanese attack on Pearl Harbor 42 years ago was as much a surprise to the Nazi High Command as it was to the American people. Hitler quickly ordered a force of U-boats to cross the Atlantic in order to attack shipping in the former "Pan-American Neutrality Zone." While pleased with the decision to let him deploy his U-boats against America, Admiral Karl Doenitz' joy diminished some when he realized that he had only five U-boats available at that time to send to the American coast. These were Type XI long-range U-boats and they were hastily sent out under the code name "Operation Paukenschlag" to patrol the Gulf of St. Lawrence to Cape Hatteras.

The U-boats arrived on station to begin their attacks on 13 January 1942. It was almost child's play for the large U-boats. The entire east coast of the United States was still practically operating on a peacetime basis. Cities were fully lit up at night, ships' radio operators were using the normal frequencies without encoding their traffic, and few U.S. Navy patrols were operating—and those that were in operation seemed to be transmitting their positions "in the clear."

U-boats found they could be as bold and

brazen as they liked. The U-123 cruised directly into New York Harbor as far as the Narrows and the skipper reported that he could see the full panorama of lower Manhattan from his decks. One U-boat torpedoed a ship right off the U.S. Navy base at Norfolk, Virginia at night, then defiantly remained on the surface for several hours with a yellow light shining in the conning tower. The U-161, under Capt. "Ajax" Achilles, was running wild in the south Caribbean, first sinking a number of ships right in Port of Spain (Trinidad), then entering the harbor at Castries in the British West Indies. Not only did the U-161 sink several ships in Castries Harbor, he departed the harbor on the surface with all of his running lights fully lit!

Soon, Admiral Doenitz was able to send more and more U-boats across the Atlantic. As many as 19 U-boats blanketed the entire east coast and cruised the Gulf of Mexico, the Bahamas, and the Caribbean. They were sinking ships at will. The year 1942 was known as the "American Shooting Grounds" and U-boat skippers competed fiercely to be assigned to the American patrol, for they knew that they could sink the required 100,000 tons and win the Iron Cross quickly and without danger.

Returning U-boat skippers boasted to their counterparts of the Allied ships which they had sunk, and they displayed their sun-tanned crews as proof that they had been

daring enough to remain on the surface in broad daylight!

Why did the U.S. Navy allow the vast and sweeping attacks upon shipping in waters so close to the United States? To put it simply, in 1942 we were ill-prepared to meet the challenge of the U-boats. There were practically no destroyers or aircraft on the eastern seaboard to fight back—a fact that was kept from the American public. Nazi U-boats were able to mine the harbors at Boston, Jacksonville, Charleston, even New York. They also mined Norfolk, right in front of the U.S. Navy's large base!

In fact, it was in April of 1942 before our Navy racked up even a single kill in this hemisphere, even though the U-boats were sinking about two ships a day and were daring to operate on the surface in full view of shore! Strollers on Atlantic City's boardwalk often saw U-boats torpedo tankers close to the beach! bathers on Miami's beaches were used to seeing the flames and smoke of burning tankers on the horizon.

It was when the American destroyer, *USS ROPER*, came upon that first kill that we began to get a clearer picture of the nature of the U-boat threat. The *ROPER* came upon a U-boat while the vessel was lying on the surface at night. It was charging its batteries, but in water far too shallow to allow the U-boat's captain to dive and escape if caught on the surface. The U-85 tried to make a run for it on the surface, firing a torpedo at the *ROPER* from the single stern-tube. The torpedo missed its target and the *ROPER* continued in pursuit. The *ROPER*'s gun crews opened fire on the U-85 and sent the U-boat to the bottom.

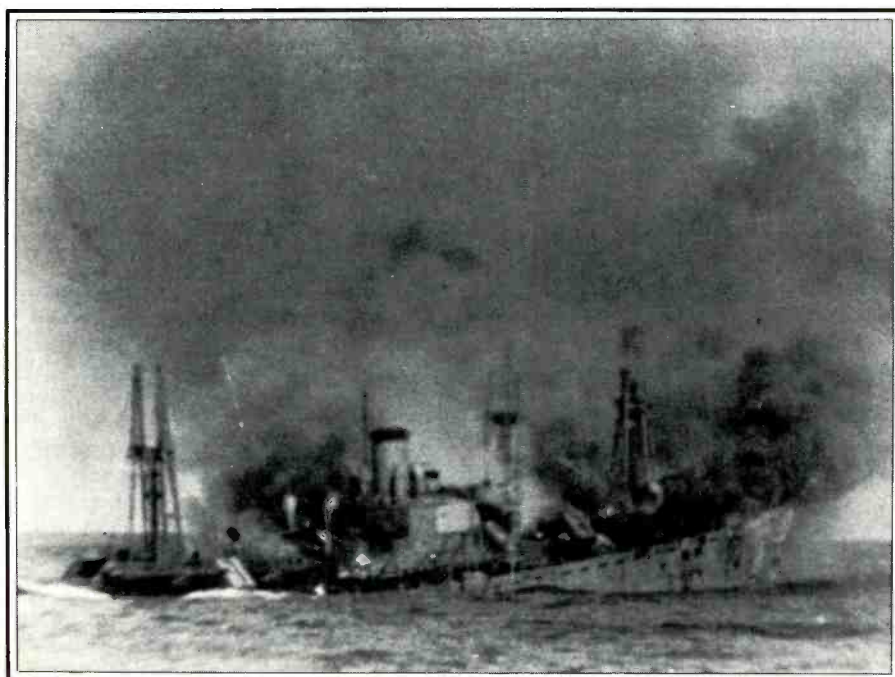
What was most curious about this incident was that it was noted by the *USS ROPER*'s skipper that the U-85 was not one of the long-range Type XI U-boats. It was a Type VII with limited range—certainly not intend-

ed to cross vast oceans, but rather for operating close to a home port. The Type VII carried a crew of 44 officers and men, fuel for 8,000 miles at best, and relatively little fresh food. The fact was that after the initial stages of the U-boat war in the western hemisphere, many of the U-boats operating in waters off our coastlines were Type VII!

The Mystery Thickens

The question was, how did these U-boats make a 5,000 mile crossing of the Atlantic, operate for 4 to 6 weeks (or longer) in a patrol sector, and then return home? They carried only enough fuel for 8,000 miles! Certainly by the time the Type VII boats would have reached their patrol areas, their crews would have been eating raw potatoes like apples. Their food, fresh water, supplies, and fuel would have had to have been replenished. But how? Where? During the war years, and afterward, our government staunchly denied any and all speculation and rumors to the effect that the U-boats were picking up supplies in the western hemisphere. That simply was not the case. We knew full well that they had to be operating from supplies picked up from under our noses on this side of the Atlantic.

A lot of the refueling in western waters was provided by so-called *milk cows*, or U-tankers. These were the Type XIV boats which carried no weapons but were submarine tankers stationed throughout the Atlantic to refuel the U-boats. They could supply only fuel however; they didn't have the space needed for carrying food or fresh water to offer the U-boats. For that matter, their existence was very short. As soon as more land-based bombers became available and were able to extend their range well out to sea, the era of the Type XIV U-tankers quickly ended.



One of U-505's victims, the ship THOMAS MCKEAN, sunk in the Caribbean.

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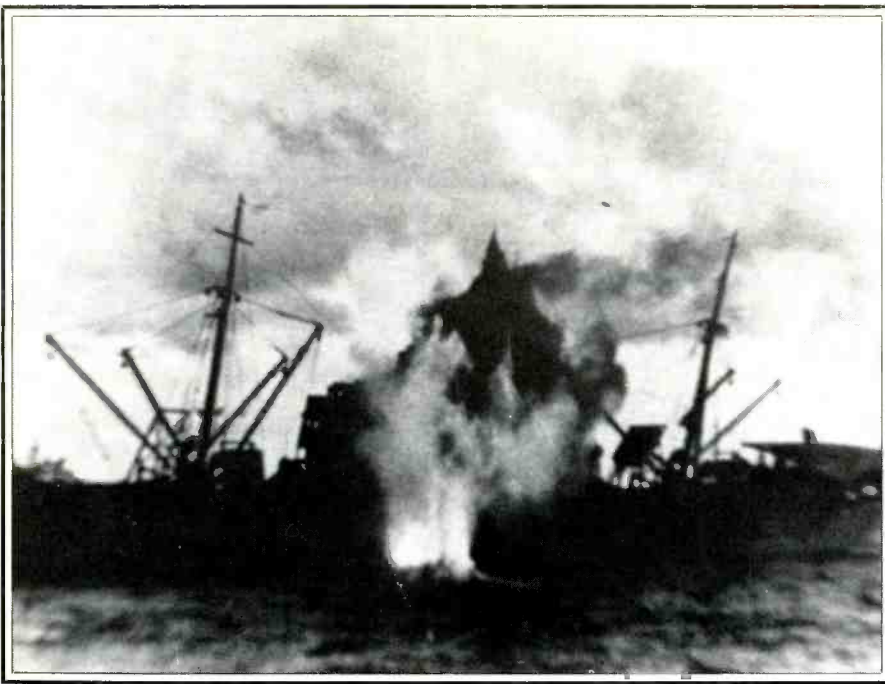
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Another victim of U-505 that was sunk in the Caribbean.

Clues To The Mystery

An American pilot returning to Miami from Nassau (Bahamas) noticed a large three-masted schooner loafing along with only a small jib set. She was in the Gulf Stream, only 35 miles from Miami. Since he was flying low, the pilot could see that the cargo hatches were open and the holds were filled with steel drums. The pilot assumed that the drums were empty, as the schooner was riding high on her waterline. He circled the schooner once; then he noticed the U-104 on the surface only a mile away. The pilot phoned Navy Intelligence and reported what he saw. The schooner's crew was arrested upon reaching port in Miami.

A man named Tagarapoulos owned a small fleet of trading schooners based in what was then British Honduras. Known to his friends as the "King of Honduras," Tagarapoulos had been supplying fuel to the U-boats from his trading vessels. He was ultimately caught and sent to jail.

An oil multi-millionaire had also established a network of supply bases throughout these regions in 1938, specifically for the purpose of supplying Nazi vessels for the war which seemed certain to spread into the western hemisphere, notwithstanding Japan's attack on Pearl Harbor. Some tankers of one of America's leading oil companies were actually fueling U-boats and their supply tankers. A few of these tankers were under command of Nazi officers for much of the war and one was captured by a British warship.

While that explained the U-boats' fueling arrangements, it still did not explain the way they were receiving whatever food and water they had aboard. Some U-boats were in the habit of stopping small coastal fishing boats in the Bahamas and along the Cuban coast and raiding whatever food and fresh water they could find on board.

Enter Ernest Hemingway

In these early stages of the war, best-selling author Ernest Hemingway became part of the American war effort. According to FBI files released last October, Hemingway ran a spy ring centered around his cronies in Cuba. The ring was financed by the U.S. ambassador to Cuba when Cuba was filled with Nazi sympathizers, and at a time when the U-boats were prowling the area's waters. While the FBI itself had 16 people spying on Hemingway and also upon the Nazis, Hemingway himself had 26 anti-Nazi spies in his spy ring. Most of the spying appears to have taken place at Hemingway's favorite night clubs, saloons, and around the fishing boat piers of Havana.

Hemingway also had outfitted his private yacht, *PILAR*, with weapons, and these included several cases of hand grenades, a .50 cal. machine gun, weapons which were designed for anti-tank purposes, plus other assorted items. His crew was made up of a millionaire athlete, an out-of-work Spanish cook, a somewhat famous but over-the-hill jai-lai player, and a USMC Gunny Sergeant.

Hemingway's plan (called "Operation Friendless," in honor of one of his favorite cats) was to sit on deck with one of his pals, pretending to fish. This was intended to offer a potential sitting duck for any U-boat which happened to spot this idyllic scene. When the U-boat surfaced, the idea was for Hemingway to open the throttles of the *PILAR* and head straight for the U-boat, raking the Nazi vessel with machine gun fire. In true John Wayne fashion, Hemingway planned to board the U-boat and lob hand grenades down the still-open hatches and finish off the crew remaining below deck.

None of this came to pass. Although Hemingway could copy the radio messages from the U-boats, and he even saw one once in the distance, none ever attempted to



Interior of the barracks on Darby Island. Remains of upper and lower bunk supports can be seen in the right foreground.

interrupt Hemingway's fishing during the six months the *PILAR* was on patrol. Hemingway eventually disbanded his little private navy, returned to Havana to conduct his spying activities, and later went with the ground forces in Europe.

While Hemingway had every reason to believe that a U-boat would have tried to raid his food and fresh water supplies, as had happened to other fishing boats, mostly such raids were the exception rather than the rule. This was because of the ample supply of bases which were already in operation for this purpose. Ernest Hemingway's brother, Lester, reported that the Corn Islands (off the coast of Nicaragua) were just such a base. Shortly after that report, there were a number of U-boats sunk within a few hundred miles of the Corn Islands.

The Duke of Windsor (the abdicated King Edward VIII of England) was then residing in Nassau as Governor General of the Bahamas. He radioed London in February of 1942:

"ENEMY SUBMARINES ATTACKED SHIPPING IN FLORIDA STRAITS ABOUT 130 MILES NORTHWEST OF GRAND BAHAMAS. AM INFORMED THAT THE U.S. NAVAL AIR BASE AT EXUMA WILL NOT BE IN OPERATION UNTIL MAY AND AM TAKING UP WITH COMMANDER-IN-CHIEF, AMERICAN AND WEST INDIES, POSSIBILITY THAT ENEMY SUBMARINES ARE SHELTERED AMONG UNOCCUPIED CAYS AND THAT AIR PATROL IS NECESSARY."

These U-boats were not simply passing the time of day. It turned out that Darby Island (in the Bahamas) was the location of just such a base! Owned by Englishman Guy Baxter, and named for his native Darby, England, Darby Island was unique in that it contained 26 fresh water wells and supported a small plantation. Not only did Baxter live in splendor in a huge mansion on Darby Island's highest hill, he set to work on building the base and radio communications station which was to be used by the U-boats. Quick to follow the construction of Baxter's castle were a barracks, a sophisticated radio shack, and a steel reinforced dock which he also used for his two trading vessels, *MAS-TER D* and *LEANDER*.



The radio shack weather-worn but still standing on Darby Island.



Interior of the radio shack on Darby Island.

By and large, none of the workers on Darby Island knew where all of the fresh water and vegetables were going. Nor did they know where the many freshly slaughtered pigs and goats went, even though one worker said that after days and days of killing, "We'd come into the cold room of a morning, and there wouldn't be a piece of meat on the island big enough to stick in your eye." All of the meat, fresh water, and other provisions had been taken aboard either the *MASTER D* or *LEANDER* to a U-boat waiting during the night in the deeper waters off Exuma Sound.

Approximately 80 German U-boats lie sunk in the waters of the western hemisphere and, of those, two dozen are down in American waters! While it was an impossibly long trip for the Type VII boats to make with their limited range, it was even more difficult to believe that they could travel to South America and return—but they did—that is, with the help of secret bases right in Uncle Sam's "backyard."

Update

In 1980, I sailed to the waters of the Bahama Islands and was able to verify the location and existence of the secret radio station and base on Darby Island. The castle still stands on the highest hill, looking out over the beautiful and peaceful waters. However, by the beginning of 1943, the U-boat operations had come to an end there and the supply installation was raided. The German supply personnel were shot, and the dock was dynamited.

Digging through the thick tropical vegetation, I was able to find the barracks and photograph them. The radio shack was there



Interior of the radio shack, with remains of the radio equipment.



Some papers found lying on the floor of the radio shack.

too. Not only was one of the antenna towers still standing, but inside the radio shack there were the remains of a great deal of radio equipment strewn across the floor as well as perched atop desks. There were also a num-

ber of pages from various documents and communications codebooks still to be seen, having survived almost 40 years of being hidden from view. Somehow, being well hidden was the intention when this communications station was built; time has proven that it lived up to at least that expectation of its designers. Undoubtedly, time will reveal more of these secret U-boat stations throughout the western hemisphere, although it is hard to believe that they will be as well preserved as the mysterious one located only a relatively few short miles from the beaches of Miami!

•••

About the author: Harry Cooper has written many articles for leading boating/yachting publications, as well as travel and auto racing magazines. He is presently writing a book about the secret western hemisphere supply bases used by U-boats during WWII. He's done extensive research on U-boats and is considered one of the world's foremost authorities on their activities. Harry runs an organization called SHARKHUNTERS (P.O. Box 137, Fox Lake IL 60020) for U-boat researchers.

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Central American Survey

BY GERRY L. DEXTER

It's as if some giant grabbed Alaska with one hand and Tierra del Fuego with the other, gave a mighty yank, and then let go just before the whole thing snapped in two. The part that was stretched nearly to the breaking point got tagged with the name "Central America."

Unless you were in the business of bananas or revolution, no one paid very much attention to Central America other than the sending in of the Marines every few years to quench some fervent revolutionary plans or the CIA toppling the government of Guatemala back in the 1950's.

Then the Sandinistas overthrew the government of the Nicaraguan dictator Somoza. Since then, with El Salvador added to the formula, Central American datelines have been fixtures on the nightly news.

Shortwave listeners, too, have tended to ignore Central America, more or less, perhaps because there are no large stations there beaming easily-heard English broadcasts, or because it seems too near to be of any interest.

But Central America offers some fascinating listening opportunities for the casual listener and some real challenges for the died-in-the-wool DXer as well. It deserves a closer look.

Central America was the home of the great Mayan civilization and, that of the Aztecs, based largely in what is now Mexico. Numerous other Indian groups are also part of the Central American makeup. Much of this background is reflected by the programming of shortwave stations there.

There are places in Central America where you can view both oceans from a single site. There are active volcanos, thousands of magnificent crater lakes, plazas, plantations, jungles, 32 varieties of parrots, white sand beaches on the Atlantic coast, and black sand beaches on the Pacific coast.

Central America is a place where a becon means goodbye, where a wave means "come here," and where roosters start to crow at dusk, rather than at dawn.

Generally, the shortwave stations of Central America are on the small, low-powered side. Many are operated by religious organizations and many use the tropical bands, with split operating schedules and little English. Relatively few are strictly commercial ventures. Disturbingly, there has been an overall decline in the number of shortwave stations operating in this region over the past two decades.

Let's get going on our tour.

Mexico

Step across the border of the United States and you are, of course, in Mexico. Strictly speaking, Mexico isn't considered to

be part of Central America but, like our giant, we'll stretch things and, for our purposes, consider it so.

The number of shortwave stations in Mexico varies. On, then off, then on again.

The most difficult log on the list of Mexican shortwave stations is probably XEUJ at Linares, operating on 5.982 MHz. It doesn't sign on until just before 1400 GMT, and goes off around 0000, so the schedule is pretty much a daytime affair on what is a nighttime band of frequencies. Best bet to hear this one is probably wintertime when there's a longer period of darkness with which to work. If you hear it you can send your reception report to Apartado Postal 62, Linares, Nuevo Laredo, CP67700.

In teeming Mexico City one finds the first of the university stations, Radio Universidad de Mexico, XEYU, located on the campus of the University of Mexico. Listed for 9.600 MHz and scheduled from 1400 to 2400 GMT with 1,000 watts, it is not regularly heard and it may be the station is not consistently on the air. It began operating in 1942, so it's been around a while. Reception reports can be sent to Adolfo Prieto 133, Colonia de Valle, Mexico 12, D.F.

Also in Mexico City is the interesting Radio Educacion, XEEP on 6.185 with 1,000 watts. This is a semi-autonomous broadcaster owned by the Secretary of Public Education (a government department, not an individual), and is a non-commercial, cultural-educational station featuring everything from children's programs to historically-based soap operas! Transmitters are in a modern facility located on the Mexico-Puebla highway. The station began operating in 1967 as "La Voz del Maestro," then was off the air for several years before returning in its new guise a few years ago. It's not often

heard and may be periodically inactive. Try for it around 0300 or later. The address is Angel Urraza 622, Colonia del Valle, Mexico 12, D.F.

The National Astronomical Observatory of Mexico operates La Hora Exacta, XEQK, with time announcements and commercials using 500 watts on 9.555. The schedule of this one is unknown but most recent receptions have been during local daytime hours so it may be that it is not a night person. The address is Rio Tiber 100, 9° piso, Mexico 5, DF.

An old-timer is La Voz de la America Latina, XEWW, operating on a somewhat irregular basis. It uses, variously, 6.165, 9.515, and 15.160 or 15.175 with 10 kilowatts of power. The station can be reached at Ayuntamiento 52, Colonia Central, Mexico 1, D.F.

On 6.010 you'll often find Radio Mil, XEOI, with its 250 watt transmitter. The schedule is uncertain but you should hear it occasionally in local evenings if the frequency is clear. Their address is Nucleo Radio Mil, Insurgentes Sur 1870, Mexico 20, D.F.

The Mexican government's international



Listening to a "radio school" broadcast over Radio Huayacocotla in Mexico.

QSL XERMX RADIO MEXICO	QSL XERMX RADIO MEXICO	QSL XERMX RADIO MEXICO	QSL XERMX RADIO MEXICO
7 12/82	(Nombre):	(País):	
	Tarjeta QSL que verifica su amable Informe de Recepción de		
	QSL card to verify your kind Reception Report of		
fecha date	frecuencia frequency	GRACIAS THANK YOU	
	Atentamente Cordially		
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Radio Mexico International's QSL.



Staff announcer Juan Francesca Garcia in one of TGNA's on-air control rooms.

voice is Radio Mexico, XERMX, which operates with 10 and 50 kilowatts on 5.985, 9.705, 11.770, 15.430, and 17.765 from 2000 to 0500 (but only on 15.430 from 2000 to 2200).

The station started, then stopped, then started and now has again stopped their English features entitled "Mexico in a Minute," which they dropped into their otherwise all Spanish programming. Reception reports go to Radio Mexico International, Apartado 24306, 06700, Mexico, D.F.

Let's leave the capital and visit Ciudad Mante in the state of Tamaulipas where Onda 145 uses 6.090 irregularly for its XECMT outlet. Not a lot is known about this station, but apparently it is inactive at the moment. It has been around for many years however, so it's likely it'll show up again one day. The address is Km. 560, Carretera Mexico-Laredo, Ciudad Mante, Tamaulipas.

In Veracruz we find a station on 6.020 known variously as La "U" de Veracruz or Radio Nucleo Oro, again broadcasting on something of an irregular basis. XEUW uses 250 watts and some years ago went by yet another name—"El Eco de Sotavento." Perhaps they have an identity crisis. When you log them, reports go to Ocampo 119, 7° piso, Veracruz.

Another university station is Radio Universidad de San Luis Potosi from the city of the same name and operated by the Autonomous University of San Luis Potosi. XEXQ runs 250 watts on 6.045 but, again, doesn't appear to be consistently active. The address is Apartado Postal 456, San Luis Potosi.

Su Pantera (The Panther) from Merida in the Yucatan can be identified by the sound of the panther growling! It even operates a Panther Youth Club, likely as a promotional venture. The 250 watt XEQM is scheduled from 1115 to 0500 on 6.105. The address: Publicentro de Merida, Calle 62, No. 508, Merida, Yucatan.

Hermosillo, in Sonora state, is the site of a third university station. This one is XEUDS, Radio Universidad de Sonora on 6.115 with 1 kilowatt and scheduled from 1500 to 0230 (Sundays to 0500). At this writing, 6.115 is dominated by La Voz del Llano in Colombia, blocking any signal from XEUDS. But that, like everything on shortwave, can change at any time. XEUDS can be reached at Apartado 106, Universidad de Sonora, Domicilio Conocido, Hermosillo, Sonora.

Another challenge is Radio Huayacocotla

TRANSMITIENDO GRATAS NUEVAS ALEGRES
Telling the Good News Abroad

From:
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"Beautiful land
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Frequencies:

730 khz
3.300 khz
5.955 khz
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Facts:

The Quetzal is the national emblem of Guatemala. This bird seldom survives in captivity, hence, symbol of liberty.

"If the Son (Christ) therefore shall make you free, ye shall be free indeed".
John 8:36

TGNA's famous QSL card hasn't changed in basic design in over 30 years!

or, more formally, Escuelas Radiofonicas de Huayacocotla (Radio School of Huayacocotla). This radio school doesn't train announcers, however. It's intended as a teaching medium and has now become the main station in what has developed into an educational radio network—S.E.R. de Mexico. The station began broadcasting in 1964 and now also uses field workers to assist in community development. Try their 500 watt transmitter on 2.390, local evenings. Radio Huayacocotla's address is Zaragaza 78, Apartado 21-970, Coyocan, Mexico, D.F.

Guatemala

Now to Guatemala where half the population are full-blooded Indians still wearing traditional costumes, where Lake Atitlan stuns the senses, where two active volcanos rumble now and then, and where the stirrings of guerrilla war are sadly beginning.

Relatively cool Guatemala City gives the visitor spectacular mountain views and three radio stations on shortwave.

The government station, Radio Nacional or La Voz de Guatemala, has been on the air since 1930. Although occasionally missing from the airwaves, more often than not you can find it operating with its ten kilowatt transmitter on 6.180, scheduled from 1800 to 2300 although it can frequently be found on the air later than that. The restricted operating hours may only be a temporary measure. The station also uses 9.760 on an irregular basis. Transmitters are at Campo de Mante and reception reports go to 5a Av. 13-18, Zona-1, Guatemala City.

Two religious organizations operate stations based in the capital. Adventist World Radio's Union Radio, "The Voice of the Seventh Day Adventist Church in Latin America" went on the air in 1980. It operates with a ten kilowatt transmitter on 6.090 from 2330 to 0330. The last two hours of the schedule are in English. TGUMA's address is Apartado 35-C, Guatemala City. English reports are acceptable but replies can take some time.

Radio Cultural has been more commonly known over its long history as TGNA. Founded in 1950 by Harold Van Broekhoe-

ven and affiliated with the Central American Mission (now CAM International), TGNA has been one of Central America's most stable broadcasters. The English slogan is "Telling The Good News Abroad." In Spanish it's "Transmitiendo Gratas Nuevas Alegres." TGNA is a non-commercial, cultural-educational-religious station which also airs some programming in cooperation with the Guatemalan government. Frequencies used are 3.300 and 5.955 with Spanish aired from 1100 to 0300 and 0430 to 0830. English runs from 0300 to 0430. The Spanish broadcasting periods also include local Indian languages. Both frequencies are ten kilowatts. Studios are in the city with transmitters on Anacoche Mountain where they were recently placed to provide better coverage. TGNA's attractive QSL card features the Quetzal, national bird of Guatemala, and is sent in response to correct reports. Write Apartado 601, Guatemala City.

When it first went on the air in late 1972, Radio Tesulutlan provided quite a mystery. Its brief, two or three day appearance wasn't long enough to allow DXers more than an approximation of the name. It was something like a year later before it showed up again and began regular programming on 4.835 where it's been ever since. Operated by the Benedictine Fathers from Coban, center of a rich coffee-producing area, the station is a cultural and religious broadcaster. TGTZ runs 3,000 watts and is scheduled from 1100 to 1530 and again from 2100 to 0230. The address is simply Barrio de San Marcos, Coban, Alta Verapaz.

The Ursuline Congregation of Washington state operates a station known as La Voz de Nahuala in the city of the same name, Department of Solola. Broadcasts are aimed at the Quichi-speaking Indian population. This is another radio school operation, teaching basics via radio broadcasting courses during the months of March through September, the normal school year. Other programming is aired during the rest of the year. TGVN operates with one kilowatt on 3.360 from 1130 to 1400 and 2100 to 0230. The address is simply Nahuala, Departamento de Solola.

At Jocotan, in the state of Chiquimala, one of the great Mayan centers of centuries ago, you'll find Escuelas Radiofonicas Chorotis, TGCH, operating on 3.380 with 1,000 watts. This, too, is a missionary station using its broadcasts as a teaching tool. Broadcasts are scheduled from 2200 to 0300. Like Nahuuala, Jacotan is a small town and Jacotan, Departamento de Chiquimula is all you need for an address.

The "Mam" in Radio Mam refers to the Mam branch of the Mayans and it is to them that the programming of this station in Cabrican, Quezaltenango, is directed. Radio Mam has been on the air since 1975. It's another educational and religious broadcaster. TGMN uses 1,000 watts on 4.825. Normally, the schedule runs until 0100 or 0200 and, like Tesulutlan 10 kilohertz away, it often puts in a good signal. The address: Escuelas Radiofonica Cabrican Huitan, Cabrican, Quezaltenango.

TGNA's "little brother" is Radio Maya Barillas from Barillas in the Department of Huehuetanango. The station is, like TGNA, owned by CAM International and broadcasts from 1000 to 1500 and again from 2200 to 0400 in Spanish and six Indian languages. TGBA can occasionally be found on 2.360 MHz with its 250 watt transmitter. It's been on the air since the mid 1960's. Reports can be sent to the station at Barillas, Departamento de Huehuetanango.

El Salvador

The heat's been on in El Salvador for a couple of years now, with our attention focused on the guerrilla war there and U.S. backing of the El Salvador government.

El Salvador has never made much of a splash on shortwave. A Radio Panamerican and a La Voz del Comercio operated in past years. The only other shortwave outlet has been Radio Nacional. The government station has a history of doing a lot of coming and going, disappearing from the bands for long periods. It has recently returned, but who knows for how long? It's being heard evenings on 9.553 with fair levels, all in Spanish. Reports can be sent to Parque Venustiano Carranza, San Salvador.

Honduras

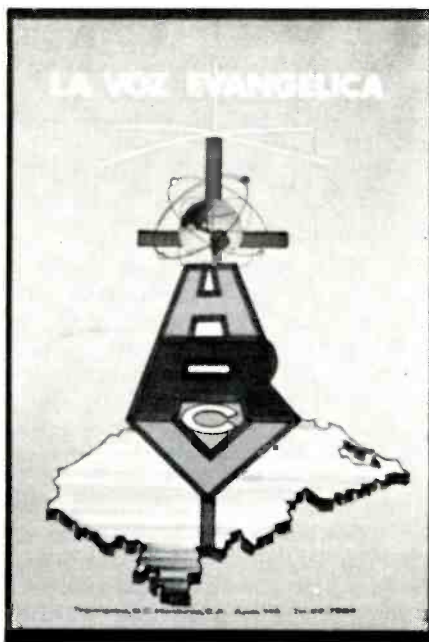
Honduras has become the staging area for anti-Sandinista rebel groups seeking to throw out the Sandinistas. Honduras is the second largest, least populated of the strictly Central American countries. Things are on the move there as the Hondurans are concentrating on the development of their country.

Much of Tegucigalpa is built on the side of Mt. Picacho. And some of the sidewalks are more like stairways!

There are two shortwave stations in the Honduran capital. One of the several stations operated by religious organizations is La Voz de Evangelica, HRVC, operated by the Conservative Baptist Home Mission Society and the Baptist Association of Honduras. HRVC is on 4.820 with 5 kilowatts running Spanish programming from 1100 to



Sections of the antenna tower are carried up the mountain, later to beam the programs of Radio Maya Barillas in Guatemala.



HRVC, La Voz de Evangelica's QSL card.

0300 and English from 0300 to sign off at 0500. Transmitters are on a hill some three miles from the city. HRVC is a good verifier; write to Apartado 270, Tegucigalpa.

A strange broadcast partnership turned up a year or so ago when a station which had been on shortwave many years ago, El Eco de Honduras, based in San Pedro Sula, showed up on 6.000 broadcasting the programs of Radio Variedades in Tegucigalpa. Both are part of the Cadena Zeta Network. The 6.000 frequency is, however, silent at present. Variedades can be reached at Apartado Postal 852, Tegucigalpa. HRP1 in San Pedro Sula consistently ignores reception reports.

In Puerto Lempira on the Eastern Honduran "Mosquito Coast," one finds La Voz de

Mosquita, operated by the Universal Concern Foundation of Yazoo City, Missouri. Reverend Landon Wilkerson almost single-handedly put the station on the air in early 1981 in this inhospitable location where 125 inches of rain falls in a year and temperatures pushing 130 degrees are not uncommon. HRXK runs 1,000 watts on 4.910 from 1100 to 0400 GMT, programming in Spanish, Miskite, and English. The station is located only some 40 miles from the big U.S. military base under construction in Honduras. Reports can be sent to Mision Bautista, Puerto Lempira, Departamento Gracias a Dios or to P.O. Box 388, Yazoo City, Missouri 39194. La Voz de Mosquita is the only media in the area. There's no other radio, no TV, no newspapers, and no magazines.

Olanchito, with a population of only around 3,000, is the home of Radio Lux, which has been around for a long time although, like so many others, on something of a catch-as-catch-can basis insofar as shortwave is concerned. HRVL is currently inactive but watch for it on 4.890—it'll no doubt reappear one of these days if it hasn't already. Its 1,000 watt transmitter was scheduled from 1200 to 0300. Reports to Apartado 109, Olanchito, Yoro.

Believe it or not, the manager of Radio Lux y Vida in San Luis, Santa Barbara department is a DXer! Manager Don Moore runs the station on behalf of Evangelistic Faith Missions of Bedford, Indiana. San Luis is located in the northwest mountains, about 30 miles from the Guatemalan border. The station is only some four years old and began with a converted ham transmitter using only 50 watts. That has now been upped to 250 watts fed to a simple dipole antenna. The schedule on 3.250 MHz runs only 2200 to 0400 since Moore notes they must generate their own power. Once commercial power becomes available they'll be able to increase the schedule. Programming

is mostly of a religious nature and aimed at Guatemala and El Salvador as well as Honduras. Incidentally, Reverend Moore is also a ham operator and if you have a license he'll be glad to make contact with you during the Halo Missionary Network schedule, daily at 1800 on 21.390. His call is WA5FFK/HR5. Reception reports on Radio Luz y Vida can be sent to Rev. Moore at Apartado 303, San Pedro Sula.

Juticalpa, center of a rich agricultural area, is where we find Radio Juticalpa, a pretty regular performer on 4.780 if you can get past the Venezuelan, La Voz de Carabobo. The station is scheduled from 1040 to 0400 with 500 watts. HRRZ has been on the air since December of 1962. The address is Apartado 3, Juticalpa.

Costa Rica

Costa Rica boasts Central America's highest standard of living. It has no army, but it does have a national guard. Americans seem to have a natural affinity for Costa Rica since there are more U.S. citizens living there than any other of the Central American countries.

Its capital is the most cosmopolitan too, and San Jose boasts five broadcasters on shortwave.

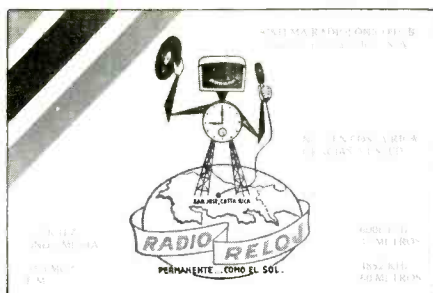
The newest is Radio Impacto, which came on the air in the spring of 1983, putting out a smashing signal on 6.150, 24 hours a day. Power is unknown yet but it must be at least 10 kilowatts. The station is easily identified by the woman who says, simply "Impacto" after nearly ever record. Reports are requested to Box 497, San Pedro de Montes de Oca, San Jose.

The University of Costa Rica operates TIUCR, Radio Universidad on 6.105 variable with ten kilowatts. Although first noted a year or two ago, it hasn't been heard recently so the transmitter may be sitting there idle, awaiting new parts or a decision to turn it on again. If it shows up, you can send your report to Apartado 2198, San Jose.

The government operates Radio Nacional de Costa Rica but, again, not necessarily all of the time! A 43-person staff is involved in the government broadcast effort. When the shortwave is on, check 6.035 between 1000 and 0600 for the two kilowatt transmitter, fed into a rhombic antenna beamed north and east. Radio Nacional's address is Apartado 701980, San Jose.

Radio Reloj is part of Sistema Radiofonico HB, a group of stations under private ownership dating back to 1945. On shortwave it was Radio Crystal until around 1958 when the name was changed to Radio Reloj. It's a 24 hour a day operation in Spanish on two frequencies—4.832 and 6.006 with 1,000 watts on each. The station claims to be "number one in Costa Rica" and can be reached at Apartado 341, San Jose.

Faro del Caribe, or TIFC, uses the captivating slogan "Lighthouse of the Caribbean" and is another religious station with a long history of service. It's owned by the Latin American Mission but Costa Ricans are responsible for most of the operation. The



The QSL card of Radio Reloj in Costa Rica.

schedule runs from 1100 to 0400 on three frequencies—5.055 with 5,000 watts, 6.175 with 2.5 kilowatts, and 9.645 with 1,000 watts. English reports are accepted at Box 2710, San Jose.

Puerto Limon, one of the spots where Columbus landed on his last voyage to the new world, is the home of Radio Casino, another steady broadcaster. TIQ runs 1,000 watts on 5.954 from 1100 to 0600 with English programming during the last hour. You can send your reception report to Apartado 287, Puerto Limon.

Irazu volcano looks down on Cartago and Radio Rumbo, a commercial broadcaster with a shortwave outlet on 6.075 using 1,000 watts. TICAL supposedly runs 24 hours a day on shortwave and was first heard in mid-1980. A guitar-playing potato graces their QSL card. Reports go to Apartado 140, Cartago.

At Heredia you'll find coffee, cattle, and Radio Nueva Victoria, with call letters TIPJ, on 6.082. This one began in late 1979 though, again, not a totally consistent broadcaster on shortwave. It's scheduled from 1100 to 0500 with 250 watts. If you log them, your report goes to Apartado 76, Heredia.

Nicaragua

The Sandinistas now hold power in Nicaragua and, in turn, are fighting bands of

"contras" attempting to create another change in this beleaguered country that's as big as England and Wales combined.

Nicaragua's shortwave population is sparse. In the capital city of Managua, which sits on the shore of Lake Nicaragua, one finds the government station La Voz de Nicaragua, YNM, with a 50 kilowatt transmitter operating on 5.950 and scheduled between 1100 and 1300 and again from 2300 to 0500. The schedule features some English programs, mostly extolling the wonders of the Sandinista struggle. The station also has a 100 kilowatt transmitter which has recently operated on 11.715, with 11.850 as an alternate frequency. La Voz de Nicaragua's slogan is "Voz Oficial del gobierno de reconstruccion nacional"—"Official voice of the government of national reconstruction." Reports can be sent to Apartado 4665, Managua.

On Nicaragua's Atlantic coast, at Bluefields, is Radio Zinica on 6.120. Prior to the revolution this was Radio Atlantico. Zinica is "the official voice of the popular Sandinista revolution on the Atlantic Coast." Although listed as 1,000 watts, YNCA apparently installed a stronger transmitter shortly after the Sandinistas took over. Perhaps they availed themselves of the equipment Radio Atlantico had planned to put into use. Verifications from this one are spotty, as they were from Radio Atlantico. Write Apartado 25, Bluefields, Zelaya.

In Ocotal, a little station called Radio Hernandez de Cordoba may still be struggling for survival. It is largely a one man operation, short on advertising funds and using a homemade transmitter of just 400 watts. Normal broadcasting is just on Sundays at 1500, an impossible time for its frequency of 6.100. But try at Christmas and Easter for, in the past, YNHC has carried religious services on these occasions during local evening hours. You might get lucky and bag a real treasure. If so, their address is just Ocotal, Departamento Nueva Segovia.



Rober Barahona Gomez, founder of Sistema Radiofonica HB, operators of Radio Reloj in Costa Rica.

Belize

Guatemala would very much like to absorb Belize (formerly British Honduras), but a British garrison there has kept a damper on such designs. A very mixed bag of ethnic groups make up the tiny population of this tiny nation.

For \$15.65 you can buy a one minute commercial on Radio Belize, which began operations in 1937 with 200 watts and a daily one hour transmission of news, weather, and announcements on 10.6 MHz with the call ZIK2. It went semi-commercial in 1964 carrying Spanish and English language programs. The first music wasn't aired until 1944. Today, Radio Belize operates with 10 kilowatts on 3.285 MHz from 1100 to 0500. The staff is largely BBC-trained and the station used to be known as the British Honduras Broadcasting Service. Reception reports go to P.O. Box 89, Belize City.

Panama

There's a sorry situation in Panama. Once upon a time you could try for Radio Baru, Circuito RPC, HOLA, and Radio Balboa. But for a decade or more now, Panama has been absent from the shortwave bands. But there may be light (or sound) at the end of the tunnel. Radio Japan is holding talks with the Panamanian government regarding the possibility of establishing a relay station there. If they do, Panama should be an easy catch. But, any such eventuality is a long way off.

Clandestine Stations, Too

No review of Central American shortwave would be complete without mentioning the several clandestine stations active in the radio and other wars there. Anti-Nicaraguan government stations include:

Radio Quince de Septiembre, operated by the Nicaraguan Democratic Front (FDN). Frequencies include 5.565, 6.510, 6.900, and 7.000.

La Voz de Nicaragua Libre, the Voice of the Democratic Revolutionary Alliance (ARDE) often reported on 5.570 and 5.750.

La Voz del Sandino, the station of the Sandinista Revolutionary Front (FRS), is usually to be found on 6.200 or 6.220.

La Voz de la Libertad, backers unknown, has been heard once or twice around 6.895.

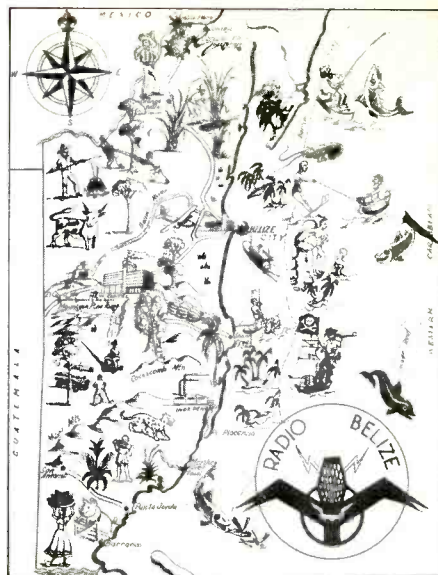
Radio Miskus, Voice of the Miskitos Indians can usually be heard around 6.965.

The anti-El Salvador government clandestines include the well-known Radio Venceremos of the Farabundo Marti Liberation Front (FMLN) on 6.980 and 7.000. This one verifies reports sent to Apartado Postal 7-907, Mexico, D.F. and claims to operate from Morazan Province in El Salvador.

Radio Guazapa, La Voz de Cuscatlan, claiming to operate from Guazapa volcano in El Salvador, is part of the FMLN group. Try it in the range of 9.800 to 9.850.

Radio Farabundo Marti claims to be in Chalatenango Province, El Salvador and is often heard around 6.900, 6.920, 7.000, and 7.035. Apparently operated by the Popular Liberation Forces, a group within the FMLN.

Broadcast times on all of the Central American clandestines are highly variable. So are the frequencies used! Your best bet is to check the ranges of 5.500 to 5.900,



The picture-map QSL of Radio Belize.

6.200 to 6.300, 6.500 to 6.600, and 6.800 to 7.100 during the evenings. Scan them every half hour or so and you should eventually log most of them.

At one time Central America was a treasure trove of targets. But over the years, many of these stations remain only as memories, slightly yellowing cards in the collections of long-time DXers. Catch them while you can.

Some of the world's most famous explorers have investigated Central America—Columbus, Cortes, Davila. Now, perhaps it's your turn to explore the lands of the Maya, the Aztecs. Central America—it's another world right next door providing fascinating listening and challenging DXing.

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Central American Log

2.360 R. Maya Barillas, Guatemala	6.075 R. Rumbo, Costa Rica
2.390 R. Huayacocotla, Mexico	6.082 R. Nueva Victoria, Costa Rica
3.250 R. Luz y Vida, Honduras	6.090 Union Radio AWR, Guatemala
3.285 Radio Belize	6.090 Onda 145, Mexico
3.300 R. Cultural, TGNA, Guatemala	6.100 R. Hernandez de Cordoba, Nicaragua
3.360 LV de Nahuala, Guatemala	6.105 R. Universidad de Costa Rica
3.380 Escuelas Radiofonicas Chortis, Guatemala	6.105 Su Pantera, Mexico
4.780 R. Juticalpa, Honduras	6.115 R. Universidad de Sonora, Mexico
4.820 LV Evangelica, Honduras	6.120 R. Zinica, Nicaragua
4.825 R. Mam, Guatemala	6.150 R. Impacto, Costa Rica
4.832 R. Reloj, Costa Rica	6.165 LV de la America Latina, Mexico
4.835 R. Tesulutlan, Guatemala	6.175 TIFC, Costa Rica
4.890 R. Lux, Honduras	6.180 La Voz de Guatemala
4.910 LV de Mosquita, Honduras	6.185 R. Educacion, Mexico
5.055 TIFC, Costa Rica	9.515 La Voz de la America Latina, Mexico
5.950 La Voz de Nicaragua	9.553 Radio Nacional, El Salvador
5.954 R. Casino, Costa Rica	9.555 La Hora Exacta, Mexico
5.955 R. Cultural, TGNA, Guatemala	9.600 R. Universidad de Mexico
5.980 R. Nacional, El Salvador	9.645 TIFC, Costa Rica
5.982 XEUJ, Mexico	9.705 Radio Mexico
5.985 Radio Mexico	9.760 La Voz de Guatemala
6.000 R. Variedades/El Eco de Honduras	11.715 La Voz de Nicaragua
6.006 R. Reloj, Costa Rica	11.770 Radio Mexico
6.010 R. Mil, Mexico	15.160 La Voz de la America Latina, Mexico
6.020 R. Nucleo Oro, Mexico	15.430 Radio Mexico
6.035 R. Nacional de Costa Rica	17.765 Radio Mexico
6.045 R. Universidad San Luis Potosi, Mexico	

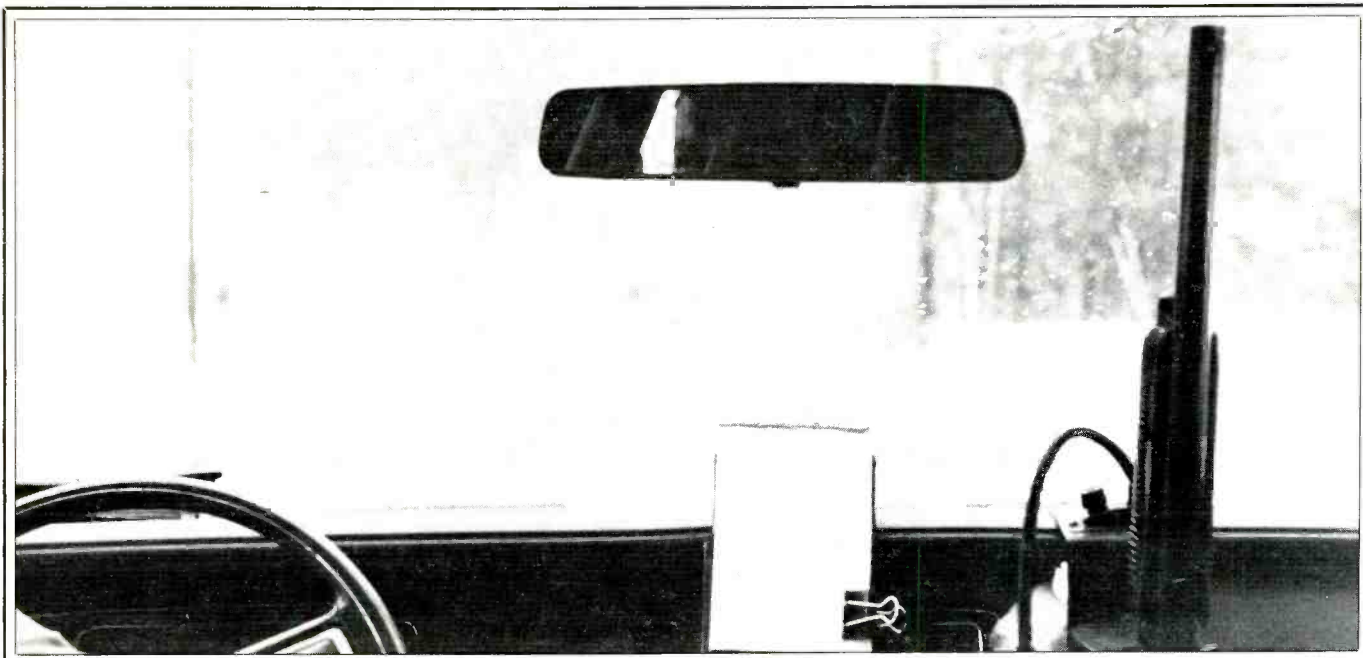
Note: Clandestines not included. Frequencies subject to change.

CIRCLE 70 ON READER SERVICE CARD

RADAR REFLECTIONS

RADAR DETECTORS AND THEIR USE

BY JANICE LEE



Radar Questions Help Judge Beat Charge

After hearing an electrical engineering professor testify for a defendant in a radar speeding case, Judge Frank Kosanda threw the charge out of his Grand Forks, ND County Court. In fact, Kosanda was so impressed that he later hired the professor as his own expert witness after the judge himself was stopped for speeding near Fosston, Minnesota.

The judge argued his own case in Crookston, MN and won. Polk County Court Judge John Roue found him not guilty.

"These radar devices are not as accurate as most people think they are," Kosanda said in a telephone interview. "They will read a lot of things, including blowing snow; there's an effect from waving grass."

That's true, said his witness, Ronald Moe, associate professor of electrical engineering at the University of North Dakota. The radar speed also can be affected by a vehicle traveling in the opposite direction from the one being clocked, Moe said.

That's what apparently happened in the judge's case, Moe and Kosanda said.

"Radar's OK if it's used right," said the 62-year-old native of Hopkins, MN, but "it's hard to admit guilt when you're not guilty."

He said he felt a desire to "keep the radar machine honest." If someone like himself, who knows the procedure and the laws, didn't do it, he said, "I would probably be letting everybody down."

"It's virtually impossible for any layman to perceive what's happening, much less argue against it," he said.

Moe said he has appeared as a witness in several cases, and has not been very suc-

cessful in getting information from radar manufacturers.

Kosanda, a former trial attorney, said his court has heard as many as 12,000 cases a year, mostly for speeding. "Many times I convict, but I try to look and see if there is a possible error in the system. These radars are subject to substantial error."

In Crookston, he said, "there was little justice done."

Big Brother Is Watching Californians

It seems that there now are some scary looking radar disks staring down from overpasses on the Santa Monica Freeway.

Big Brother is actually Caltrans (CHP Operations), and he's also watching with cameras, which, along with those radar disks, have been installed at some 14 locations along Interstate 10. The cameras and disks, and some pavement sensors that you couldn't have noticed unless traffic has been exceptionally slow, are all linked to an electronic array in downtown Los Angeles that looks a little like the set of *WarGames*. Theoretically, at least, they're not for spying on motorists but are "mainly for purposes of traffic management," assures John Higgins, information officer at Caltrans.

Here's how it works: If the sensors show that traffic is slowing below 25 mph or, worse, stopping entirely, all of the cameras in the vicinity are turned toward the trouble spot so Caltrans can see what the problem is. If necessary, the CHP is alerted and sent to the rescue. The center also relays reports to 14 radio stations, which inform their listeners of traffic conditions.

The system started in December 1980

with a 42 mile test loop. When the project is completely installed, it will cover freeways in the entire L.A. basin as well as in Ventura and Orange counties. Caltrans estimates the entire cost at around \$1.3 million.

The good news about all of this is that you'll never have to read dumb poems or car-pool information on those giant message boards again; they'll be used instead to relay traffic information gained from the new system. The bad news: They're watching you. Just how much can they see? According to Caltrans, they get about the same view as would a police officer standing by your car asking for your driver's license. So smile . . . you're on Caltrans camera.

Radar Nabs Anti-Radar Lawmaker

State Senator Joe Neal, D-Las Vegas, who has tried to abolish or limit radar guns, was back in court on another speeding ticket. A trial was recently set after he was cited for driving 65 mph in a 45 mph zone. He paid a \$30 fine in May for a speeding ticket which also involved radar. He says it's a waste of taxpayers' money for police to hide with radar guns.

MPH S-80 Rejected By CHP Officials

Plans by the California Highway Patrol to begin snagging speeders in Mission Viejo with a new radar device were delayed because the device failed to meet federal standards. Had the project started on schedule, it would have marked the first time radar had been employed by the CHP in Orange County.

CHP officials, who have used radar rarely in California and fought long and hard for permission to experiment with the devices in Orange County, expressed frustration with the delay in the program which they say will save lives.

"I am very disappointed," said CHP Capt. Chuck Chase, "and I worked almost two years to get this thing off the ground . . . It's a feeling of frustration more than anything else."

CHP officials said that they were not sure why the radar unit didn't meet federal standards during a test conducted routinely on all such equipment used by law enforcement agencies.

A company official that manufactures the device said the radar gear failed to start at room temperature after it had been frozen at 20 degrees below zero Fahrenheit. The cold test, he said, is one of the several that radar equipment must withstand during tests required by the federal government.

Authorities said all radar equipment used by law enforcement agencies must pass standard tests before it can be used. The CHP chose Dr. P. David Fisher, a Michigan State University engineering professor, to inspect its new radar gear.

The CHP ordered the radar equipment after the Mission Viejo Municipal Advisory Council successfully petitioned the county Board of Supervisors for permission to buy the \$1,600 device with special district tax funds paid by Mission Viejo residents. It will be used only in Mission Viejo.

Police Chief Sets 40 MPH Limit For Employees

The police chief in Shrewsbury, NJ, has ordered his officers to keep their five dilapidated patrol cars at speeds under 40 mph because he would rather lose suspects than risk injuring his employees.

Police Chief Raymond Mass said recently that he set the speed limit because of the fleet's "totally unsafe condition."

In the meantime, Mass said, "It now takes two cars to catch a speeder."

He said the cars are stationed about a mile apart. One has the radar; the other stops the speeding motorist. He also noted that the 11 Shrewsbury officers will now have to call neighboring police departments for help in case of a car chase.

"I'd rather lose a criminal than unnecessarily jeopardize the life of a police officer," Mass said.

Appeals Court Sides With Pasadena Restaurant Owner

The 5th U.S. Circuit Court of Appeals recently upheld the \$75,000 in damages awarded a restaurant owner who was beaten and arrested when he complained for a third time about Pasadena police using his parking lot as part of their speed trap!

The City of Pasadena and officers J.R. Winn, R.P. Myers, and L.E. Stewart appealed when a U.S. District judge awarded \$25,000 in compensatory and \$50,000 in

punitive damages to Dominique Hermex, proprietor of the Burger Island fast food restaurant.

Citing a variety of violations of his constitutional rights, Hermex sued in U.S. District court after he was acquitted in state court of interfering with a police officer in the performance of his duty and resisting arrest.

Hermex said Stewart first ignored him, then restrained him when he tried to call the Pasadena mayor with his complaint. Hermex said Winn and Myers joined in the scuffle, forcing him into a glass door, which broke, and then throwing him to the ground and handcuffing him.

The 5th Circuit, in its review of the case, did not say when the incident occurred.

On appeal, the officers maintained the statute of limitations had run out before Hermex managed to identify them; that they weren't to rough on Hermex; that there was insufficient evidence to support the amount of damages.

Dallas Police Want 100 Cars Equipped With Radar

Dallas police officials are studying a plan to equip more than 100 patrol cars with radar devices. If the plan is approved, it would be more than double the number of Dallas police cars equipped with radar by next year.

While police departments in several major cities have equipped their entire fleets with radar, Dallas has installed speed detection units in only about 100 of its approximately 240 vehicles.

Last year, officers in two divisions wrote a combined 93,000 speeding citations. This year, police are issuing an average of more than 8,000 tickets a month.

"If everyone thinks there is radar in every car, they would slow down," said Assistant Chief Leslie Sweet, head of the 800-member patrol bureau. "Everyone feels they can watch in the rear view mirror, but they would not be sure they could spot the radar."

Georgia State Patrol Clears Gwinnett County Of Speed Trap

Gwinnett County police do not operate a speed trap, but they need to improve records on their use of radar equipment, the Georgia State Patrol has concluded after a seven week investigation.

The inquiry found "the Gwinnett County Police Department does not engage in a program that could remotely be labeled a speed trap," Col. Hugh Hardison said recently in a prepared statement.

Police Chief John Crunkleton had asked for the investigation after County Commission Chairman Charles Ashworth said that Gwinnett might get a reputation for operating speed traps if it sought more money to enforce speeding laws. Crunkleton said at the time that Ashworth had cast a cloud over his department.

Ashworth said that he'd never alleged

Gwinnett had speed traps and that Crunkleton had blown the issue out of proportion.

The confrontation between Ashworth and Crunkleton had come over plans to extend a grant that had given Gwinnett six more police officers to enforce the 55 mph speed limit. With the help of those patrolmen, the number of speeding tickets issued in Gwinnett rose in the first quarter of 1983 by 150 percent.

The state patrol made no inquiry into that increase but sought to determine whether the speeding cases that were made were valid, patrol spokesman Bill Wilson said.

"While certain instances of record-keeping deficiencies existed, compliance with the laws governing the use of radar was good," Hardison said.

Nevada Gets Aid Despite Speeders

The federal government has decided not to withhold \$1.4 million in highway funds from Nevada for failing to enforce the 55 mph speed limit, said Senator Paul Laxalt, R-Nev.

Senator Laxalt said the Federal Highway Administration had settled for a promise by the state to improve monitoring and enforcement of the federally mandated speed.

Federal officials said 51.2 percent of Nevada's drivers exceed the 55 mph, and its motorists receive the most tickets of any state in the nation for going faster than 65 mph.

Texan Judge Finds Drivers Not Guilty When Police Claim They Speed

Judge Tommy Adkisson, a municipal judge for the small town of Elmendorf, Texas, is finding many motorists not guilty of speeding where complainants say there is a "speed trap."

Elmendorf's mayor stresses that as a matter of policy, speeders are given citations only when they exceed the limit by 12 mph.

However, recently several drivers went to municipal court to challenge citations given to them for allegedly doing 66 mph in a 55 mph zone.

In two such instances, despite sworn testimony from the patrolman that a radar had been used to detect the infractions, the defendants were found not guilty by Adkisson.

"People are getting really sophisticated these days," said the judge in explaining his decision to overturn the officer's word. "They are bringing witnesses to present their cases and so forth."

In Elmendorf, clocking a speeding driver with a radar will not necessarily bring a guilty verdict.

Why?

Either because radars are not all reliable, explained Adkisson, or, as critics are saying louder and louder, because an excessive number of tickets are being written to the point that if the judge has to decide whether to believe the work of the defendant and his family or the professional view of the pa-

troldman and his radar, he may choose to believe the defendant.

"Speedtrap" Raising Speed Limits

Smyrna, Tennessee, once known as "Speedtrap U.S.A.," may be changing its image with motorists after officials proposed raising the speed limit on three major streets.

"I've also instructed the police to be lenient with motorists," Mayor Sam Ridley declared.

In most cases, the police have been told to allow about 10 miles above the limit unless the motorist is driving recklessly, he said.

"And then they will be given a reckless driving ticket" which carries a stiffer penalty, the mayor said.

"These speeds were recommended as appropriate to move the traffic safely through the city," said Ken Pilkerton, planning commission chairman.

The planning commission made the recommendation to raise the speed limits on the four-lane highways based on information from the State Department of Transportation, Pilkerton said.

Speed limits within the jurisdiction of a city are the city's responsibility, said Richard Fitzgerald, of DOT's planning division.

"They have the right to establish their own speed limits on state highways if they are in the city's limits. We do study the highways and make recommendations if they request assistance," Fitzgerald said.

Fitzgerald said the state recommended the increase in the speed on the highways "because they can bear the speed."

Police Radar Units Undergoing Testing Again

The following article by Christopher Jensen recently appeared in *The Cleveland Plain Dealer*:

In an effort to ease public concerns, the International Association of Chiefs of Police (IACP) is conducting accuracy tests on every police radar unit sold in the United States.

The association, in Maryland, expects to issue a list of IACP-approved units to guide police departments buying new radar units.

But the standards may affect radar units already in use. Those which are not approved could face court challenges to their accuracy, said Warren Woodfield, an IACP research official.

If those court challenges are successful, police departments might be required by the courts to either abandon those units or to make costly electronic modifications, Woodfield said.

"When you start getting radar cases thrown out because you are not using a qualified product, you will go out and buy a product that meets the qualifications," he stated.

Woodfield said two laboratories hired by the IACP were testing about two dozen speed measuring devices.

"We want to make sure we have a good unit that the officers can rely on when they go into court to testify," he said.

The IACP is essentially picking up where the Reagan administration left off in the federal government's investigation of radar's accuracy. That investigation was begun in the late 1970's by the National Bureau of Standards (NBS) and the National Highway Traffic Safety Administration (NHTSA).

Although NHTSA public relations officials tried to downplay the results in their press releases, tests by the National Bureau of Standards released in 1980 showed there were problems with police radar which raised the possibility that innocent motorists could get tickets.

The problems included:

- If more than one vehicle is on the road, a policeman can have serious problems telling which is speeding.
- Moving radar is subject to a variety of electronic quirks which can cause erroneous readings.
- Radar units can be tricked into giving false readings by devices including citizen band radios, police radios, and heater fans.

To try to improve radar's accuracy, NHTSA planned to have a list of approved radar units. Under that plan, federal dollars could not be used by any police department to help purchase radar units not on the list. But in 1981 federal officials abruptly

abandoned that idea, although almost \$1 million had been spent and federal officials admitted the cost of implementing it would have been minimal.

NHTSA officials told *The Plain Dealer* at the time there was no need for the regulation to be adopted because radar manufacturers had voluntarily improved their products so that they met the proposed standards. But top NHTSA officials have declined to disclose which manufacturers met the standards at the time the decision was made.

They said allowing each state to enact such a policy would be as effective as a federal regulation. But they were unable to explain how making adoption of the standards voluntary would be as effective as making them a national requirement.

Some NHTSA officials were also worried that adopting the new standards would result in state courts ruling that many of the units already being used did not meet the accuracy requirements and would have to be junked, according to documents obtained through the Freedom of Information Act.

If old radar units were found unacceptable, it could cost law enforcement agencies much money if they had to purchase all new radars, an NHTSA's Office of Plans and Programs analysis said.

The NHTSA and NBS then turned their proposed performance standards over to the IACP as part of the voluntary program.

Janice Lee is the Editor of Monday, A.M., the newsletter of Electrolect, Inc.



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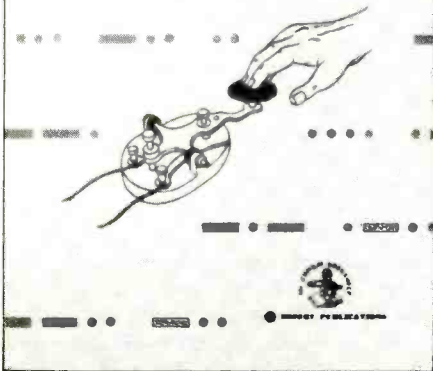
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PRODUCTS

REVIEW OF NEW AND INTERESTING PRODUCTS

SECRET CODES & CIPHERS



New Codes & Ciphers Book

Codes have been important to mankind almost since the beginning of warfare and espionage. Indeed, even Indian smoke signals and native drum beats can be used to communicate in a primitive form of code. But with the introduction of written language, codes and ciphers could be made much more sophisticated, thus more difficult to break. The book *Secret Codes & Ciphers* thoroughly examines and explains transposition and substitution cipher systems as well as the major code systems: code groups, one and two part codes, and enciphered codes. Within its twelve chapters, code and cipher systems are compared and the fundamental rules for safeguarding cryptograms are explained. A thorough and comprehensive work, originally written as a "classified" manual by our own government for use by the military, it is filled with charts and examples of cryptograms, along with complete instructions (in straightforward layman's language) on creating and breaking various codes, including those used for radio communications. One section even discusses the most common errors used in telegraphic transmission of codes.

Secret Codes & Ciphers is available at \$7.95 per copy, plus \$1 for postage/handling by First Class Mail. Order your copy from CRB Research, P.O. Box 56, Com-mack, NY 11725.

Antenna Products

Kilo-Tec announces two new Antenna Products—the "KT5B" multi-band dipole antenna and the DP-1 center connector.

The "KT5B" is a multi-band antenna de-

signed for the 1.8 MHz through 30 MHz amateur radio bands. It uses no loading coils or traps and will handle 2 KW PEP. Unit price is \$59.95.

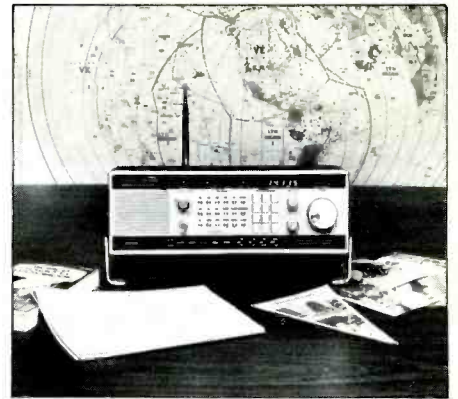
The DP-1 Antenna center connector, with SO-239 can be used with dipoles, quads, or Vee antennas where a weather resistant coax connection is needed. The unit is rated at a full 2 KW and features a Mil-Type potting material to prevent RF flash-overs. The unit price is \$8.95.

For information contact Kilo-Tec, P.O. Box 1001, Oak View, CA 93022, or circle number 106 on the reader service card.



Electra's First Entry Into Shortwave Market

Electra Company is entering the short-wave radio market with the Bearcat DX-1000. Utilizing innovative microprocessor digital technology, the DX-1000 features direct access keyboard tuning. This makes it simple to tune from the BBC World Service to an English language newscast from Radio Ghana instantly, without band-switching. Covering 10 kHz to 30 MHz continuously, with PLL synthesized accuracy, the Bearcat DX-1000 will monitor all short-



wave bands, longwave, standard broadcast band "AM," amateur radio, and even the marine band.

As easy as the new DX-1000 is to tune, it has all of the features even the most sophisticated DXer could want. For example, 10 memory channels make it possible to store favorite frequencies for instant recall—or for faster "band scanning" during important openings. The digital display measures frequencies to 1 kHz, or at the touch of a button, doubles as a two time zone, 24-hour digital quartz clock. A built-in timer wakes the user to a favorite station, or it can be programmed to activate peripheral equipment like a tape recorder to record up to ten broadcasts, in any frequency or mode, while the user is asleep or at work.

Other important features include independent selectivity selection, with 12, 6, and 2.7 kHz IF filters to help separate high powered stations on adjacent frequencies, plus a two-position noise blanking system that stops Russian pulse radar interference. In addition, the DX-1000 features a two position RF attenuator, FM squelch control, tone control, battery back-up system to hold memorized frequencies and time if power fails, LED indicators for modes and functions, front mounted speaker, "fast"/"slow" automatic gain control, and separate push buttons for selecting AM, LSB, USB, CW, or FM modes. The unit comes with a built-in telescoping antenna for portable use, and includes an SO-239 antenna connector for 50 ohm leads, and a screw connector for "High Z."

The Bearcat DX-1000 can be operated with batteries (12 Vdc), or from an electrical outlet (120/240 Vac). The unit measures 14½" W x 5" H x 9⅞" D, and weighs 17 lbs. Each radio comes with a free shortwave information guide that includes listings of stations from all corners of the world.

The Bearcat DX-1000 has a suggested retail price of \$599.95. Further details are available by contacting Electra Company, 300 East County Line Road, Cumberland, Indiana 46229, or circle number 101 on the reader service card.



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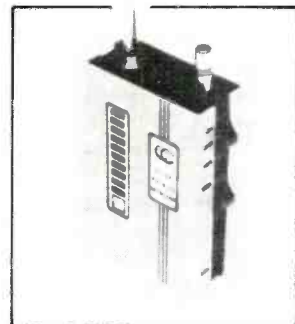
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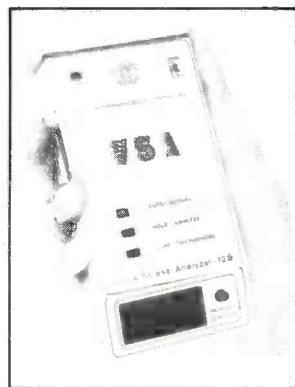
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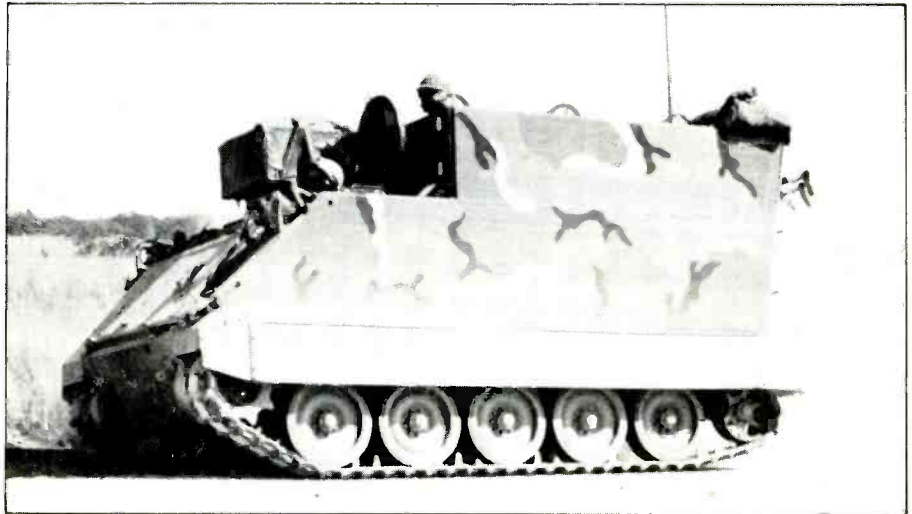
THE EXCITING WORLD OF RADIOTELETYPE MONITORING

In most of the previous columns, we have covered the world press news RTTY point-to-point schedules and we will continue to do so. But, in addition, we will look at the majority of RTTY transmissions—the military. After we purchase a new RTTY demodulator and give it the “smoke test,” we tune up and down the band to hear the standard tweedle-dee of an FSK signal—only to find the signal is not copyable due to its encrypted military origin.

Two reasons for using encryption are for privacy and for authentication. Authentication prevents unauthorized persons from placing or ingesting information into the channel while privacy prevents unauthorized persons from extracting information from the channel. Encryption converts plaintext or the actual message into ciphertext by scrambling algorithms. A “key” selects the individual transformation to either encrypt or decrypt messages. This key is carefully sent via a secure channel (such as a courier or a truly secure data channel) and generally remains unchanged for several transmissions. The goal of an eavesdropper is to produce plaintext by analyzing the ciphertext obtained from the public channel without use of the valuable key.

In this case, the public channel used for transmitting encoded FSK RTTY data is HF (3–30 MHz) satellite or microwave links. This variety of transmission methods dramatically increases the probability of survival in a war. For example, if a killer satellite destroys a military satellite, one would like to rapidly switch to an HF link or land lines to continue strategic communication. This is why the military will continue to use HF as a backup to wideband satellite. The use of several transmission media is known as n-fircated channels.

Two generic categories exist for encryption schemes—block encryption and continuous data stream encryption. Block encryption implies a block of data of fixed size where different encryption schemes are used for separate blocks of data. Several techniques are used in encryption, usually involving combinations of permutations



This is an Army M-577 mobile communications center. Believe it or not, these units are equipped with RTTY. This photo was sent in by a reader who was operating from an M-577 for the Vermont Army Guard.

(simply rearranged) and substitutions. Practical implementations of this basic concept was first used by IBM in developing its Lucifer system, and in 1977 the National Bureau of Standards adopted a modified Lucifer system as the national data encryption standard (DES.) For more on this subject, I would recommend David Kahns’ book, *Codebreakers*, NY, MacMillan Co., 1967.

Rest assured decryption of military RTTY is not a trivial task (as it should be). In fact, U.S. military encryption is not subject to hobbieist unauthorized decoding. However, certain foreign military transmissions use simple privacy encoding techniques (some of the Cuban diplomatic messages are sent using oddball data rates and non Baudot codes). Try 16220.0 kHz—selecting 96.25 baud and Morse code!

Several types of encrypted Baudot are currently in use:

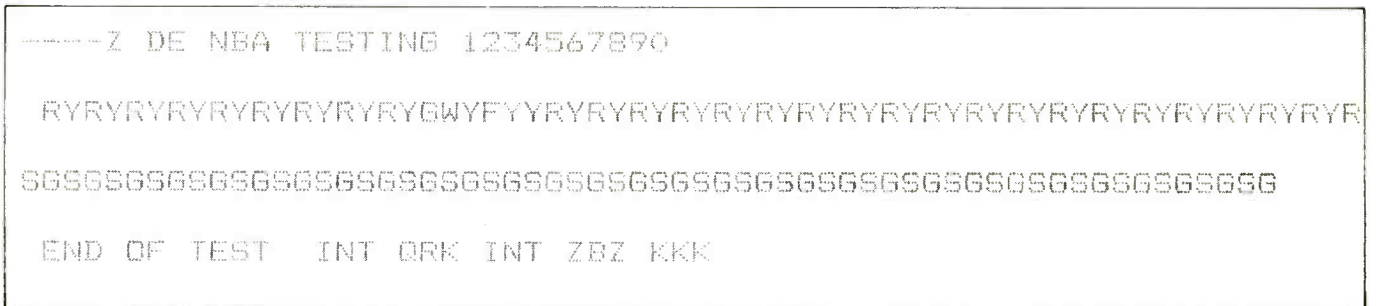
- a) 45 baud, normal start/stop bit, encrypted data and very narrow shift.
- b) 50 baud, encrypted start/stop/data bits, and 850 Hz. Commonly used by the U.S. Navy and other NATO powers.
- c) 75 baud, normal start/stop bits, 850 Hz shift. Used by U.S. Navy and U.S. Coast Guard.

I would not consider simple bit inversion to be a form of encryption but more of a technique to prevent only the most casual listeners to monitor RTTY transmissions. The FCC uses bit inversion according to a daily look-up table. The Info-Tech M600A does an admirable job with reading bit inverted data since the M600A allows one to watch the displayed characters while stepping through all the possible combinations of bit inversions.

When plaintext results, the keypad is pressed in order to leave the particular combination fixed. The FCC can be found on 23035.0 kHz, 19230.0 kHz, 13830.0 kHz, 10902.0 kHz, and 7604.0 kHz. We have looked at coding schemes but the military also varies the modulation for privacy, interference rejection, selective addressing, and multiple access. The most popular scheme for this is spread spectrum.

Spread spectrum is a technique to quickly vary the carrier frequency while transmitting RTTY, voice, or other input modulation.

Spread spectrum is a technique to quickly vary the carrier frequency while transmitting RTTY, voice, or other input modulation.



U.S. Naval Station NBA in Panama. Here's how their test slip on 22810.0 kHz appears.

The rate and spectrum location can now be digitally controlled by a particular code. This is an excellent way to control who actually receives this data since only the intended party can track this changing frequency after exchanging an agreed-upon spread code.

What does the SWL or ham hear while tuned to one frequency when a spread spectrum RTTY signal is being transmitted? Only a slight increase in background noise! Perfect for secure communications. Also, multiple signals can occupy the same RF bandwidth simultaneously without interfering with one another due to only a brief (less than a second) stay at one frequency. With several transmitters hopping around in frequency (with different rates), the probability of two or more colliding is miniscule. This leaves one major problem—one of synchronizing the receiver with the transmitter. After all, if they do not start together there can be no hope of ever catching up with each other on frequency. In order to synchronize, a brief FSK RTTY transmission establishes a starting position and then converts to a spread spectrum mode.

The author has heard this many times—a strong FSK RTTY signal that logs on and off quickly. A systems vulnerability to jamming is improved sufficiently when spread spectrum is used. Frequency hopping is generally classified as slow or fast hopping. In the

case of slow hopping, there are typically several bits per hop, while in the case of fast hopping there are several hops per bit.

Frequency division multiplexing (FDM) is quite popular with the military users due to the many simultaneous channels available as one group. Usually, these broadcasts consist of 8 or 16 channels with a 42.5, 60, or 85 Hz shift. Most of the 16 RTTY channels are encrypted in nature; however, one or two weather channels at 75 baud and an AP or UPI news channel at 50 baud may be found buried in the 16 channel cluster. A loud busy is a typical indication of an FDM signal. Try listening to 14387.7 kHz or 16037.5 kHz for a sample of FDM.

Very few U.S. military RTTY signals are plaintext. One exception is NBA, found on 22810.0 kHz at 75 baud (see Figure 1). Another is the USN Kato Soli found at 22515.0 kHz. McMurdo Sound, Antarctic (USN) can be found on 13682.0 kHz at 75 baud around 0950 GMT.

In summary, because of their relatively low cost for beyond-line-of-right applications, HF RTTY communications links have remained popular with military users. All military users rely on HF for some long-haul strategic and short-haul tactical links.

Let me know what foreign military RTTY stations you find. Also, I would like to thank David Wilson for his military loggings.



The Army's New Terminal Unit

The AN/UGC-74 is a microprocessor controlled "smart" communications terminal or teletypewriter. It is the replacement for the current and antiquated inventory of teletypewriters. The terminal allows an operator to compose, edit/correct, store, and transmit messages as well as receive messages, store, print upon demand or upon receipt. Message storage for up to ten pages of narrative record traffic is possible. An operator can prepare and correct messages and store them prior to transmission. It can be operated by anyone who can operate a typewriter, thus eliminating a significant amount of training.

The AN/UGC-74 played an important role on board the space shuttle *Columbia*. It was a component of the space shuttle's extensive electronics suite and was used to receive and printout command information from Houston mission control. (U.S. Army photo)

by Harold Ort, Jr.
Military Consultant
Popular Communications

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A decent communications antenna system generally requires that the system be mounted in conjunction with one or another type of supports, towers, masts, etc. If you've got a beam type antenna, then chances are it's on a mast, either the full-length type intended for ground-level mounting or the "shortie" tripod type intended for mounting on a rooftop.

Other types of antennas ranging from VHF transmitting or scanner ground planes to HF long wires may also be mounted on these support structures as well as from points on buildings. I'd like to mention here some thoughts on antenna mounting structures, improvised and otherwise, which you may find will come in handy. For instance, they aren't without their own unique problems, and unless you've looked those problems squarely in the kisser, you may find that one fine day you suddenly don't have the trusty antenna doing its job because of the inability of the mounting structure to do what you hoped it would do.

Mother Nature certainly is not a fan of antennas and their mounting structures. Wind, ice, and lightning are natural enemies of antennas and their mounting structures, often doing their very worst just at a time when you find you most require their services! One good gust of wind can wipe out all communications at a station!

If you are contemplating erecting an antenna mounting structure for temporary, semi-permanent, or permanent use, or you are looking for a structure you can easily store until required for possible emergency use, I invite you to check out the telescoping antenna masts which are sold with the intention of being used for TV installations. While these devices will probably not be suitable for supporting an antenna rotor and some sort of monster beam antenna, they should easily handle most VHF types and also a two or three element HF beam and rotor. Available at many TV shops and communications dealers, they seem to come in 19 and 36 foot heights. These telescope down when not in use, when they are opened, the sections interlock for stability. You do, however, have to guy them at a couple of points in order to keep them on the job. These antenna masts require a couple of people to erect them—one or two to hold it up while another person takes care of the guy wires and stakes. The prices of these range from about \$25 to \$45, making them most attractive and also quite a bit more economical than standard antenna towers.

Another approach to mounting an antenna is the standard aluminum extension ladder. The ones I've seen around at local



Here's the type of unit you need to check radiation levels.

home improvement and paint stores seem to come in total (extended) lengths of 20 to 40 feet. However, they aren't cheap; the 40 footer was a cool \$180! The idea is not to go out and buy one for use as an antenna. Hopefully you can borrow your neighbor's, or maybe you already have one stored in the rafters of your garage. If you have one available, keep in mind that it can be pressed into service as a makeshift antenna tower. The antenna can be mounted to the ladder by any number of means (depending upon the antenna type), and a couple of guy wires can be attached to the rungs. I've found that by digging a hole in the ground (about 2 feet deep) you can insert the bottom part of the ladder in the hole in order to give it some additional stability, although you still will need guy wires. I most definitely do NOT suggest attempting to climb a ladder while it is set up for use as an antenna mast since it will fall right over under such conditions. If guyed adequately, however, it will do a reasonable job of supporting an antenna in a pinch.

I suspect that at this point I should remind you that antenna structures should not be erected where they could possibly topple over into electrical power lines, telephone lines, or a neighbor's (or your own) home. Nothing is as ungraceful as an antenna that is partially erected, and it is during the process of putting up antennas that most people are injured or even killed; a slight puff of wind which would have no effect on a fully erect antenna structure seems to wreak havoc on an antenna that is in the process of being put into place. Antennas and structures which bump into electrical power lines invariably

cause a disaster or two. In other words, don't attempt to erect any antenna within an area where there is less than a 15 to 20 foot clearance between the highest point on the antenna or structure and any power lines or buildings into which it could topple. You could be sued if your antenna should topple onto your neighbor's property.

Antenna feedlines should always be protected with proper lightning protection, a simple job which all too many people seem to totally ignore.

A couple of anti-wind damage hints: 1: If you're using antenna systems which incorporate hollow tubing, these can be substantially strengthened by dropping a wooden broomstick handle into the tubing, and 2: If you have a beam antenna, you can reduce the adverse effects of strong winds on the beam by turning the antenna with one end of the boom facing into the wind (in other words, turn it so that it is not broadside to the direction of the winds).

Radiation Hazard?

The Monitor 4 is a new radiation detection device being offered by Solar Electronics, 156 Drakes Lane, Summertown, TN 38483. The unit offers broad-spectrum detection of Alpha, Beta, Gamma, and X-rays, with readings shown on a meter to 50 mR/hr. A count light and beeper indicate background radiation. Small enough to fit in the palm of the hand, the reasonably-priced survival product runs for up to 2,000 hours on one 9-volt battery.



One of our readers is so enthusiastic about 49 MHz FM, he even put it on his license plate.

Reader Douglas Ferrell of Florida writes to say that he's a big fan of 49 MHz FM communications systems and has even gotten a special license plate reading "49 MHz FM" to let everybody know about it. That plate is affixed to Doug's nifty Trans Am and cuts quite a picture zipping down the Interstate. Doug is Registered Monitor KFL4CR and his favorite haunt is 49.86 MHz. Folks seek-



Mark Peterson's emergency communications station.



The PRC-1X FM transceiver.

ing to try to arrange for a sked with Doug can contact him at P.O. Box 12862, Tallahassee, FL 32308.

Marc F. Peterson, of Murray, Utah says that he liked our previous coverage on how to become licensed under FCC Part 90. He says that actually it's pretty easy to license systems in Public Safety bands and goes on to tell how he helped to establish the Salt Lake County Emergency Radio Association, an emergency services group that specialized in search and rescue operations, plus motorist assistance. For a variety of reasons, the SLCERA evolved into a group later known as the Intermountain Search & Rescue Association; the IS&RA has a complete communications system. The organization's system operates on 155.295, 155.325, 155.16, 155.34, 155.505, etc., and the members plan to establish a UHF base to communicate with other emergency groups. Marc notes that many persons and groups have run into all sorts of snags in obtaining FCC licenses in Public Safety services and that after spending several years in this field, he's got some answers to many of the questions that always seem to crop up. Marc suggests that those who have had problems obtaining FCC licenses in Public Safety services can contact him and he'll give whatever advice he can to help. Contact him at: Lt. Marc Peterson, Intermountain Search & Rescue, 386 East 6270 South, Murray, UT 84107.

A nice looking 49 MHz FM personal communicator is being offered now by Nady Systems, Inc., 1145 65th St., Oakland, CA 94608. The unit is called the PRC-1X "Easy Talk" and offers 1/4 to 1/2-mile range license-free no-hands communications. The "Easy Talk" has a nice beeper call mode when the headset is removed—loud intermittent beeps clearly signal incoming calls. For more information on this device, contact the manufacturer directly.

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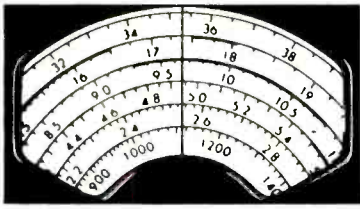
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COMMUNICATIONS CONFIDENTIAL

BY HARRY HELMS, KR2H

YOUR GUIDE TO SHORTWAVE "UTILITY" STATIONS



Photo of the beacon station taken by George Osier of New York.



A close-up view of George Osier's beacon station.

This month we have some photographs taken by George Osier of New York. The photos show a radio installation of some sort and George notes it is located on U.S. government property. George, I would say that you photographed a long wave beacon transmitter of some sort. Note the vertical antenna with the radials at the top—that's known as a "top hat" and is a common design for electrically "shortened" antennas for frequencies below 2000 kHz. Our thanks to George for a look at the type of stations you readers hear each month!

Ken Eichman of Ohio writes with some interesting information on Aeroflot flight transmissions. Ken says 15023 kHz is a very active channel during the day for CW transmissions from flights enroute from the Soviet Union to Cuba. The Cuban station uses the callsign COL and the Soviet station is RFNV. The Aeroflot craft use either five figure or five letter calls, and the figure calls begin with "8" and the letter calls with "R." Standard aeronautical Q-signals are used, along with international coordinates and checkpoints for locations. Ken says to look for the word "Gawana," which is used for "Havana." Many thanks, Ken!

Paul Mathieu of Texas sent along copies of some of his utility QSLs. Many thanks, Paul! If you have a favorite QSL you'd like to share with your fellow POP 'COMM readers, send along a clear photocopy of it. Please don't send the original QSL, as no submissions can be returned.

SSB Coastal Stations

One of the frustrating aspects of DXing SSB coastal stations is the lack of information relating to the frequencies, calls, and locations for many of these stations. Commonly available frequency guides simply don't cover them. The best source of infor-

mation about these stations is the list of coast stations published by the International Telecommunications Union in Switzerland. Unfortunately, this publication costs as much as some shortwave receivers!

I have been compiling information on these stations for some time based upon actual receptions by listeners. The following is a list of the most commonly reported stations. Note that these stations frequently go a long time before using callsigns. Also, this list is by no means complete; don't assume you've heard a station on the list merely because you hear a location mentioned on a certain frequency.

Ship stations use callsigns consisting of four letters, while shore stations use callsigns consisting of three letters (and a numerical suffix in some cases).

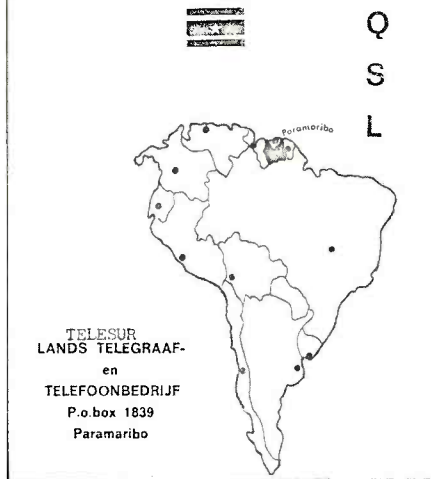
If you hear these or any other shore stations, why not report them to Communications Confidential?

1694	FFB, Boulogne Sur Mer, France
1715	GLV, Anglesy, England
1785	SAG, Goteborg, Sweden
1939	PCH, Scheveningen, Netherlands
2182	VAR, St. Johns, NF, Canada
2182	VAU, Yarmouth, NS, Canada
2182	VCA, Charlottetown, PEI, Canada
2182	VCS, Halifax, NS, Canada
2182	VFZ, Goose Bay, NF, Canada
2182	VOM, St. John's, NF, Canada
2182	WAD, Grafton WI

2522	WOX, New York NY
2590	WOX, New York NY
2598	VAR, St. John's, NF, Canada
2598	VCS, Halifax, NS, Canada
2670	NMF, USCG, Boston MA
2670	NMO, USCG, Honolulu HI
3786.1	NRT, USCG, Yokota, Japan
3786.1	NRV, USCG, Guam
3786.1	NRT7, USCG, Yap Island
4040	NPN, USN, Agana, Guam
4087	WJG, Memphis TN
4125	KGW, Galliano LA
4125	WFE, Houston TX
4125	WHG696, Golden Meadow LA
4143.6	KDM, Seattle WA
4143.6	KDN, Seattle WA
4143.6	KEA, Houston TX
4143.6	KIU, Seattle WA
4136.6	KJW, Galliano LA
4143.6	KLX, Houston TX
4143.6	KMH, Golden Meadow LA
4143.6	KQD, Westwego LA
4143.6	KQM, Honolulu HI
4143.6	KWE, Golden Meadow LA
4143.6	KZA, Lafayette LA
4143.6	KZU, Harvey LA
4143.6	KCE386, San Diego CA
4143.6	KGA288, Berwick LA
4143.6	NMA, USCG, Miami FL
4143.6	WDC, Greenville MS
4143.6	WDK, Morgan City LA
4143.6	WQA779, Fort Bragg CA
4143.6	WQB333, Port Angeles CA
4143.6	WQB453, Golden Meadow LA
4143.6	WQX664, Rancho Palos Verde CA
4357.4	KMI, San Francisco CA
4363.6	WOM, Miami FL
4366.7	FFL21, St. Lys, France
4376	NMN, USCG, Portsmouth VA
4385.3	WOO, Ocean Gate NJ
4391.5	WOM, Miami FL
4397.7	WLO, Mobile AL
4403.9	WOO, Ocean Gate NJ
4407	WOM, Miami FL
4419.4	KJY, Houston TX
4419.4	KMB, Houston TX
4419.4	KNG, Seattle WA
4419.4	KYV742, Golden Meadow LA
4419.4	KXR979, Morgan City LA
4419.4	WAK, New Orleans LA
4419.4	WRB742, Galliano LA
4425.6	WOM, Miami FL
4428.7	NMC, USCG, San Francisco CA
4428.7	NMN, USCG, Portsmouth VA
4431.8	JBO, Tokyo, Japan
5320	NMA, USCG, Miami FL
5320	NOK, USCG, Key West FL
5696	NMC, USCG, San Francisco CA
5696	NOY9, USCG, Houston TX
6218.6	KBL, Edmonds WA
6218.6	KBZ, Edmonds WA
6218.6	KDL, Houston TX
6218.6	KHT, Cedar Rapids IA
6218.6	KPL, Seattle WA
6218.6	KUG, Sheffield AL
6218.6	KBE505, Seattle WA
6218.6	KEB202, Seattle WA
6218.6	KIB741, Seattle WA



REPUBLIEK SURINAME



NETHERLANDS ANTILLES



- 6218.6 KUZ452, Astoria OR
- 6218.6 KVV752, Newport CA
- 6218.6 KWS666, Port Hueneme CA
- 6218.6 KXC772, Edmonds WA
- 6218.6 KXQ70, Homer AK
- 6218.6 KYQ607, Houston TX
- 6218.6 KZB683, Seattle WA
- 6218.6 KZK517, Seattle WA
- 6218.6 WCY, Memphis TN
- 6218.6 WRN, Jackson MS
- 6218.6 WQA877, Tacoma WA
- 6218.6 WQX660, San Diego CA
- 6218.6 WQZ293, San Diego CA
- 6218.6 WQZ403, Newport RI
- 6218.6 WQZ461, Curtice OH
- 6218.6 WQZ476, Rosedale MS
- 6218.6 WQZ490, Seattle WA
- 6218.6 WSX733, Seattle WA
- 6218.6 WXZ293, San Diego CA
- 6218.6 WXZ476, Bothell WA
- 6221.6 KEA, Bayou Base LA
- 6221.6 KHS, San Diego CA
- 6221.6 KHT, Cedar Rapids IA
- 6221.6 KHU, San Diego CA
- 6221.6 KIS, Portland OR
- 6221.6 KMB, Houston TX
- 6221.6 KUY, Port Arthur TX
- 6221.6 KBY565, St. Louis MO
- 6221.6 KEA986, Pearlant TX
- 6221.6 KFN540, Port Arthur TX
- 6221.6 KHJ694, Seattle WA
- 6221.6 KPA612, Morgan City LA
- 6221.6 KUC969, Seattle WA
- 6221.6 KZG394, Edmonds WA
- 6221.6 KZK517, Seattle WA
- 6221.6 WBJ, St. Louis MO
- 6221.6 WDJ, Morgan City LA
- 6221.6 WDK, Morgan City LA
- 6221.6 WGM, Rockport LA
- 6221.6 WHS, Miami FL
- 6221.6 WJN, Weehawken, NJ
- 6221.6 WJU, Dravoborg PA
- 6221.6 WJX, Vancouver, WA
- 6221.6 WKC, St. Petersburg FL
- 6221.6 WKE, Houston TX
- 6221.6 WMZ, Fort Lauderdale FL
- 6221.6 WYL, Portland OR
- 6221.6 WSX613, Port Arthur TX
- 6506.4 NMA, USCG, Miami FL
- 6506.4 NMC, USCG, San Francisco CA
- 6506.4 NMF, USCG, Boston MA
- 6506.4 NMG, USCG, New Orleans LA
- 6506.4 NMN, USCG, Portsmouth VA
- 6506.4 NMO, USCG, Honolulu HI
- 6506.4 NOJ, USCG, Kodiak AK
- 6506.4 NRV, USCG, Guam
- 6512.6 LPL, Buenos Aires, Argentina
- 6515.7 WCM, Pittsburgh PA
- 6518.8 NMC, USCG, San Francisco CA
- 6518.8 NMN, USCG, Portsmouth VA
- 6518.8 NOJ, USCG, Kodiak AK
- 6518.8 UFL, Vladivostok, USSR
- 6521.9 KLA, Freeport TX
- 6521.9 KLN, Greenville MS

- 6521.9 KLS, Houston TX
- 6521.9 KLU, Houston TX
- 6521.9 KJA, San Diego CA
- 6521.9 KRV, St. Louis MO
- 6521.9 KRZ, St. Louis MO
- 6521.9 KSG, Houston TX
- 6521.9 KEA995, Aransas Pass TX
- 6521.9 KYJ563, Cutoff LA
- 6521.9 WBK, Pittsburgh PA
- 6521.9 WEC, Norfolk VA
- 6521.9 WFA, Tampa FL
- 6521.9 WFE, Houston TX
- 6521.9 WGZ, Natchez MS
- 6521.9 WMB, Houston TX
- 6521.9 WRV423, Houston TX
- 7836.6 NRT, USCG, Yokota, Japan
- 7836.6 NRV6, USCG, Marcus Island
- 7836.6 NRV7, USCG, Yap Island
- 8213.6 WCM, Pittsburgh PA
- 8291.1 KCQ, Galveston TX
- 8291.1 KDJ, Houston TX
- 8291.1 KDK, Houston TX
- 8291.1 KGN, Delcambrie LA
- 8291.1 KIZ, Charleston WV
- 8291.1 KUR, Port Arthur TX
- 8291.1 KBK495, Tampa FL
- 8291.1 KBN87, Seward AK
- 8291.1 KUS653, Cedar Rapids IA
- 8291.1 WNW, Pascagoula MS
- 8291.1 WPE, Jacksonville FL
- 8291.1 WQB353, Erath LA
- 8294.2 KKP, Seattle WA
- 8294.2 KRM, Port Arthur TX
- 8294.2 KZU, Harvey LA
- 8294.2 KAE728, Honolulu HI
- 8294.2 KMD304, Bayou Vista LA
- 8294.2 KPB659, Lafayette LA
- 8294.2 KZG394, Edmonds WA
- 8294.2 WJK, Miami FL
- 8294.2 WWY, Houston TX
- 8294.2 WQB581, Luling LA
- 8294.2 WRD691, Scott LA
- 8645 WWD, La Jolla CA
- 8722 WOM, Miami FL
- 8728.2 KMI, San Francisco CA
- 8731.3 WOM, Miami FL
- 8737.5 VAI, Vancouver, BC, Canada
- 8740.6 SAG, Goteborg, Sweden
- 8746.8 WOM, Miami FL
- 8753 JBO, Tokyo, Japan
- 8759.2 KMI, San Francisco CA
- 8759.2 LPL, Buenos Aires, Argentina
- 8759.2 SVN4, Athens, Greece
- 8759.2 WOM, Miami FL

- 8762.3 WOO, Ocean Gate NJ
- 8765.4 NMG, USCG, New Orleans LA
- 8765.4 NMN, USCG, Portsmouth VA
- 8765.4 NMO, USCG, Honolulu HI
- 8765.4 NOQ, USCG, Mobile AL
- 8771.6 LPW97, Bahia Blanca, Argentina
- 8777.8 JBO, Tokyo, Japan
- 8808.8 FFL41, St. Lys, France
- 8808.8 WLO, Mobile AL
- 8811.9 WOM, Miami FL
- 8984 NMG, USCG, New Orleans, LA
- 12429.2 KLM, Seattle WA
- 12429.2 KZY, Lafayette LA
- 12429.2 KZR416, Pensacola FL
- 12429.2 KZU452, Astoria OR
- 12429.2 KZK77, Seattle WA
- 12429.2 WJN, Weehawken NJ
- 12429.2 WAC656, San Diego CA
- 12429.2 WHG5.6, Seattle WA
- 12429.2 WQX715, Corpus Christi TX
- 12432.3 KUZ, Ilwasco WA
- 12432.3 KMC955, Seattle WA
- 12432.3 KUZ523, Miami FL
- 12432.3 WFE739, Seattle WA
- 12435.4 KBB551, Coral Gables FL
- 12435.4 KYV265, Miami FL
- 12435.4 WMP, West Palm Beach FL
- 13100.8 GTK51, Portishead, England
- 13100.8 KMI, San Francisco CA
- 13100.8 UAT, Moscow, USSR
- 13103.9 GKT52, Portishead, England
- 13107 VIS, Sydney, Australia
- 13107 WOO, Ocean Gate NJ
- 13113.2 JBO, Tokyo, Japan
- 13113.2 NMC, USCG, San Francisco CA
- 13113.2 NMN, USCG, Portsmouth VA
- 13113.2 NMO, USCG, Honolulu HI
- 13113.2 NRV, USCG, Agana, Guam
- 13116.3 WOM, Miami FL
- 13119.4 JBO, Tokyo, Japan
- 13122.5 EHY, Pozuelo del Rey, Spain
- 13122.5 WOM, Miami FL
- 13122.5 5BA54, Nicosia, Cyprus
- 13125.6 WOM, Miami FL
- 13128.7 WOO, Ocean Gate NJ
- 13144.2 WOM, Miami FL
- 13147.3 SPC61, Gdynia, Poland
- 13147.3 9VG66, Singapore
- 13150.4 UFL, Vladivostok, USSR
- 13153.5 JBO, Tokyo, Japan
- 13156.6 SAG, Goteborg, Sweden
- 13162.8 LPL, Buenos Aires, Argentina
- 13162.8 PJC, Curacao, Netherlands Antilles
- 13165.9 FFL64, St. Lys, France
- 13169 WOM, Miami FL
- 13172.1 GKV54, Portishead, England
- 13175.2 EHY, Pozuelo del Rey, Spain
- 13175.2 LFL, Rogaland, Norway
- 13178.3 VIP, Perth, Australia
- 13184.5 WOO, Ocean Gate NJ
- 13187.6 FFL62, St. Lys, France
- 13193.8 FFL63, St. Lys, France
- 13193.8 LFL45, Rogaland, Norway
- 16587.1 KHT, Cedar Rapids IA

16587.1 KMC981, Seattle WA
 16587.1 WHD567, Houston TX
 16593.3 WDZ258, Seattle WA
 17232.9 LPL5, Buenos Aires, Argentina
 17232.9 WOM, Miami FL
 17236 GKT62, Portishead, England
 17239.1 KMI, San Francisco CA
 17242.2 FFL83, St. Lys, France
 17257.7 WOM, Miami FL
 17260.8 WOM, Miami FL
 17263.9 WOM, Miami FL
 17267 KVFH, Norfolk VA
 17270.1 OSU63, Ostende, Belgium
 17276.3 CUL37, Lisbon, Portugal
 17276.3 HEB27, Berne, Switzerland
 17285.5 4XO, Haifa, Israel
 17285.6 VRT, Bermuda
 17291.8 WOO, Ocean Gate NJ
 17304.2 KMI, San Francisco CA
 17307.3 NMC, USCG, San Francisco CA
 17307.3 NMO, USCG, Honolulu HI
 17316.6 FFL81, St. Lys, France
 17325.9 HEB37, Berne, Switzerland
 17329 JBO, Tokyo, Japan
 22124 KGP, Seattle WA
 22133.3 KUX, San Diego CA
 22124 NMQ, USCG, Long Beach CA
 22605.3 LPL21, Buenos Aires, Argentina
 22614.6 UAT, Moscow, USSR
 22623.9 WOO, Ocean Gate NJ
 22627 IAR, Rome, Italy
 22629.4 IAR, Rome, Italy
 22636.3 HEB52, Berne, Switzerland
 22639.4 WOM, Miami FL
 22651.8 SPO91, Szczecin, Poland
 22676.6 WLO, Mobile AL
 22692.1 PCG94, Scheveningen, Netherlands
 22704.5 JBO, Tokyo, Japan
 22704.5 KMI, San Francisco CA
 22704.5 WOO, Ocean Gate NJ
 22706.6 WLO, Mobile AL
 22710.7 PPR, Rio de Janeiro, Brazil

Featured Frequencies

Many of you know that 2182 kHz is an international marine distress frequency. But have you ever tuned to 8364 kHz? That's the frequency allocated internationally for CW transmissions from lifeboats and other survival craft.

Are any of you hearing the "3/2" or "2/3" numbers stations lately? These are the numbers stations that transmit numbers in blocks of five digits but with a brief pause between the third and fourth or second and third digits of each block. After a flurry of such stations in the first half of 1983, reports of them have dropped off since then (I haven't been hearing any). How about the rest of you? Report any you might hear to Communications Confidential.

Listening Reports

Here are this month's listening reports. Some of them have been contributed by members of the American Shortwave Listeners Club (ASWLC, 16182 Ballard Lane, Huntington Beach, CA 92649) and the Association of Clandestine Radio Enthusiasts (ACE, P.O. Box 13225, D.T. Station, Minneapolis, MN 55414). If you're seriously interested in the topics covered in this column each month, you should seriously consider joining both ASWLC and ACE. Send them



\$1.00 for a sample bulletin and membership details; be sure to tell both that POP'COMM and Communications Confidential sent you!

We'd like to see your reports here as well. Please submit them in the form you see here, including time in GMT, frequency, and enough details to make your report useful to other readers of this column. For example, don't simply report "CW marker" or "Spanish numbers station." Tell us the type of marker (CQ, V, etc.), how many digits were in each number group, the sex of the announcer, etc. Send your reports to Harry Helms, P.O. Box 157, Rockefeller Center Station, New York, NY 10185.

And now this month's listening reports . . .

- 254:** CCZ, Pittsburgh, PA, aviation weather 1420 (George Zeller, OH/ASWLC)
376: ZIN, Great Inagua, Bahamas, radiobeacon at 0422. (Kneitel, NY)
391: DDP, San Juan, PR, radiobeacon at 0303. (Kneitel, NY)
396: ZZB, Bimini, Bahamas, radiobeacon at 0437. (Kneitel, NY)
418: WSL, Amagansett, NY, with frequency list in CW 1700. (Jim Pinfield, NH)
1715: SIS, Puerto Asis, Colombia, radiobeacon at 0512. (Kneitel, NY)
2670: NMA, U.S. Coast Guard, Miami, FL, overdue vessel broadcast in SSB 0400. (Tom Lewandowski, NY)
2683: NOQ, U.S. Coast Guard, Mobile, AL, working ships in SSB 0954. (Spence Naylor, CA/ASWLC)
2716: NAM, U.S. Navy, Norfolk, VA, working USS Kidd in SSB 1300. (Tom Lewandowski, NY)
2863: Aukland, New Zealand, VOLMET b/c in USB at 1122. (Kneitel, NY)
3646: Numbers in Spanish read by man very rapidly 0210, was parallel to 7397 kHz. (George Zeller, OH/ACE) As reported two columns ago, we now have a new type of numbers station—one consisting of random numbers read rapidly by a man. (Editor)
4098: Five-digit Spanish numbers station with female announcer 0200. (Alan Berger, PA) Welcome Alan! (Editor)
4251.6: GKC2, Portishead, England, V marker in CW 0350. (Tom Lewandowski, NY)
5016: Five-digit German numbers station with female announcer 0033, was in SSB and opened with musical tones and "Papa November." (George Osier, NY)
5692: Five-digit Spanish numbers station with female announcer 0629. (Ken Kimwa, NY) Ken notes that this is an active U.S. Coast Guard and U.S. Navy frequency, and that another active USCG channel, 5320 kHz, is also often used for numbers transmissions. Could USCG/USN transmitters be used for some numbers messages? (Editor)
5696: This is an active frequency for U.S. Coast Guard stations. Among those heard from 0240 to 0400 are NMC, San Francisco, CA, and NMN, Portsmouth, VA. (Tom Lewandowski, NY)
5921: Five-digit Spanish numbers station with female announcer 1005. (George Osier, NY)
6050: Unidentified CW signals 1200 and 1345, very strong signals. (George Osier, NY) In last month's column, George Zeller of Ohio reported an unidentified "VR30" on 6100 kHz at 1200: perhaps the same or a similar station? (Editor)
6223: Five-digit Spanish numbers station with female announcer 2340, voice was very distorted. (George Osier, NY)

ROYAL NAVAL WIRELESS STATION MAURITIUS

Thank you for your report of receiving Mauritius Wireless which is confirmed. The details of our transmissions are:

Date and Time: 5 JAN 70 @ 1350^z Frequency: 8627^z kHz

Type of Aerial: 2A Dipole Power Output: 6 kW

Modulation: A1

Remarks: Many thanks for your report on 13s and good DX.

Signed: A. Ingham

Chief Radio Officer

- 6478:** SVA, Athens, Greece. "DE SVA" marker in CW 2226. (Don Schimmel, VA)
6578: Five-digit Spanish numbers station with female announcer 0530. (Ken Kimwa, NY)
6698: "Delta Seven Mike" calling "Eight Juliett Zulu" in SSB 0500 exchanging coded messages. (Les Robison, NV) Military traffic of some sort. (Editor)
6722: Five-digit Spanish numbers station with female announcer 0610: strong signals with absolutely no fading (ground wave propagation?). Noted about once a week on this frequency and sometimes RTTY is heard on this channel as well. (Ken Kimwa, NY) If there is no fading or other variation in signal strength, then the propagation would have to be ground or space wave and the transmitter would have to be located within a few miles of your location. (Editor)
6748: Five-digit Spanish numbers station with female announcer 0719, strong signals with only slight fading. (Ken Kimwa, NY)
6768: Five-digit Spanish numbers station with female announcer 0700: strong signals but "fuzzy" audio. In the background, news in English could be heard! (Ken Kimwa, NY) Ken, could you identify the source of the news (VOA, BBC, CBS, etc.)? That could be an important clue in solving this mystery. (Editor)
6802: Four-digit Spanish numbers station with female announcer 0500. (Les Robison, NV)
6886: Five-digit Spanish numbers stations here around 0600-0630 several nights, usually with female announcer but noted once with male announcer in same format. (Lani Pettit, IA/ACE)
7528: Five-digit Spanish numbers station with female announcer 0400. (Les Robison, NV)
7540: Female reading coded message in a style similar to a "Foxtrot" message (but this wasn't one) at 0408, all I've previously heard on this channel was a "Victor Lima Bravo Two" marker and the announcers sounded similar. (George Osier, NY) A very interesting and significant logging. George! (Editor)
7605: "Victor Lima Bravo Two" repeated by female announcer 0145. (George Osier, NY)
7675: "DE K-R" repeated continuously in CW 0345. This frequency is one of those listed for Cape Canaveral. (Tom Lewandowski, NY) Very interesting! (Editor)
8221: Arabic number groups 1833 (Charles Keilholz, APO NY/ASWLC)
8419: Four-digit Spanish numbers station with female announcer 0625. (Les Robison, NV)
8568.3: XFM, Manzanillo, Mexico, calling CQ in CW at 0157. (Kneitel, NY)
8745: KMI, Oakland, CA, handling phone patch traffic from merchant vessel 0305. (G.J. Harris, WA)
8777.9: "Lima One Victor" working "Lima One Mike" in SSB 0227. (John Tomaszewicz, NE)
9027: Five-digit numbers read by man in English with European accent, USB at 0234. (Kneitel, NY)
9074: Four-digit Spanish numbers station with female announcer 2330. (George Osier, NY) A popular frequency for four-digit activity—and, if we are to believe the Nicaraguans, a frequency operated by the CIA. (Editor) 0400, a female announcer kept repeating the number "uno" over and over! She went at it fast and furious for the next fifteen minutes! Was parallel to 11532 kHz. (Bryan Lowe, WA) Obviously some technical difficulties at the numbers station studios . . . or else a very short message that night! (Editor)
9265: Five-digit German numbers station with female announcer 0113, sounds like a different announcer. (George Osier, NY)
9325: Five-digit German numbers station with female announcer 0416: was in SSB. Powerful signals, transmission closed with a two second long pause. (George Osier, NY)
9918: Five-digit Spanish numbers station with male announcer 1023: extremely strong signal, meter was

S9 + 60 dB! (George Osier, NY) Such a signal would have to be local in origin. (Editor)

10107: RIW, Khiva, Uzbek SSR, calling Soviet ship in CW 0333; this frequency is in new 30 meter ham band and RIW was called by an American ham station. RIW replied, "DWQ DWQ 163826 18QDW 16272 18382 15382 R AR" (Tad Cook, WA/ACE) The question here is whether RIW deliberately sent gibberish to discourage the American ham from attempting to contact it or if RIW thought the American ham was a legitimate contact! (Editor)

10466: Rapid two-way exchange of five-digit number groups in Spanish 0400; male operators and in SSB. (Les Robison, NV) This channel is well within range of new amateur transceivers with 30 meter coverage. (Editor)

10710: Five-digit German numbers station with female announcer 0345. (Tom Lewandowski, NY)

11108: Five-digit German numbers station with female announcer 0600 in SSB; used "Papa November" identifier. (Ken Kimwa, NY)

11118: Air Force One in contact with AFA, Andrews AFB, in SSB 1500. (Ken Eichman, OH)

11238: Five-digit German numbers station with female announcer 1900. (Ken Kimwa, NY)

11249: Air Force Two in contact with Andrews AFB (AFA) in SSB 2000. (Tom Lewandowski, NY)

11269: "J7K," "C4E," "4MH," and "Y8N" passing traffic using phonetics at 1430. (Gary Bledsoe, FL) These are likely military traffic of some sort. (Editor)

11533: Four-digit Spanish numbers station with female announcer 2011; was in SSB. Also noted in AM 0126 in parallel to 9074 kHz. (George Osier, NY)

11620: Five-digit German numbers station with female announcer 2102; was in SSB. Opened with musical tones and "Bravo Juliet." (George Osier, NY) This marks another month in which George has contributed many excellent loggings. On behalf of all POP/COMM readers, many thanks George! (Editor)

12290: Radio Australia feeder running USB at 2030, playing "Waltzing Matilda" as a marker. (Kneitel, NY)

12491: LZW, Varna, Bulgaria, CW marker at 0023. (Gary Bledsoe, FL)

12716.9: ZLO5, Iirangi Naval Radio, New Zealand, running CW marker at 2050. (Kneitel, NY)

12738: PPR, Rio Radio Brazil, calling CQ in CQ at 2056. (Kneitel, NY)

12743: NRV, U.S. Navy, Guam, CW marker at 1409. (Gary Bledsoe, FL)

12754: PW233, Brazilian Navy, Rio, CW marker at 2103. (Kneitel, NY)

12781: YUR, Rijeka, Yugoslavia, CW marker at 0023. (Gary Bledsoe, FL)

12874: HPN60, Canal Radio, Panama, CQ marker in CW 0330. (G.J. Harris, WA)

13012: AQP2, Karachi, Pakistan, CW marker 2314. (Gary Bledsoe, FL)

13043: FUV, French Navy, Djibouti, Afars & Issas, CW marker 0000. (Gary Bledsoe, FL)

13068: TFA, Reykjavik, Iceland, CW marker 1945. (Gary Bledsoe, FL)

13201: SAC "Skyking" broadcast in SSB to aircraft aloft 0420. (Les Robison, NV)

13215: AFA, Andrews AFB, in contact with SAM683 2325; many references to "the Secretary," this was when Defense Secretary Weinberger was en route to El Salvador. (Les Robison, NV) "SAM" stands for "special air mission," meaning a flight with government VIPs on board. (Editor)

13235.5: HWN, Houilles, France, V marker in CW 2200. (Tom Lewandowski, NY) Tom is another regular

contributor to this column; it is much appreciated Tom! (Editor)

13414: Two and three letter CW groups 2111; no calls heard. (Don Schimmel, VA)

13428: Five-digit Spanish numbers station with female announcer 2135. (Don Schimmel, VA)

13436: Y7L36, East German Embassy, Havana, Cuba. "Y7L36 QAP QEG 36" CW marker 2031, then into RTTY. (Don Schimmel, VA)

13452: Four-digit Spanish numbers station with female announcer 0630; was parallel to 11532 kHz. (Les Robison, NV)

13469: 8PO, Barbados. "DE 8PO" CW marker 2025. (Don Schimmel, VA)

13483: Five-figure CW groups 0109, used letters, numbers 2, 3, and 8 plus Spanish character "MW" (nyeh). (Don Schimmel, VA)

13490: Five-letter groups in CW 1332, probably Soviet in origin since characters IM, OE, OT, and AA used. (Don Schimmel, VA)

13499: "07A QSV K PSE QSY 73" in CW 0203. (Don Schimmel, VA)

13503: "U2K QSV K QSY 71" in CW 2140. (Don Schimmel, VA)

14901: CLN451, Havana, Cuba, La Prensa Latina news station running RTTY "foxes" at 2058, 425/66R. (Kneitel, NY)

15048: "970 ANDY" U.S. mil aircraft working unid, ground station on LSB at 2102. Made frequent mention of switching over to FM and spoke of the following UHF frequencies: 295.05, also 295.075-transmit paired with 299.55-receive. Mentioned ground station with ID "Brandywine." (Kneitel, NY)

15664.3: AFP news in Spanish via RTTY (425/67R) at 1929. (Kneitel, NY)

15693.5: ISX56, Rome, Italy, ANSA news in English, RTTY (425/67N) at 1935. (Kneitel, NY)

16108.8: FZF61, Ft. de France, Martinique, news in French via RTTY (425/67N) at 1933. (Kneitel, NY)

16965.2: SVI, Athens Radio, Greece, CW marker at 1507. (Kneitel, NY)

16927.8: OFJ, Helsinki, Finland, CW marker at 1502. (Kneitel, NY)

16961.5: FUF, Ft. de France, Martinique, French Navy in CW sending VVV at 1506. (Kneitel, NY)

16981.6: SVG, Athens Radio, Greece, call marker in CW at 1508. (Kneitel, NY)

17021: TAH, Istanbul, Turkey, calling CQ in CW at 1511. (Kneitel, NY)

17180: HWN, Paris (Navy) France, V's in CW at 1518. (Kneitel, NY)

17045: ROT, Moscow, USSR, traffic list in CW 1301. (Gary Bledsoe, FL)

17203: A9M, Bahrain, "DE A9M" repeated in CW 0134. (Gary Bledsoe, FL)

17205: HEC, Berne, Switzerland in CW at 1523. "QRV" followed by data burst. (Kneitel, NY)

17426: KKN44, U.S. Embassy, Monrovia, Liberia, "QRA/QSX" CW marker 2358. (Brent Levit, TX/ASWLC)

18210: Five-digit Spanish numbers station with male announcer 1510. (Fred Roberts, OH/ACE)

18669.3: FTS67/H1, Paris, France, AFP news in RTTY, English 425/67N at 1539. (Kneitel, NY)

18995: SOT29, Warsaw, Poland, Sending news in Polish via CW at 1547. (Kneitel, NY)

19950: VPC, Port Stanley, Falkland Islands, overseas telephone traffic in SSB 1830. (Charles Keilholz, APO NY/ASWLC)

22480: 9VG2, Singapore, CW marker 1540. (Gary Bledsoe, FL)



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5G 11/79

NEW AND EXCITING TELEPHONE TECHNOLOGY

Only The Name Has Changed

January 1st spelled a new era for the Bell Telephone Company. The Federal Communications Commission has split up Bell and has accepted their plan for a new reorganization of the company called "AT&T." Although the name has been changed, much of the existing telephone marketing by AT&T will continue.

No longer will you go down to your local Bell Phone Center; now you'll go over to the AT&T Phone Centers and AT&T Phone Booths. They will still have the same brands of equipment, but the logo will no longer be the telephone, but rather the new AT&T grid-lined globe logo.

You are still allowed to either rent or buy your telephone equipment. If you operate a large company, you might even lease it. There is no plan to do away with the monthly rental charge; however, house calls are no longer free. If your rented telephone should die, you will need to take it into an AT&T Service Center for repair. House calls will cost you.

If you opt to purchase your own AT&T telephone equipment, it will be covered for a year if it is new. Rebuilt telephones have a 90-day free repair policy.

There is still no problem in installing your own privately purchased equipment. Just make sure that your privately purchased telephone setup bears FCC credentials—usually an acceptance number printed or stamped on the base of the unit. Almost everything sold these days will have that FCC okay on it. Some European phones don't, so watch out when you try and hook up European phones on local telephone systems.

Here's good news. You can expect telephone rates to lower. You can also expect some fierce competition from those other long distance telephone networks vying for your business. Choose the system that gives you your best value. You should also demand that your long distance, coast-to-coast phone calls go through quickly and clearly, without echo. Nothing disturbs me more than to place an expensive, long distance call and hear everything in a one-second echo. It makes interrupting impossible, and half the time both parties talk at the same time. It's hard to believe that with the modern-day communication system, we can't get crystal clear phone calls without that annoying, one-second echo delay.

I don't see much change in telephone equipment prices this year. Cordless phones that sell below \$99 can't go much lower for anyone to make a profit in selling them. Same thing with the \$10 all-in-one telephone handset; there's not much room for any further price drop.



A phone doubles as an intercom/security system.



Phones that do more than ring.

What you can expect are more innovations to be built into your standard telephone equipment. As long as the keyboard is there, they now offer you a calculator as well. Liquid crystal displays (LCD) may soon be replacing the dull, fuzzy LED displays. Have you ever tried to read an LED display in the sunlight? LCD may soon be found on all digital-type readouts.

More and more places will sell telephones this year. I wouldn't be surprised to find blister-packed cordless phones and regular phones in supermarkets and drug stores. I think a \$50 cordless telephone is about the lowest priced phone you will ever see. Although the channels are filled with cordless users, more and more folks are finding that a cordless phone is all but indispensable around the house.

Your home phone is also going to control more than a conversation; it might be hooked into a computer, a security system that controls the lights in the house, and may even act as a timer to turn on your oven. There are a lot of electronics that can be built

inside the common telephone to offer more than intercommunications to another phone line. Instead of looking for a new telephone by price, consider looking for features. It costs very little to add more features into a quality telephone setup. If you're looking for a telephone and an answering machine, consider a setup that has both built in. You will find that the answering machine can also double as a dictating machine, too. It's also possible that the answering machine might automatically transfer calls to another number. Instead of littering your desk with three different telephone apparatuses such as the regular phone, a 60-memory dialer, and a telephone answering machine, plus a dictating machine—why not consider a setup with everything built into one nice and neat compact package.

This year expect the voice synthesizer to become an important part of your phone setup. Instead of ringing, your new phone might simply announce, "Phone call." As you punch out the numbers, instead of beeps, you get a tiny voice saying the numbers. They are even coming out with voice-synthesized instructions on how to hook up your new telephone setup. "Plug in the power cord, "Unplug the telephone cord," "Plug the red wire into the green jack," and things like this might be common on your next phone installation.

The phones will also become much simpler to use. Let's face it, no one likes to admit that the keyboard gadget on their desk is smarter than the operator!

When looking for a new telephone, make sure that it will generate tones for dialing numbers, not pulses. The old pulse-dialing systems are out. The new long distance phone companies can't accept pulses. If

T Tone

 Cordless

P Pulse

 Adjustable Ringer

 Last number redial

 Ringer ON/OFF

 Memory

 Hold/Mute

This is the Sharper Image® Dictionary of phone features.

your new machine only generates pulses, not specific dial-tones, chances are you won't be able to make that quick phone call.

One of the best guides for telephone equipment is the new *The Sharper Image® Phone Book™*. This 31-page book gives all the latest on telephone equipment, and issues distinct logos beside each piece of equipment to denote the features. You can quickly scan the logos to see whether or not it's cordless, has an adjustable ringer, whether it has a hold circuit, memory circuit, last-number-redial circuit, or generates tones or pulses. Congratulations, Sharper Image®. You have simplified the phone buying process and we hope that others will

soon standardize on the same logos that call out the features. Somebody was really thinking when they came up with this catalog (Sharper Image, 680 Davis Street, San Francisco, California 94111).

There is still no word from the FCC on when it will release those new channels for telephones. Until then, don't be surprised if you should hear funny sounds come out of your cordless telephone base station box when your neighbor starts dialing up a telephone number on his equipment. Your only solution is to change channels, and there are only five possibilities. Just make sure that whoever sells the phones will cheerfully issue you replacement units on different

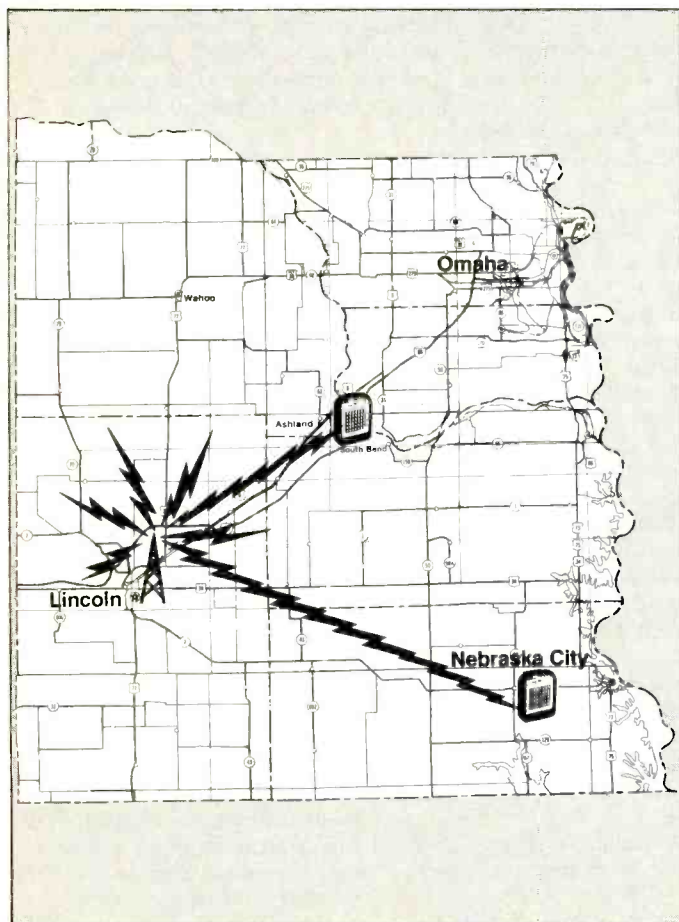
channels if you encounter neighborhood interference. Gadgets that extend the range of your cordless phone will also give you a greater chance of picking up interference, too. By the way, those remote antennas and power-cord extender circuits only increase range by about 20 percent; there is no way that today's cordless telephone is going to go beyond 1000 feet. The power output is so small from the base unit and the portable handset that radio frequencies simply "fade out" at 1000 feet. (Signal strength diminishes proportionately with the square of the distance.)

If you really need longer than cordless range, you might consider commercial radio telephone service on the new cellular telephone systems. Although the service and rental equipment might run over \$100 a month, you can place crystal clear phone calls and receive phone calls from your car radio telephone system.

Many cities offer cellular telephone service; and if you have the bucks, it's the only way to go for long-range communications from car or from UHF/FM hand-held telephone transceivers. Look under "Radio Telephones" in the Yellow Pages for more information.

Still no word as to when the FCC may release frequencies at 900 MHz for an extended cordless telephone service suggested by General Electric. We're still waiting!

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SCANNER SCENE

BY CHUCK GYSI, N2DUP

MONITORING THE 30 TO 512 MHz "ACTION" BANDS

With the genesis of all of the new scanners on the market now that are capable of monitoring any VHF or UHF frequency, we thought we would take a look this month at what you might be able to hear between the bands you are already familiar with.

What we've done is taken a look at allocation charts and tables for the United States and have drawn several conclusions about what you generally will hear between several bands of frequencies. Also, because of the interest in the 800 MHz metropolitan land mobile band, we've also included a detailed breakdown on how the band is being used at present. However, because of the growing need for radio communications, it's very possible that some of the allocations will be subject to change. In any event, let's take a look at what you can hear between 25 and 1400 MHz.

25.02 - 25.32: The frequencies are used by petroleum companies and for oil spill cleanups.

25.87 - 26.47: These frequencies can be used for relaying remote broadcasts. However, the only place we know them to be in use is in the Los Angeles area.

26.62: The Civil Air Patrol still uses this frequency in some areas.

26.965 - 27.405: This is the 11-meter band, also known as citizens band. With the exception of a few radio control channels thrown in, channels are spaced 10 kHz apart. You'll still find several businesses and even municipal governments using CB, especially in rural areas. In fact, many police departments are using CB as a backup when they don't want communications going out over their regular VHF/UHF radio channels. As the fad has died, it's worth keeping an occasional ear on this band.

27.43 - 27.53: Here the remaining 27 MHz business band channels of what were several more a few years ago. You'll still find plenty of business activity on these channels. Some townwatch units also are using these frequencies in some cities.

27.54 - 28.00: There's still plenty of bootleg CBers around and they operate primarily in this band. Most communications are via "skip" (long distance) and a good deal is single sideband, which you won't be able to hear on AM on the new scanners.

28.00 - 29.70: This is the 10-meter ham band, which has been gaining in popularity in the past few years. In addition to SSB, there's plenty of AM and FM activity to hear. There also is a growing number of FM repeaters operating on the upper end of the band.

29.70 - 30.00: Government and non-government fixed systems are here.

30.00 - 50.00: This is the VHF low band that all scanners already cover.

50.00 - 54.00: The 6-meter amateur band here seems to have lost a bit of popularity over the years, but as the 2-meter and



A businessman uses a cellular mobile telephone to make a telephone call from his car. Cellular phone calls can be heard on the 870-890 MHz band on new scanners.

even 440 MHz bands become more crowded, more activity is sure to appear here. On the lower end of the band, most activity is Morse code and SSB, but there are several FM repeaters operating on the band and there are still some AM users on the band.

54.00 - 72.00: These are the band of frequencies used for TV channels 2, 3, and 4. Both the audio and video portions are in this band. TV audio is FM, whereas TV video essentially is AM.

72.00 - 73.00: This band is used mainly for fixed stations.

73.00 - 74.60: This band is used for link stations to relay receiver site communications to the transmitter site.

74.60 - 75.40: Marker beacons can be found here. They are used for aviation radionavigation.

75.40 - 76.00: This band is also used for fixed stations to transmit from site to site.

76.00 - 88.00: TV channels 5 and 6 use this band for video and audio.

88.00 - 108.00: The popular FM broadcast band uses these frequencies, in case you didn't recognize them. That's right. You'll be able to hear FM broadcast stations on some of the new scanners. The band between 88 and 92 MHz is used for educational and community radio stations, which generally operate at lower power than the commercial outlets. If you live near a major city, don't be surprised to find a pirate station operating illegally in this band as well.

108.00 - 118.00: This band is used for aviation radionavigation and VOR stations can be heard here.

118.00 - 136.00: These frequencies are used for routine aviation communications and enroute communications. The upper end of the band is used for airline company communications. All aviation communications employ AM.

136.00 - 138.00: These frequencies are used for the downlinks of space research satellites.

138.00 - 144.00: The U.S. government uses this band primarily for military com-

munications. On the lower end of the band, you might hear some AM activity by military aircraft, although most of the band is FM.

144.00 - 148.00: This is the popular 2-meter amateur band. There's some SSB, Morse code, and AM activity on the lower end of the band, but most activity is FM.

148.00 - 150.800: This band is used by the federal government and while a good portion of it is used by the military, there are some satellite downlinks on the upper end of the band.

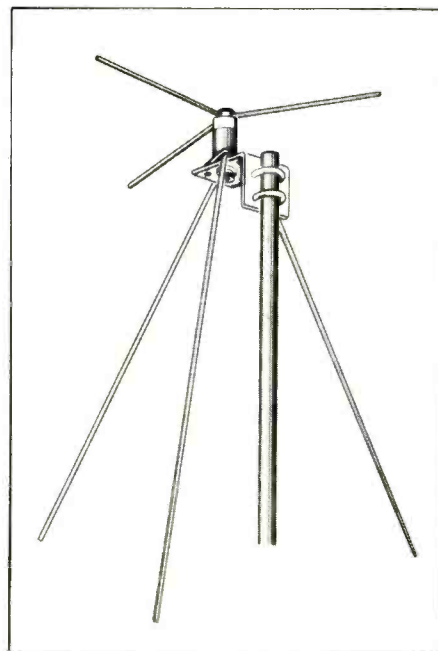
150.80 - 174.00: If you don't recognize this band, perhaps we ought to reacquaint you with your scanner.

174.00 - 216.00: TV channels 7 through 13 use this band for video and audio. There have been reports of federal agencies experimenting with using the band for two-way radio communications.

216.00 - 220.00: There's non-government telemetry and radar operating here.

220.00 - 225.00: Once almost doomed to be shared with a new CB service, these frequencies remain in the domain of the 1/4-meter amateur band. Many of us hams (yes, including myself) have found this to be a good band to get away from eavesdroppers, but the new scanners may change that!

225.00 - 328.60: Here's a band worth checking out with some of the new scanners. Military aircraft and towers operate on these frequencies and most major airports are also capable of communicating with mili-



A Discone antenna made by Hustler or the Discan antenna, pictured, made by Antenna Specialists, is a good antenna to listen in to the new bands on newer scanners. The Discan antenna is good for monitoring frequencies from 25 to 512 MHz.



Because some of the new scanners can receive as low as 25 MHz, you'll be able to keep an ear on 27.065 MHz—also known as CB Channel 9—to know when REACT monitors are answering emergency calls. REACT groups also operate repeaters on 462.675 MHz throughout the nation.

tary planes on these frequencies. The frequency 243.0 is the emergency distress frequency for military aircraft and AM is used in this band.

328.60-335.40: This chunk of spectrum is used for aviation instrument landing system glidescope.

335.40-400.00: Military aircraft share this band with some satellites.

400.00-406.00: There's a real hodgepodge on this band. You'll find meteorological aids, radionavigation, satellites, and radio astronomy. More specifically, space research satellites operate from 400.15 to 401 MHz and earth exploration satellites operate from 401-403.

406.00-406.10: This tiny band is used for meteorological satellites.

406.10-410.00: This band is used by the federal government for two-way radio communications, and radio astronomy.

410.00-420.00: Used by the federal government, the band includes two-way use and also links from receiver sites to transmitter sites.

420.00-450.00: This is the 3/4-meter ham band. FM and repeater operations primarily are on 440-450 MHz. The 420-440 band is used for experimental use, repeater links, satellite use, etc.

450.00-512.00: You know what you can hear in this band, but don't forget the audio and video for TV channels 14-20 also uses the 470-512 MHz band.

512.00-806.00: TV channels 21 to 69 use this band for audio and video.

806.00-881.00: Because land mobile operations share this band now with TV channels 70 to 83, we also are including a breakdown of this band as follows:

806.00-825.00: Inputs for repeater and trunked systems operating in the 851-866 MHz band are located here, 45 MHz lower than the output. These systems include business, municipal, and other radio services.

825.00-835.00: These frequencies are used as the inputs for cellular mobile telephone systems operated by radio common carrier companies. The cellular transmitters

operate on the 870-880 MHz band.

835.00-845.00: These are the frequencies used as inputs for telephone company cellular telephone systems that operate on the 880-890 MHz band.

845.00-851.00: Although not allocated at the present time, expect to see action here in the near future. This band is used as inputs for the 890-896 MHz band.

851.00-870.00: These frequencies are the outputs for repeater and trunked systems operating with inputs on the 806-825 MHz band. The lower end of the band is used for community repeaters, while the middle of the band seems to be used for municipal systems and the upper end is used for trunked systems.

870.00-880.00: Here you'll find the cellular transmitters used by radio common carriers providing cellular mobile telephone service. The inputs are 825-835 MHz.

880.00-890.00: The cells in cellular mobile telephone systems operated by telephone companies operate in this band. The inputs are 835-845 MHz.

890.00-896.00: This 6 MHz chunk is not allocated right now, but with the need for spectrum growing, expect activity here soon. The inputs are 845-851 MHz.

896.00-898.00: These frequencies proposed to be used by aircraft in communicating with ground stations on the 941-943 MHz band for mobile telephone calls.

898.00-902.00: This band has been proposed to be used as a personal radio service by General Electric. These frequencies would be used as inputs for the 937-941 MHz band.

902.00-928.00: This band is used for some radar and also is allocated for government fixed and mobile systems.

928.00-929.00: Fixed stations operate on this band.

929.00-930.00: Paging stations operated by private licensees operate here.

930.00-931.00: This 1 MHz band is reserved for future paging use.

931.00-932.00: Radio common carriers use this band for paging transmitters.

932.00-935.00: Both government and non-government fixed stations can operate in this band. The band is paired with frequencies in the 943-946 MHz band.

935.00-937.00: This band is reserved for future use.

937.00-941.00: These are the output frequencies that have been proposed for a private radio communications service by General Electric. The inputs are in the 898-902 MHz band.

941.00-943.00: This is the band proposed to be used by ground stations providing mobile telephone service for aircraft operating in the 896-898 MHz band.

943.00-946.00: Paired with the 932-935 MHz band, fixed stations can be operated here in both government and non-government systems.

946.00-947.00: This band is another reserved for future use.

947.00-952.00: Broadcast radio stations use this band for relaying their programming from their studios to their transmitter sites.

952.00-960.00: Fixed stations in the private radio services can use this band for microwave service.

960.00-1215.00: Now we're talking about *GigaHertz!* This band is used for aviation radionavigation. In fact, 1030 and 1090 MHz (yup, that's 1.03 and 1.09 GHz) are used for air traffic control radar beacons.

1215.00-1300.00: This band is expected to see a lot more activity in the next five years. It is allocated to the amateur radio service and most activity up here until recently has pretty much been experimental. However, one manufacturer of amateur radio equipment came out with a mobile unit and repeater system that can operate on this band. Expect to find hams escaping to this band in the crowded urban areas.

1300.00-1400.00: This band is used primarily for radar.

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FCC ACTIONS AFFECTING COMMUNICATIONS

New Experimental Licenses

The Commission has taken the following actions:

KE2XMU, KE2XMV, KE2XMW, State of California, Carmel Valley, San Jose, and Livermore, CA, to operate on 401.7895 MHz for the collection of data using GOES satellite for fire/weather forecasting and prediction of water runoff.

KM2XNI, KM2XNJ, Harris Corp., Rochester, NY and 50 mile radius, to operate in 825-845 and 870-890 MHz bands for realistic testing of cellular equipment under development.

KM2XOQ, Electrocom, Inc., Ft. Worth, TX, station to operate in 890-900 MHz band for testing and upgrading radar system for shipment to Peoples Republic of China.

KM2XOR, Motorola, Inc., Continental U.S., to operate on 838.590, 839.220, 883.590, and 884.220 MHz to demonstrate cellular communication system concept and equipment performance characteristics to potential customers.

KM2XOS, Motorola, Inc., Geneva, IL to operate on 878.58, 879.21, and 879.84 MHz to conduct tests of evaluation of design propagation coverage and performance comparison of cellular system components, and to demonstrate hand-held and mobile units to prospective customers.

KM2XOU, Logisticon, Inc., Santa Clara, CA, to operate on various discrete frequencies between 461.5125 and 469.0125 MHz to provide data link between computer and forklift to provide flow of goods information.

KM2XOV, Bypass Communications Corp., Continental U.S., to operate in 38.600-40.000 GHz band to evaluate use of millimeter wave radio under realistic conditions.

KM2XOX, Thomas J. Kirby, Pelham, NH, to operate in 902-928 MHz band to develop radio hardware for use in Amateur Service provided by WARC 1979.

KM2XPB, Rockwell International Corp., Tulsa, OK, on 2.0-18.6 GHz and 9.0-10.0 GHz to design and develop materials of radar structures for the purpose of reducing radar cross sections.

KM2XPC, Montgomery County Civil Defense, Crawfordsville, IN, to operate on 2950 MHz to allow civil defense group to install, modernize, and operate weather radar for purpose of developing a storm warning system to supplement radar facilities in Indianapolis, and to provide digital circuitry capable of turning screen image into a digital form so computer processing can be used to create image.

KM2XPD, Marcus Lee Perry, Tucson, AZ, to operate on 10250 and 10260.7 MHz for communications essential to research project under U.S. Government contract.

KM2XPE, Litton Systems, Inc., Van

Nuys, CA, to operate in 1250-1340 MHz band for development and interface tests as required by U.S. Government contract.

KM2XPF, King Broadcasting Company, Area of Seattle, WA, to operate on 21825 MHz to test and evaluate the suitability and capabilities for using this frequency in a broadcast TV environment, as put forth in Docket 82-334.

KM2XPG, Hi-Ho Broadcasting of Wyoming, Riverton, Wy, to operate on 21825 MHz to test feasibility of using 23 GHz microwave radio in a broadcast TV environment.

KM2XPH, KM2XPJ, KM2XPM, General Electric Company, Syracuse and Cazenovia, NY, stations to operate on 1215-1400 MHz for tests as required by U.S. Government contract.

KM2XPN, The Boeing Company, 10 miles SW of Mansfield, WA, research station to operate on 1227.6 and 1575.42 MHz for support tests to determine if superior jamming resistance can be obtained for the Global Positioning System.

KM2XPO, KM2XPP, KM2XPQ, Recreation Broadcasting of Aspen, Inc., Glenwood Springs, Basalt, and Avon, Co., stations to operate on 21,825 MHz, 21,925 MHz, and 23,125 MHz to determine if 23 GHz band is suitable for use in broadcast TV service as set out in Docket 82-334.

KM2XPR, University of Alaska, Fairbanks, AK and 1,200 mile radius, research station to operate on 47.70 and 49.18 MHz to acquire and transmit oceanographic data from Gulf of Alaska to Fairbanks using meteor burst. Short term, expires March, 1984.

KM2XPS, KM2XPV, KM2XPW, KM2XPX, KM2XPY, Hewlett-Packard Company, fixed and mobile locations at San Jose, Santa Clara, Sunnyvale, and Palo Alto, CA, to operate on 2500-2650 MHz (this system uses direct-sequence spread-spectrum techniques with a spectral spread of approximately 50 MHz) to operate low-power, spread spectrum frequency devices to determine whether there are commercially feasible uses for data communication systems primarily in factories and warehouses.

Amateur Radio License Terms Extended To Ten Years; Grace Period For Renewal Extended To Two Years; General Mobile License Terms To Remain The Same

The Commission has extended the operator and station licensing periods in the Amateur Radio Service to ten year license terms and changed the grace period for renewal of

an expired amateur operator and station license to two years.

Currently, licenses in the Amateur Radio Service are granted for terms of up to five years. The period of grace for renewal of an amateur station license is one year and for an amateur operator license, five years.

These changes were proposed in a rule-making notice adopted March 31, 1983, in response to a petition by the American Radio Relay League, Inc.

The Commission declined, however, to extend the license period for the General Mobile Radio Service (GMRS) and terminated the proceeding proposing this change (PR Docket 83-330).

The Commission noted there are over 417,000 licensed amateur radio operators in the Amateur Radio Service and over 56,000 amateur licenses were modified during 1982, either by change in class of operator license, change of mailing address, or change in the station location. There were also over 25,000 new and 36,000 renewed amateur radio licenses issued by the Commission during this same period. Extending the license term and changing the grace period will result in a saving of resources for the Commission.

The Commission said it would not issue a blanket order extending the terms of existing licenses because this would be confusing to both amateur licensees and foreign licensing authorities. Rather, the new ten year license term will be "phased in" as licenses come up for renewal.

With respect to the GMRS license term extension, proposed by the FCC on its own initiative, the Commission said the comments received in response to the rule-making notice indicated that an accurate data base of current licensees is of major importance in frequency selection and coordination in the GMRS and a ten year license term would result in a less current licensee data base. Therefore, the Commission said, it would continue to require GMRS renewals every five years.

FCC Dismisses Petition For Authorization of Low-Power Radio Rescue Device

The Commission has dismissed a petition filed by Gerhard T. Weiss of WREN Industries seeking authorization of a portable, low-power, relatively inexpensive radio rescue device he developed for use by recreational boaters. Weiss withdrew his petition after the FCC issued a Notice of Inquiry in October, 1982.

The proposed device was intended for use by persons fallen overboard to alert the boat's crew and provide a homing signal to be used in rescue efforts.

In dismissing the petition and terminating the inquiry, the Commission said it did not believe that a limited radio rescue device would serve the public adequately unless it closely resembled a Class C emergency position indicating radio beacon (EPIRB) which already is authorized to operate on Channels 15 and 16. Channel 16 is the international VHF maritime distress, safety, and calling channel; Channel 15 is suitable for homing purposes. Class C EPIRBs alert the Coast Guard, as well as radio-equipped boats in the area of the emergency.

The notice had requested comments on the proposed frequencies, technical and non-technical requirements, operating rules, or limitations and licensing. Although all parties participating in this proceeding favored authorizing a limited radio rescue device, each had different ideas about how the device should operate. In addition, several parties pointed out serious problems inherent in the device which would make it useless.

Reconsideration of Action Authorizing Field EICs to Require Amateurs to Keep Operating And Maintenance Records Denied

The Commission has denied David Popkin of Englewood, NJ, reconsideration of its May 26 action authorizing Engineers-in-Charge (EICs) of field facilities to require Amateur station licensees to maintain such operating and maintenance records as the EICs deem necessary to resolve interference or deficient technical operations.

Popkin maintained that since Section 0.314(x) of the FCC rules makes no reference to the Amateur Radio Service, it would, therefore, pertain to licensees of any station in any service regulated by the Commission. If it was the FCC's intent to apply this rule to all services, then the public was not given the proper opportunity to comment on the proposed rule. If the Commission intended this rule to apply only to the Amateur Radio Service, then its wording should be changed to so state.

Popkin also argued that the rules give FCC EICs far greater authority than was solicited or contemplated in the original proposal by requiring any operating or maintenance records, not just part or all the records required at the time of the proposed rulemaking.

The Commission pointed out that its final rule authorized EICs to require all station licensees, not just Amateur station licensees, to maintain a record of such operating and maintenance logs as might be necessary to resolve interference problems or deficient technical operation; prior public notice was unnecessary since it was an internal procedure. As for Popkin's argument that too much authority was given to the EICs, the Commission noted that the EICs need sufficient authority to require logging of any item they may deem necessary for enforcement. Otherwise, the FCC's enforcement effort would be diminished.

Revised Edition of Communications Act Available From GPO

A revised edition of a Commission publication is now available from the Superintendent of Documents. "The Communications Act of 1934 as amended and Other Selected Provisions of Law" is a looseleaf publication updated and reissued periodically by the staff of the Commission.

The January, 1983 edition can now be ordered from the Government Printing Office. It incorporates statutes enacted through the 97th Congress.

The revised publication contains the Communications Act of 1934, as amended; the Communications Satellite Act of 1962, as amended; and selected provisions from the United States Code. Included are provisions from the Administrative Procedure Act, the Freedom of Information Act, the Privacy Act, the Government in the Sunshine Act, the Judicial Review Act, the Regulatory Flexibility Act, the National Environmental Policy Act, the Paperwork Reduction Act, provisions pertaining to copyright and judicial procedure, and other selected provisions pertaining to communications including provisions from the Criminal Code and the Internal Revenue Code.

The publication also contains background material in footnotes and indexes to the Communications Act, to public laws amending the Communications Act, and to portions of Title 5 of the U.S. Code. The con-

tents have been expanded from previous editions. (The first edition of the publication, dated June 5, 1936, contained 103 pages, including a 57-page index, and cost ten cents.)

GPO Stock No. 004-000-00404-3, \$6.00; 300 pages, Superintendent of Documents (202/783-3238), U.S. Government Printing Office, Washington, DC 20402.

Restrictions Diminished For Licensing And Use of Stations In Experimental Radio Services Other Than Broadcast

The Commission has deleted certain technical and operational regulations pertaining to experimental radio station operations. It replaced the mandatory routine reporting requirement for certain experimental authorizations with a requirement to submit reports only upon specific Commission request as determined on a case-by-case basis.

Certain regulations concerning frequency tolerance, the power roll-off of emissions, and the requirement to measure transmitter characteristics have been deleted. It will require that occupied bandwidth, frequency tolerance, and other transmitter characteristics of the experimental station be indicated on the application.

While, in the past, the FCC had general technical requirements for experimental stations, because of the new and innovative



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nature of some of the experimental applications, it has been granting waivers of these technical rules on a case-by-case basis. The new rules will eliminate the need for waivers in these instances.

The new rules eliminate certain requirements pertinent to the operation of experimental stations and to the qualifications of operators. The licensee will now have complete responsibility for maintaining control of the experimental station including its operation according to the specifications as filed in the application.

The requirement for filing a petition for rulemaking with an experimental application is eliminated. Instead, a public notice will be issued to alert the public to experimental radio station authorizations.

Finally, the new rules expand the scope of Part 5 to permit limited market studies to determine consumer demand under various conditions of price, quality, etc. The size and scope of such studies will be subject to Commission constraints imposed on a case-by-case basis. Limitations concerning licensing and control of equipment used in such studies are also specified.

Decision Releasing Remaining Private Land Mobile Reserve Spectrum In 800 MHz Band Modified

In response to several petitions for reconsideration, the Commission has made some changes in its July 22, 1982, second report and order (47 Fed. Reg. 41082, [Sept. 16, 1982]) releasing the remaining 250 channels in the 806-821 MHz and 851-866 MHz bands for private land mobile use and establishing new rules to govern operations on these channels.

The second report and order ended a process that began in 1970 for allocating spectrum and adopting a regulatory structure to govern private land mobile radio operations at 800 MHz by establishing uniform rules for future operation in these bands, as well as certain interim rules to cover grandfathered systems authorized under previous rules. It also consolidated four related dockets that dealt with 800 MHz private land mobile radio.

The second report and order: (1) apportioned the remaining 800 MHz private land mobile radio spectrum among four user categories established by eligibility affinity; (2) opened channels to both trunked and conventional technology; (3) established uniform loading standards for all conventional systems and for all trunked systems; (4) increased the number of mobile stations required to assure channel exclusivity; (5) reduced the time within which certain channel loading benchmarks must be reached in areas where there are waiting lists for frequencies; (6) required frequency selection by applicants, except in the case of Specialized Mobile Radio System (SMRS) licensees; (7) eliminated a number of technical restrictions which reduced licensees' operational flexibility; and (8) removed the restric-

tion on manufacturers' entry into the SMRS marketplace as licensees of systems.

Reconsideration of this action was sought by the Associated Public-Safety Communications Officers (APCO), the E.F. Johnson Company, the Land Mobile Communications Council, Motorola, Inc., the National Association of Business and Educational Radio, Inc., (NABER) and the Telocator Network of America.

The issues they asked the Commission to consider included: the appropriate number of transmitters necessary to achieve channel loading in any given locale or radio service; FCC authority to authorize one-way paging on 800 MHz two-way systems; whether Business Radio Service eligibles should also be allowed extended system implementation schedules when certain predefined conditions are met; the status of remote or satellite stations in wide-area radio systems operated by public service agencies in situations in which the geographic area needed to be covered exceeds the protected area which the rules provide; the comparative criteria which the Commission will apply in cases in which applications are received for more frequencies than are available; the authorization of trunked SMRS licenses to RF equipment manufacturers; the termination of PR Docket 79-107; and the application processing procedures applicable to trunked SMR systems.

In response to these petitions, the Commission clarified and to some extent modified its channel loading standards for trunked private land mobile 800 MHz systems by including control stations to determine channel loading and permitting licensees with systems loaded to 80 percent to obtain additional channels; affirmed the permissibility of paging on unshared 800 MHz channels and SMRSs, and extended paging to shared systems when all licensees agree; allowed extended radio system implementation schedules in the Business Radio Service; affirmed the removal of entry restrictions on radio equipment manufacturers in the offering of trunked SMRS service; affirmed its decision to terminate the proceeding looking into multiple licensing at 800 MHz (PR Docket 79-107); affirmed trunked SMRS application processing procedures employed by the Commission; and clarified the comparative criteria to be applied when more applications are received than can be accommodated on available frequencies in the SMRS category to consist of the following two criteria: (1) whether the proposed system is conventional or trunked and (2) whether the application would expand a fully loaded trunked system.

The two criteria will be given equal weight in evaluating the qualifications of applicants in the SMRS category and awarding comparative points during expedited hearing proceedings in these cases.

One point will be awarded to each applicant proposing to operate a trunked system. Applicants proposing to expand existing loaded trunked systems also will be awarded one point. Therefore, the Commission said,

each applicant will receive two, one, or no comparative points based on these criteria. No fractional points will be awarded. Applications will be ranked based on the number of comparative points awarded and grants among this tied group will be made first to those applications with the most comparative points. If sufficient channels are not available in a geographic area to grant all SMRS applications with the same number of comparative points, grants among this tied group will be made in accordance with the Commission's random selection procedures described in the second report and order in Gen Docket 81-768 (48 Fed. Reg. 27182, June 13, 1983).

Maryland State Police Denied Reconsideration of Elimination of Individual CB Station Licenses

The FCC denied a request by the Maryland State Police for reconsideration of an FCC action which eliminated individual station licenses in the Citizens Band (CB) Radio Service.

The petitioner argued that: help groups may now be impersonated without violating Commission rules; the title of the docket was misleading; and public notice was insufficient.

In denying the request, the FCC said that false or deceptive communications such as impersonating a help group still violate new CB rule 13 (a) (12); that the title of the docket was not misleading because it did not confuse persons filing comments or reply comments; and that the public notice and comment procedures met Administrative Procedure Act and Commission criteria.

FCC Affirms Staff Revocation of San Diego Amateur's License

The Commission has affirmed the Private Radio Bureau's action revoking Harold R. Claypoole's license for amateur radio station N6BII and the suspension of his General Class Amateur radio operator license.

On March 25, 1983, the Bureau revoked Claypoole's license on the basis of his willful and repeated violation of Sections 97.125 (malicious interference) and 97.121 (use of false call sign) of the rules; and willful violation of Sections 97.113 (broadcasting) and 97.115 (transmitting music).

Noting Claypoole has continued to operate in defiance of the order of revocation despite warnings by FCC staff, the Commission said that it would seek criminal prosecution for violation of Section 301 of the Communications Act if Claypoole continued to operate.

The Commission said that malicious interference is the most serious violation found in the Amateur Radio Service, warranting the most stringent penalty. Claypoole's malicious interference together with his other violations clearly disqualified him from holding an Amateur license and warranted license revocation and suspension.

PIRATES DEN

BY DARREN LENO, WD0EWJ

FOCUS ON FREE RADIO BROADCASTING

As reported in the January *POP'COMM*, Radio Caroline, the famous British offshore pirate station whose broadcasting vessel ran aground on the English shoreline in 1980, is once again broadcasting to Europe on 319 meters. The station's manager and founder, Ronan O'Rahilly, won his battle against legal and financial problems that nearly kept Caroline off the air permanently.

Listeners in North America should have a chance to hear Radio Caroline as soon as a shortwave outlet for the station is setup. In fact, by the time you read this, such an outlet may already be in operation. I'll pass along the frequency to you just as quickly as I can after learning of it.

In the meantime, why not try for these currently active Euro-pirate Free Radio stations, compliments of Podney Sixe of Cornwall, England.

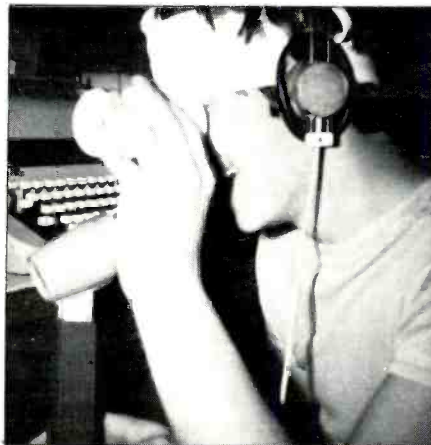
Station	Frequency	GMT
Arena Radio	6244	0950
World Listening Service	6265	0900
Radio Jacqueline	6230	1400
Radio Sunday Int'l	6306	1100

While our attention is still focused on Europe, it may be fitting to note that Jolly Roger Radio, the famous American FM pirate from Bloomington, Indiana who was highlighted in this column a couple months ago, has reportedly left the airwaves. Furthermore, a news item from the Associated Press states that JRR has even left the country! According to this article, the station's manager, known as the Flying Dutchman, has decided to move his operation to London, England, where he states that operations like his are more commonplace and somewhat accepted among the authorities. The Flying Dutchman stated earlier that he was not planning on removing his station from the Bloomington airwaves, even amidst FCC threats to put him in prison. London must have, quite understandably, looked better than prison.

The Voice of Peace is another unlicensed broadcaster who is operating off the shores of England, specifically, Northern Ireland. Dave Markwick recently heard this station operating on 6240 kHz around 0000 GMT.

I was happy to receive Dave Markwick's report since little has been heard of the Voice of Peace since the station decided to leave Israel, where it had been broadcasting messages of peace and love for over a decade. Mr. Nathan told journalists over a year ago that he had become fed up with the bureaucracy of Israel, who had failed to grant the Voice of Peace a broadcast license so the station could set up its studios on Israeli soil. With tears in his eyes, Mr. Nathan told of his intentions to take his ship someplace where he was needed, "perhaps Northern Ireland." It's nice to know he arrived safely.

The Voice of Peace had previously broad-



Here's a shot of Mr. Blue Sky being himself during a Radio USA broadcast.

cast from a 43-year-old Dutch freighter and supported itself with advertising revenue. Any profit the station generated was used to aid those in need.

Jumping now to our side of the Atlantic, we have the details of the "bust" of Radio Northstar Int'l (RNS). Many of our readers will remember that last month this column reported that RNS had been closed by FCC officials. Just to recap for the benefit of new readers, RNS was a very popular and widely heard shortwave pirate operation. The station was famous for its pure signal, clean programming, and unique frequency of 13787 kHz.

According to an article that appeared in the Association of Clandestine radio Enthusiasts publication, *THE ACE* (which was based on an interview with the operator of RNS), the station was closed during an early afternoon transmission. The FCC was investigating reports of television interference in the general vicinity of Radio Northstar's location. The official in charge of the local FCC office was personally investigating the interference and traced it to the neighborhood in which RNS was located. Apparently, the FCC official noticed a large beam antenna, which he assumed to be that of a licensed radio amateur. Whether he decided to conduct a routine inspection of this "amateur radio" station or if there was reason to suspect that this was the source of television interference is not precisely known. As you have probably already surmised, the station he decided to inspect was not that of a ham operator, but that of Radio Northstar, who used a 14 MHz amateur radio beam antenna on the out of band frequency of 13787 kHz.

The FCC official walked up to the front door of RNS, knocked, and introduced himself by name, all the time sporting a cheerful smile that made him look like a door to door salesman. When he asked if he could step inside for a moment, he was let in. Once inside, the FCC official introduced

RADIO CBN



Radio CBN's famous koala bear, shown here on the station's QSL, has virtually become a trademark of this Australian pirate in Sydney.

himself professionally. But by this time, it was all over for Radio Northstar; the radio equipment that was at that moment broadcasting a program to the world was visible from the doorway. The official asked to see an FCC assigned Amateur radio license, but there was not one to be shown.

The operator of RNS was told that if he didn't give the FCC any trouble and cooperated with them, the consequences of his underground broadcasting activities would be kept to a minimum. Then the operator of RNS was instructed to write a letter to the FCC stating he was sorry for what he had done, which he did. The FCC would be in touch within 15 days.

At least 15 days later, RNS received a letter back from the FCC. The operator was stunned to learn that his bill came to the grand total of \$2000! That ties the record for the largest fine ever levied against an SW pirate, previously held solely by the Voice of the Voyager. I wonder what the fine would have been if RNS had decided not to cooperate with the FCC (probably the death sentence).

No immediate plans are being made for payment of this fine, partly because of lack of sufficient funds to cover the bill. The other part is because RNS feels the fine is unjust and ridiculously severe in light of this victimless crime. Currently, the station is checking into its legal rights and alternatives. *POP'*

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RX4M
 ON THE 13.7 MHz BAND FROM 0037 TO 0117 GMT
 ON 21750 KC WITH 100 WATTS

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THE VOICE OF CLIPERTON

RX4M was a well-known pirate that was on the air about three years ago.

COMM will keep you abreast of future situations concerning the RNS closure.

A couple of months ago, a new pirate calling itself Radio North East Michigan sent in its "official" broadcasting schedule. Whether or not RNEM is still conforming to it or not is up to you to find out.

The last new Michigan pirate was the Voice of Democracy. That one requested reception reports at a Battle Creek address but did not have the courtesy to QSL!

21500 kHz 2100 GMT Monday & Tuesday
 7430 kHz 0200 GMT Thu, Fri, Sat
 6950 kHz 0200 GMT
 13995 kHz 1900 GMT

I should also mention that I cannot guarantee any scheduled transmission of a pirate

or clandestine station. I will report to you information I receive from such stations, but won't stake my life on its accuracy. In the "underground radio world," things tend to change regularly and quickly.

KPRC, the notorious NYC AM pirate frequently heard on 1616 kHz, has opened an SW outlet on 6210 kHz. According to Kirk Allen of Oklahoma, both frequencies carry the same programming. The station appears to have abandoned its FM frequency, which was somewhere near 93 MHz. KPRC has not been noted operating here for quite some time.

Incidentally, Brian Graham of New York says he noticed a handbill-sized advertisement on a street pole near his house. That is not unusual in itself, except that it appeared

to be about "Pirate Joe's" KPRC, describing it as "an alternative to other stations."

The Crystal Ship continues to be heard on 7425 kHz. According to a report from Grant Lochmiller of Iowa, TCS has been taking shots at the FCC during their programs. Recently, they dedicated "You Sound Like You're Sick" by the Ramones to any FCC agents listening in.

Next month we'll be back with more coverage of the underground radio spectrum. In the meantime, good luck with your radio listening (pirate or otherwise). If you have any comments, suggestions, or contributions, please send them to me via this magazine. My address is Pirates Den, c/o Popular Communications, 76 North Broadway, Hicksville, NY 11801.

Illegal Broadcasting

**High Power
 OHIO
 Pirate**

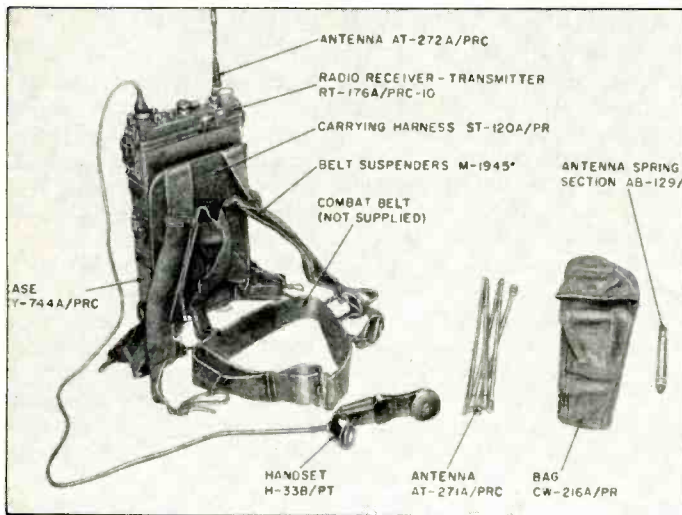
100 Watts of Power
 100 MHz
 60 Watts of Power
 74 MHz
 100 Watts of Power
 17 MHz



Broadcasters



This unusual QSL was sent in by a reader in Ohio. We suspect it is either tongue-in-cheek or wishful thinking.



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RT 176/PRC 10 feature: voice communication, tuneable range of 38-55 MC, super heterodyne FM front end, .9 watt xmtr., range of 5 miles (may vary depending on antenna used & siting conditions). & total wt. w/accessories of only 16 lb. Each set will include at no extra cost operators manual, schematic, & 4300 KHz calibration xtal. They do not come w/batteries, but they are available commercially. We are selling these as complete sets as shown below for \$100.00/set. Shpg. wt. 18 lb. The quantity is limited, so act fast.

PDR-27 NAVY RADIATION METER

Just released by the US Navy. They appear to be in excellent condition and include the fitted aluminum transit case. Batteries not furnished but are available in most electronic supply houses. 4 ranges 0.5 to 500 mr/hr. Removeable hand probe. detection of Beta and Gamma radiation. With today's world conditions and perhaps proximity to a nuke power station, it might provide a little insurance to own one of these instruments. With no facilities to check or test, we offer AS IS, visually OK Schematic provided with each. We have some accessories and offer as an option although not required for operation.

Shipping wgt. 22 lb. PDR-27 Rad Meter \$50.00

PDR-27 phones \$7.00

Hi Sensitivity GM tube \$10.00

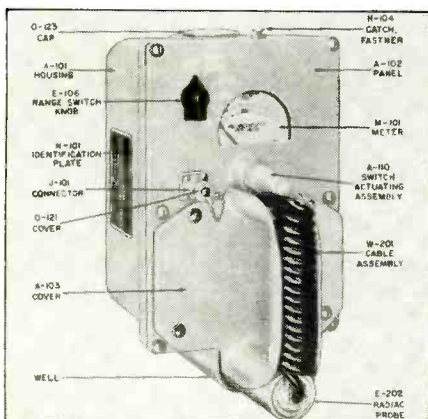
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INSIDE THE WORLD OF TVRO EARTH STATIONS

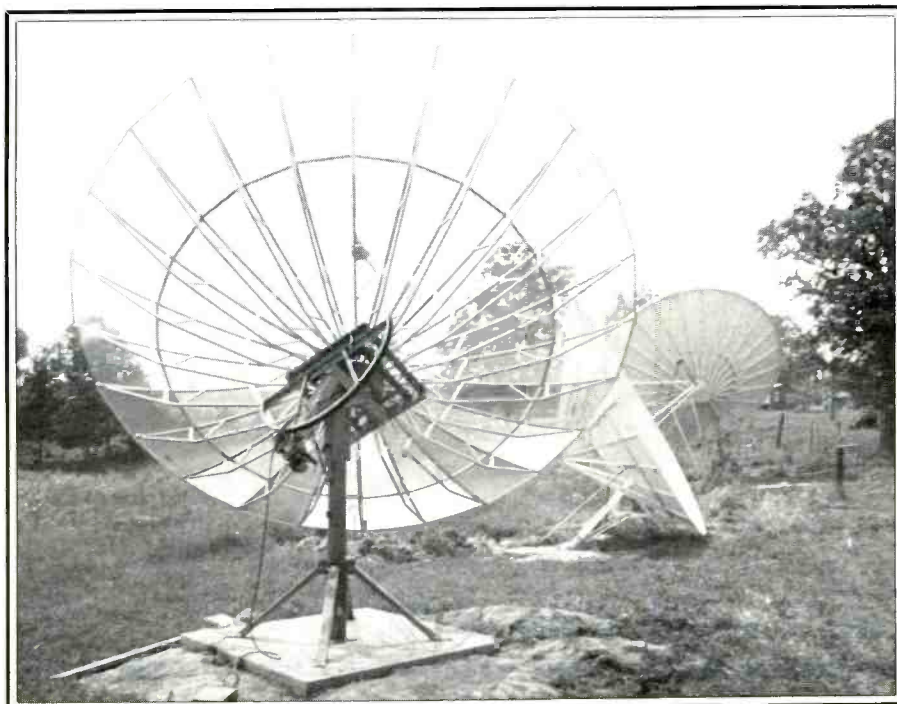
Satellite Antenna Positioning System And Techniques

Many of us have grown quite accustomed to seeing the variety of satellite earth station antennas that are sprouting up like mushrooms all over rural America these days. They come in a variety of shapes and sizes and colors. In previous columns, we have examined the geometry of these parabolic reflectors as well as how various technical specifications will affect your system's overall performance. One particular aspect of the home earth station antenna system has gone unmentioned, however. This month's column is devoted to satellite dish aiming equipment and techniques.

Considering the large number of domestic and international satellites that are viewable from North America, it's no wonder that the motorized actuator has become an essential part of any system. Once you've had a system for a very long time, you come to realize the limitations involved with running out into the yard every time you want to switch birds. After all, who wants to traverse knee-deep snow drifts during the late evening hours so that the antenna can be hand-cranked from SATCOM III to SATCOM IV? And then there's the problem of interpreting the gestures emanating from family members who view your fine tuning efforts from the other side of the living room window. After a few experiences like this, you appreciate the computerized technology offered by today's antenna actuators.

There are two basic types of antenna drive systems available today. The most common system uses an actuator arm that can be extended or retracted by connecting a voltage to its built-in motor. One end of the actuator attaches to the rear of the antenna while the other is anchored to the concrete pad or a fixed point on the mount. The arm will stop at any position along its stroke when the power is turned off. Position is maintained by the internal brake assembly of the unit. Antenna actuators come with a variety of stroke lengths; some antennas can be moved from SATCOM III to SATCOM IV with a relatively short stroke, while others will need a full 48 inches or more to achieve the same coverage. Actuators are available with 12, 24, 36, or 90 volt DC or 110 AC motors. Higher voltage actuators are often used since the distance between power source and motor is considerable.

The motorized actuator is connected to an indoor power source and remote control. Selection of antenna position can be obtained through the use of a simple east/west control switch which allows you to steer the antenna from satellite to satellite. The use of a simple east/west control requires some



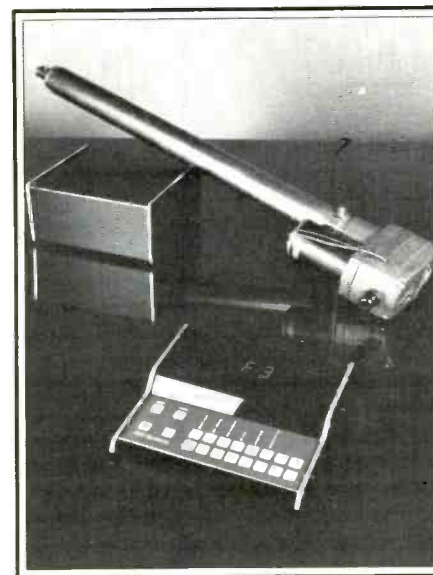
Sixteen foot parabolic antenna with tangential drive. (Photo courtesy of Solar Electronics Int.)

skill and patience however, since you must know when to stop. Before moving your antenna from one satellite to another, you must first select the correct transponder and feed polarity for the next bird so that you will have a visual indication when your antenna has arrived on boresight.

To simplify satellite selection, several manufacturers have developed computerized remote controls which will automatically move your antenna to the desired satellite at the push of a button. The computerized antenna system has a motorized actuator arm which contains a simple position sensing system. A four-magnet rotor is attached to the motor shaft and turns on a one-to-one ratio with the ball screw. A special Hall Effect transistor is positioned in close proximity to this rotor. Each magnet passes by the Hall Effect transistor, thereby generating a pulse for each quarter turn of the motor. These pulses are sent via a small diameter wire cable from the antenna actuator to the remote console within your home. There the pulses are counted by the positioner's computer circuitry and added or subtracted from the stored pulse count in the unit's memory. Once the pulse level programmed into memory for a given satellite is reached, the computer switches off the voltage to the actuator motor. Computerized actuators can be quite accurate and can be stopped at .05

inch increments of travel along the stroke.

I have found that the MTI 2100 Positioning System (see photo) provides an excellent combination of highly accurate operation with an elegant appearance. The MTI folks have carefully designed their system to make it as simple to use as possible. The MTI



MTI 2100 actuator and remote control console. (Photo courtesy of MTI.)

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2100 is completely programmable and comes with a built-in Ni-Cad battery for memory retention in the event of a power outage. The console also has programmable actuator limits which keep the antenna actuator from being maneuvered beyond its effecting range capabilities. This safeguard protects your system from inadvertent damage to antenna or actuator which otherwise might occur if the antenna was positioned too low or too high. The MTI keyboard has all known domestic satellite types listed on it along with spare positions for international or future domestic satellite systems to come.

The actuator arm type of antenna positioner has its limitations, since its limited stroke length will not allow reception of every satellite to be viewed from a given location. While it is adequate for locating those birds which lie between GALAXY I (135 degrees west) and SATCOM IV (83 degrees west), the single stroke actuator cannot provide complete coverage of all available domestic and international satellites. Even full domestic reception will become exceedingly difficult, as newer birds are positioned to the east of SATCOM IV.

An alternative antenna positioning system is used by several antenna manufacturers. The "tangential" drive system allows the antenna to sweep from horizon to horizon, effectively viewing every available satellite (see photo). For those readers who are considering receiving international satellite television along with a full fare of North Ameri-

can domestic television, we would recommend the purchase of an antenna with tangential drive.

Satellite Dish Aiming Computer Program

Many people have written in wanting to know how to locate particular satellites from their location. To find a specific satellite requires the computation of the satellite's elevation and azimuth. Elevation and azimuth are the two basic coordinates used to deter-

mine each satellite's position in the sky. The elevation angle is the angle in degrees above the horizon at which the antenna looks up at the satellite. The azimuth is the compass bearing in degrees corrected to the true north for the given satellite. From a given location, every satellite will have its own unique combination of elevation and azimuth coordinates. Once you have obtained the coordinates for the desired satellites, a compass and inclinometer can be used to correctly position the antenna.

```

10 REM***DISH AIMER- IBM PC VERSION***
20 REM***MDFI LONG 10-20-83***
30 REM***FOR COMM MAGAZINE***
40 REM
50 GOSUB 55000:REM initialization
55 GOTO 40000:REM main program
57 REM
60 DATA alignment point,180
70 DATA INTELSAT IVA-F3, 155, INTELSAT IV-F6, 181
75 DATA SATCOM V, 143, SATCOM 1R, 139,GALAXY I, 135
80 DATA SATCOM 111R, 131, COMSTAR IV, 127
85 DATA WESTAR V, 123, SATCOM 11, 119
90 DATA ANIK B, 109, ANIK D, 104, WESTAR IV, 99
100 DATA LUMSTAR I & 11, 95, WESTAR 111, 51, COMSTAR 111,87
110 DATA SATCOM IV, 83, WESTAR 11, 79
115 DATA GALAXY 11, 74, SATCOM VI, 72
120 DATA INTELSAT IV-F1, 53, INTELSAT V-F2, 34.5, INTELSAT IVA-F1, 31
130 DATA INTELSAT V-F4, 27.5, INTELSAT V-F3, 24.5
140 DATA INTELSAT IVA-F4, 21.5, INTELSAT V-F6, 18.5
150 DATA GORIZUNT, 14, SYMPHONIE I & 11, 11.5, INTELSAT IVA-F2, 4
160 DATA INTELSAT IV-F8, 1
170 REM
5000 REM COMPUTE AND PRINT
5005 T1=20:T2=60
5010 CLS
5020 PRINT TAB(18*5)"SATELLITES COORDINATES LISTING"
5040 PRINT:PRINT"for ":NAME:PRINT
5050 PRINT"AT LONGITUDE "HD", LATITUDE "AD:PRINT
5060 PRINT TAB(18*5)"
5061 IF DV=1 THEN 5020
    
```

```

5062 LPRINT TAB(TB+5)"SATELLITES COORDINATES LISTING"
5063 LPRINT:LPRINT"for ";NM#:LPRINT
5064 LPRINT"AT LONGITUDE "HD", LATITUDE "AD:LPRINT
5065 LPRINT TAB(16)"*"
5070 LN=8
5080 FOR I=1 TO 31
5090 READ SN#, SL
5100 IF I=1 THEN SL=HI
5110 W=FN RAD(SL):H=FN RAD(HD):A=FN RAD(AD)
5120 L=H-W
5130 D=FN ACSN(COS(A)*COS(L))
5135 X=-TAN(A)/TAN(D)
5136 IF X<-.999 OR X>.999 THEN C=FN RAD(180):GOTO 5150
5140 C=FN ACSN(X)
5150 IF L<0 THEN C=2*PI-C
5160 CD=FN DEG(C)
5161 IF CD<0 THEN CD=360-CD
5162 IF AD<0 AND CD=180 THEN CD=360
5170 X=(COS(D)-(1/K))/SQRT(1-COS(D)*COS(D))
5180 EL=ATN(X)
5190 Y=FN DEG(EL)
5200 IF Y<0 THEN GOTO 5310
5210 RG=RS*SQRT(1-(.295*COS(A)*COS(H-W)))
5215 RG=1.606*RG
5220 SL=INT(SL*100)/100
5221 IF DV=2 THEN 5230
5222 IF LN<95 THEN GOTO 5230
5224 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:LN=0
5230 PRINT SN#:TAB(T1):SL" DEG WEST":
5231 IF DV=1 THEN 5240
5232 LPRINT SN#:TAB(T1):SL" DEG WEST":

5240 CD=INT(CD*100)/100
5250 PRINT TAB(T2)"AZIMUTH: "CD
5251 IF DV=1 THEN 5260
5252 LPRINT TAB(T2)"AZIMUTH: "CD
5260 Y=INT(Y*100)/100
5270 PRINT TAB(T1)"ELEVATION: ";Y:
5271 IF DV=1 THEN 5280
5272 LPRINT TAB(T1)"ELEVATION: ";Y:
5280 RG=INT(RG*100)/100
5290 PRINT TAB(T2)"RANGE: "RG"KM."
5292 PRINT:LN=LN+5
5295 IF DV=1 THEN 5302
5296 LPRINT TAB(T2)"RANGE: "RG"KM."
5297 LPRINT:LN=LN+5
5298 GOTO 5310
5302 IF LN<32 THEN GOTO 5310
5304 PRINT:INPUT"RETURN TO CONTINUE":H9#
5306 LN=0:CLS
5310 NEXT I
5320 PRINT:PRINT"*"
5330 PRINT"FOR INITIAL ADJUSTMENT OF TRUE POLAR MOUNT"
5340 IF DV=1 THEN 5990
5350 LPRINT:LPRINT"*"
5360 LPRINT"FOR INITIAL ADJUSTMENT OF TRUE POLAR MOUNT DISHES."
5990 RETURN
40000 REM MAIN PROGRAM
40010 CLS
40020 PRINT TAB(9):"SATELLITE DISH AIMER"
40030 PRINT:PRINT:PRINT
40040 INPUT"ENTER USER'S NAME: ";NM#
40050 IF LEN(NM#)=0 THEN GOTO 40990
40060 LOCATE 7,1,1
40070 INPUT"ENTER ANTENNA LATITUDE: ";H9#
40072 IF LEN(H9#)=0 THEN GOTO 40990
40074 AD=VAL(H9#)
40080 IF AD<-180 THEN GOTO 40060
40082 IF AD>180 THEN GOTO 40060
40090 LOCATE 9,1,1
40100 INPUT"ENTER ANTENNA LONGITUDE: ";H9#
40110 IF LEN(H9#)=0 THEN GOTO 40090
40120 HD=VAL(H9#)
40130 IF HD<0 THEN GOTO 40090
40140 LOCATE 11,1
40150 INPUT "1=SCREEN, 2=PRINTER: ";DV
40155 IF DV=0 THEN GOTO 40990
40160 IF DV<1 OR DV>2 THEN GOTO 40140
40180 GOSUB 5000:REM COMPUTER AND PRINT
40990 END
40995 REM
55000 REM INITIALIZATION
55010 T1=0:T2=0:X=0:EP=0:DG=0:LK=0:BW=0:TH=0:TB=0:NF=0
55020 NG=0:AS=0:EF=0:FW=0:D1=0:CH=0:K=6.61:PI=3.1415927#
55030 RS=26485:AD=0 :HD=0:SL=0:W=0:H=0:A=0:L=0:D=0:C=0:CD=0:EL
55040 RG=0:I=0:LN=0
55100 H9#=" ";NM#=" ";SN#=" "
55150 DEF FN RAD(X)=X*PI/180
55160 DEF FN DEG(X)=X*180/PI
55170 DEF FN ACSN(X)=(-1)*ATN(X/SQRT(-X*X+1))+PI/2
55990 RETURN

```

Here's the program for the dish aimer to be run for your home computer which takes BASIC (IBM PC).

The easiest way to determine the coordinates for all birds visible from a given location is to use a computer. The following computer program is written in BASIC and is for the IBM PC. AZ/EL coordinates are obtained by entering in the latitude and longitude for the site location. Longitude is entered in degrees west. For locations south of the equator, latitude is entered as a negative number. This IBM PC program will provide satellite coordinates for any location within North, Central, or South America. (Locations far below the equator within South America should bear in mind that while this printout will list the physical coordinates for all accessible satellites, that does not mean that there will be enough signal to effect adequate reception. To determine this, the computer printout must be studied in tandem with the appropriate satellite footprint EIRP charts.)

The printout will also list an alignment point which is used for the initial adjustment of true polar mount dishes. If the antenna is pointed to true south (true north for locations south of the equator) and adjusted to the elevation angle given, the polar mount should correctly track the entire Clarke Belt.

If you would like to learn more about satellite television, *The World of Satellite Television* by Mark Long and Jeffrey Keating is available from Solar Electronics International, 156 Drakes Lane, Summertown, Tennessee 38483. The price is \$9.95 plus \$1.00 for shipping and handling.

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LISTENING POST

BY GERRY L. DEXTER

WHAT'S HAPPENING: INTERNATIONAL SHORTWAVE BROADCASTING BANDS

Again this month the news file contains several items in the way of new stations on the air and other changes happening on the shortwave broadcast bands.

Religion has joined rock on Saipan. KYOI's rock sound on the island now has company in the form of the Far East Broadcasting Company's KFBS, which was destined to begin regular programming on the first of October, 1983. The initial schedule called for transmissions from 0900 to 1100 GMT on 15.115; from 1100 to 1300 on 15.150; from 1300 to 1500 on 9.575; and from 1500 to 1600 on 15.110. Checks of all of these time periods here in The Listening Post have so far not turned up a logging of KFBS, which will be broadcasting mostly in Mandarin Chinese and Russian. The address for reception reports is P.O. Box 209, Saipan, CM 96950.

DXers have discovered a new clandestine station on shortwave—Radio Free Surinam. This new broadcaster is dedicated to bringing news of what's happening in Surinam and the world to the people of that country who are currently suffering from press censorship under the military government. Supposedly the broadcasts are aired daily at 0100 on 6.850 in Dutch and Saran Tango, and on the weekends in Hindi and Javanese. However, a number of checks have turned up only one logging of the station here so, at present at least, it is apparently not on a regular schedule.

Radio Free Surinam is operated by the Council For The Liberation of Surinam from a secret transmitter site "somewhere in the Caribbean." Power is said to be between 15 and 20 kilowatts with 50 kilowatts hoped for later on. Programs are recorded by professional, ex-Surinam broadcasters at a studio near The Hague in the Netherlands.

According to a report on Radio Netherlands' "Media Network" program, the broadcasts run just 15 minutes, although that too is to be expanded. However, the broadcast monitored here ran just over thirty minutes. The station's address is P.O. Box 737, Rijswijk, Holland. It's probably wise to address your letter to the Council for the Liberation of Surinam, rather than to Radio Free Surinam.

Incidentally, the arrival of this station was actually predicted on U.S. network television several months ago by a Council representative!

Scratch two in Argentina. Government stations Radio Splendina and Radio El Mundo were turned over to private interests and these new companies promptly ceased operation on shortwave. Apparently, the Argentine government will continue to use the shortwave frequencies formerly in use by these stations for the RAE service. Radio Splendid operated on 5.958, 9.740, and



Three generations of DXers—(l. to r.) Bob, Larry, and Charles Wilkner, Ft. Lauderdale, Florida.

11.880 while Radio El Mundo used 6.120, 9.710, 11.755, and 15.290. Both had been on shortwave a very long time, which shows again that you never know when a longtime service may suddenly be discontinued.

Also in South America, look for the arrival soon of Radio France International's relay station in French Guyana. It'll beam programs to the Americas with 500 kilowatts. The preliminary schedule is 2200 to 0000 on 9.605, 11.790, and 15.300; 0900 to 1100 on 9.575 and 11.800; 1800 to 2200 on 9.615; 1100 to 2200 on 15.435; and 1400 to 2100 on 17.860.

Radio Australia has been experiencing money problems as several reports over the past months have indicated. At one point, the station had a stock of some 50,000 English-Chinese program lesson booklets destined for mailing to China. They were turned into pulp because insufficient funds existed to pay the postage to mail them!

More recently, reports have reached us that Radio Australia's North American Service has been scuttled with listeners advised to listen to the Pacific Service instead.

Incidentally, the Australian Broadcasting Commission has changed its name to the Australian Broadcasting Corporation.

And, Radio Monte Carlo has a new address. Reception reports should now go to the station at B.P. 349, MC 9807, Monaco Cedex.

Mail Check

Robert Wilkner of Fort Lauderdale, Florida, who edits the excellent DX South Florida publication, checks in with a nice photo showing three generations of DXers. Bob, his father, and Bob's son are all active DXers and shortwave listeners. Bob's late grandfather started the Wilkner family's fascination with shortwave back in the 1920's!

Robert Pastrick of Baden, Pennsylvania has problems with frequency determination and says he's pretty much limited to reporting those stations which announce their frequencies as a result. That is, indeed, a limitation,

Robert. It's hard to operate effectively these days without at least having a copy of the *World Radio TV Handbook* and current information as to who is where and when! Lacking a frequency counter, a receiver with digital frequency readout, or a receiver with a dial scale that allows fairly accurate frequency determination makes DXing and shortwave listening a lot more difficult.

If your receiver has a bandspread, you should consider charting the bandspread—that is, using the bandspread only when tuning a band. Leave the main tuning dial set at the same place each time you dial up a particular band. Then chart your loggings using the bandspread scale and make notes of what frequencies show up at the different bandspread scale markings. Over a period of time, you'll fill in a lot of blanks and eventually be able to better tell where you are frequency-wise.

D. Kalin of Milford, Pennsylvania notes that he got his reception report back from the pirate station Radio Clandestine (we're



Robert Pastrick of Baden, PA with his Realistic DX-200, National NC-240, Zenith Transoceanic receivers plus an assortment of CB and scanner equipment.



This wall, full of QSLs, station pennants, and award certificates, belongs to Robert Pastrick in Pennsylvania.

not sure if that means they confirmed his report or just returned it). Anyway, the station said to listen for their "awesome" signal and Mr. Kalin wants to know what they meant by that. Dunno. Maybe higher power or perhaps, like that foreign car commercial on TV, that's the way they advertise it. For some reason, Radio Clandestine has ignored several reports I have sent so I envy you your reply.

Jim Becker of Meridian, Mississippi is just getting into the SWL game and uses a DX302 along with a Bearcat 210 scanner. It looks as though Jim is going to be a QSL-hound and he recommends that those who don't get into QSLing should consider trying their hand at this side of the hobby.

Jim's comment provides an irresistible opportunity for a commercial! By the time you read this, *QSL Address Book* (4th edition) should be off the presses. The book contains a section on how to write a reception report and treats all the ins and outs of QSLing. A listing of some 800 shortwave broadcast station addresses is the main feature with, in most cases, the name of the person who handles reports and a grade on how difficult it is to verify a given station.

The book sells for \$6.95 (\$9 outside the United States) and is available from Gilfer Associates, P. O. Box 239, Park Ridge, New Jersey 07656.

You just never know what's going to show up in your mailbox from day to day. Not long ago it was a letter from a long-lost friend, Paul Mathieu of San Angelo, Texas. Paul and I had corresponded some 25 years ago and then lost track. Paul has been too busy to do much listening over the past decades but he's getting active again and we look forward to his regular reports. Paul uses a trusty old National NC-190, with an Ameco PCL preamplifier, a Realistic DX-300, and an ICOM R-70.

Steven Kidd of San Francisco says he uses a Sony ICF 6700W receiver with a 40 foot longwire antenna and is a member of SPEEDX and the International DX'ers Club of San Diego. Welcome aboard, Steve. We hope to hear from you often!

John Freeman of Rancho Palos Verdes, California, wonders about storing club bulletins and other information one wants to keep for future reference. That's a problem we all have John. Back in "the old days" when mimeographed bulletins were the standard, it was an easy matter to punch the bulletins and keep them in three ring binders. Now, with bound, offset printed bulletins, storage is more difficult. Some people continue to pull out the staples, slice the whole bulletin down the center, punch in holes and put the sheets in the smaller size three ring binders. There are also the box-type magazine files available. I still keep bulletin copies loose on a bookshelf. This is a messy, inefficient method to be sure.

Radio Finland is the subject of a question from John H. Bruckner of Westfield, New Jersey. John has received a form letter from the station which states that Radio Finland does not issue QSLs but, rather, answers questions by letter and on their "Airmail"



Here's James Becker of Meridan, MS with his DX-302 receiver and Bearcat scanner.



Regular POP'COMM Listening Post reporter Sheryl Paszkiewicz of Manitowoc, Wisconsin in her shack.

program. John notes that we pictured a recent QSL card from Radio Finland a few months ago. Apparently, this is a recent policy change and there's little to be done about it, other than hoping that one day Radio Finland's policy will revert back to one with a more favorable view of verifying reception reports.

John uses a Realistic DX-100 and hopes to add a Kenwood R-2000 soon. He also notes that personnel at Belgian Radio are on strike so the "Brussels Calling" program is currently off the air, though it may well be back on by the time you read this.

John also wonders about obtaining mint stamps of foreign countries to include with reception reports. The answer to that one is easy. The DX Stamp Service at 7661 Roder Parkway, Ontario, New York 14519 can supply stamps for a long list of countries, most of them the equivalent airmail amounts. Send a self-addressed stamped envelope for their current price list.

Kenneth J. Gilcrest of Toronto, Ohio wants to know how he can hear news in English from the major stations at various times of the day. Well, there are two publications which specialize in hour-by-hour listings of English programming on shortwave. The monthly *Guide to English Shortwave Programs*, published by Dan Ferguson, P.O. Box 8452, South Charleston, West Virginia, 25303 costs \$15 per year. There's also the *International Listening Guide*, published four times a year at a \$6 annual subscription from Rob Harrington, P.O. Box 3434, Littleton, Colorado. This is published in West Germany but distributed in North America through Harrington.

That takes us to the bottom of the bag. Let's hear from you next month! We're interested in your loggings, comments, questions, black and white or color photos of you in your shack, good clean copies of your more interesting QSLs, copies of program schedules you've received and, in short, anything you feel would be of interest to Listening Post readers.

Listening Reports

Here's what's on. All times are in GMT.

Afghanistan Radio Afghanistan heard on 15.077 from 1915 to 1930 in Pushtu and Persian (Farsi). Clear ID but poor strength. (Rempala, IL)

Alaska KNLS on 11.820 with sign on at 1129 and sign off at 1158. a religious program in Russian in between. (Hickerson, AR) On 6.170 at 1124 with classical music. identifications by man and woman, English lessons at 1230. (Konen, WI)

Albania Radio Tirana noted at 0330 to 0355 on 7.300 at excellent level with news, folk music, and political talk. (Kidd, CA)

Antigua The BBC Relay Station heard on 9.510 at 0429 with identification in English. BBC news at 0430. For five minutes preceding the ID there was a tape loop with repeating carillon music and brief interruptions as various antennas were switched in. (Homuth, AZ)

Austria Austrian Radio on 5.945 at 0450 ending English at 0455 and signing off with the Blue Danube interval signal and identification. In parallel to 9.770. (Konen, WI)

Australia Radio Australia on 5.995 and 6.060 at 1300 with "Australian Country Style." Heard on 9.710 at 1259 with "Waltzing Matilda" and the kookaburra bird call at sign on. into Japanese. (Homuth, AZ) Pacific Service good from 1000 to 1200 on 5.995 and 6.045. (Mathieu, TX)

Bangladesh Radio Bangladesh on 21.670 heard from 1230 sign on with interval signal. identification in English, and then news. It seemed to fade around 1236. (Hickerson, AR)

Belgium "Brussels Calling" on BRT found from 0030 to 0100 on 9.880 with Flemish music being one of the features. (Pastrick, PA)

Bolivia Radioemisora Bolivia at Oruro on 4.755 made a surprise appearance from 1030 to 1100 with Andean music and heavy interference. It ended up fading by 1100. (Mathieu, TX)

Brazil Here are a number of Brazilian stations to try for: At 0900 Radio Nacional Sao Gabriel de Cachoeira on 3.375. Radio Cultura de Bahia on 4.895. and Radio Guaiba in Porto Alegre on 5.965. At around 0730 Radio Anhanguera in Goiania on 4.915. At 0800 Radio Brazil Central also in Goiania on 4.985 and at 0830 Radio Universo in Curitiba on 6.020 with gospel programming. All in Portuguese. (Mathieu, TX)

Bulgaria Radio Sofia on 17.755 at 2030 in English with a commentary on flight 007. African issues. (Paszkiewicz, IL)

Burundi La Voix de la Revolution in Bujumbura on 3.000 heard from 0300 to 0335 with vernacular singing. identification in French. (Hickerson, AR)

Cameroon Radio Douala, 4.795 from 2232 to 2307 sign off with program of African and some U.S. pop music with announcements in French to 2301 then news in English and back to French at 2303. Final announcement in French at 2305. anthem and sign off. Excellent signal. (Lazarus, LA) At 0428 to 0530 in English and French.

Canada CKFX, Vancouver on 6.080 from 0805 to 0830 with country-western songs, ads. identifications. Power only 10 watts. (Hickerson, AR)

China Xinjiang PBS, Urumqi, presumed, from 1144 to 1158 with oriental music, two short announcements by woman in Chinese. Faded by 1158. (Lazarus, LA)

Radio Beijing on 11.600 from 1011 to 1027 in English with Chinese lessons, frequencies, and times. Beamed to the South Pacific. (Pastrick, PA) At 0415 with world news in English on 17.690. (Homuth, AZ)

Clandestines Radio Farabundo Marti (anti El Salvador) on 6.920 at 0135 with close of impassioned talk, several IDs, martial music, and suffering jamming. Off 0143. (Konen, WI)

La Voz de Cuba Independiente y Democratica noted on 5.105 at 1140 to 1205 when it faded and suffered interfer-

ence from a "utility" station. Programs included "Panorama Mundial" and "Cuba Para Los Cubanos" along with a comedy/political satire program. (Mathieu, TX)

Radio Vatan, anti-Iranian, heard on 15 555 from 0410 to 0458 in presumed Farsi. Talks by man and woman. Persian music, several clear IDs by a woman. Excellent signal. (Lazarus, LA)

Radio Venceremos heard at 0350 on 6.905 with military music, revolutionary speeches. Audio quality sounded like ham radio equipment designed for voice frequencies. (Homuth, AZ)

Colombia Radio Bucaramanga. 4.845 at 0620 with excellent strength, requesting reports to Apartado Aereo 572, Bucaramanga, during their late night music program. (Mathieu, TX) At 0506 with frequent IDs and "Programa Musica Colombiana." (Konen, WI)

Ecos del Combeima, Ibaque, heard at 0324 with man and woman giving "noticias del Colombia," jingles, and announcements. (Konen, WI)

Armonias del Caqueta on 4.915 at 0335 with religious music, sermon, brief bits of music. (Konen, WI)

Radio Cinco at Villavicencio on 5.040 good at 0600 with music. (Mathieu, TX)

Radio Macarena on 5.975 from Villavicencio noted with strong signals at 1000 with a program for farmers, "Radio Macarena en el Campo." (Mathieu, TX)

Costa Rica Radio Impacto on 6.150, excellent in the early morning (1000-1200) with music, frequent IDs, and requests for reports to Apartado 497. San Jose. (Mathieu, TX) They may want reports but they don't seem to want to answer them! (Editor) Heard with talks about Radio 15 de Septiembre, the Sandinistas and other Central American news at 1109. (Konen, WI)

Cuba Radio Havana. 7.425, at 0055 in Spanish with news and martial music. At 0048 with Moscow's "Mayak" service on 7.465. (Konen, WI)

Czechoslovakia Radio Prague on 7.345 at 0355 with identification at 0357. Radioteletype interference and transpolar fading. (Homuth, AZ)

Denmark Radio Denmark on 15.165 with English and Danish IDs at 1258. Broadcasts exclusively in Danish, though the transmission was for North America and the Caribbean. (Ort, NY)

Dominican Republic Radio Clarin. 11.700, at 2300 with an anti-Cuban program. (Mathieu, TX)

Radio Santiago. 6.047 heard from 0937 to 1016, tentatively, with continuous news, a few recorded announcements. Program is called "Noti-tiempo." Several items about the Dominican Republic. (Lazarus, LA)

Ecuador Emisora Gran Colombia in Quito on 4.911 at 0307 with identification, middle of the road music, talk on Cuba and President Reagan, ID 0330. (Konen, WI)

Radio Iris. 3.380 at 0138 with man and woman announcers and program of upbeat Latin Music. (Konen, WI) Heard from around 0900. (Mathieu, TX)

HCJB's 100 watt outlet on 26.020 heard with moderate strength. (Homuth, AZ) HCJB in English from 0540 to 0600 on 11.910 with program called "Magic With Meaning." (Pastrick, PA)

Mathieu hears a number of nice Ecuadorian outlets, including C.R.E. in Guayaquil on 4.656 (announces 4.655) around 0930, usually running just music for the first ten minutes while they tune up the transmitter. On 4.820, Radio Paz y Bien. 3.220 HCJB with their Quechua language service from 0900, La Voz del Napo at Tena on 3.280, Radio Zaracay at Santo Domingo de los Colorados on 3.395, Radio Jesus del Gran Poder in Quito on 5.050, Radio Nacional de Progreso at Loja on 5.060, all from around 1000 sign on. (Mathieu, TX)

Radio Popular at Cuenca on 4.800, good from 0630 to 0715 with Andean music. (Mathieu, TX) La Vox del Rio Tarqui on 3.286 at 0630 to 0715. (Mathieu, TX)

Falkland Islands FIBS heard on 3.958 at 0920 with rock, heavy ham interference, and high static level. Fade out after about 20 minutes. (Ort, NY)

France Radio France International on 6.055 in French at 0147. Reggae and hi-life music, ID at 0200. (Paszkiwicz, WI)

Gabon Africa Number One on 4.810 with sign on at 0457: musical wake-up show until 0600. (Mathieu, TX)

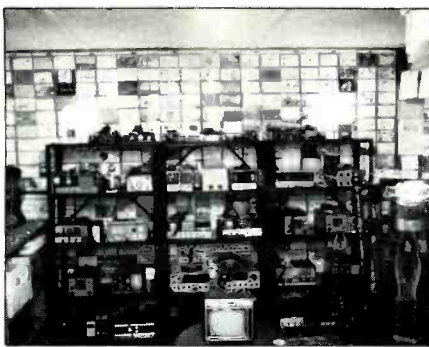
Galapagos Islands La Voz de Galapagos in Spanish with Latin music and ID between 0130 and 0215 on 4.810. (Hickerson, AR)

Great Britain The BBC heard at 0400 on 9.915 with news in English. (Homuth, AZ)

Greece The Voice of Greece heard on 9.865 from 0130 to 0150 in English, then into Greek. (Pastrick, PA)

Guam KTRW, Agana, on 9.590 at 1030 in Mandarin Chinese. (Mathieu, TX)

Guatemala La Voz de Nahuala on 3.360 at 1123 with instrumental music, ID at 1129 and fading. Radio



Dave, of Fort Wayne, Indiana has over 6,000 QSL cards in his collection.

Mam. 4.825 at 0240 with complete ID, music, and sign off at 0242. (Konen, WI)

Honduras HRVC, La Voz Evangelica, on 4.820 of ten good around 1000 and again around 0500. (Mathieu, TX)

India All India Radio heard with local news in English at 2054 on 11.620. Poor with QRM. (Paszkiwicz, WI)

Indonesia The Voice of Indonesia heard on 11.850 at 1358 to 1407. ID at 1358 ending French segment and beginning Arabic? (Rempala, IL) Radio Republik Indonesia at Biak noted on 5.451 with music from 1030, sometimes holding until nearly 1200. (Mathieu, TX)

Ireland Radio Dublin International on 6.910 at 0325 to 0345 with pop music and English identifications. (Hickerson, AR)

Israel The Voice of Israel noted from 0013 to 0030 on 9.815 with its mailbag and "DX Corner" program. (Pastrick, PA) Heard during sign off at 0155 on 15.585 in an unknown European language. (Homuth, AZ) On 11.645 at 0000 to 0024. (Pastrick, PA)

Ivory Coast Radiodiffusion Ivoirienne on 4.940 at 2328 with French ballads, African music, talk, news, identification, and frequency announcement. Sign off at 0000. (Paszkiwicz, WI) Music with man announcer in French, possible anthem of march-type music at 0000 sign off. Tuned from 2330. (Ort, NY)

Kiribati Radio Kiribati on 16.433 (lower sideband) from 0017 to 0130 sign off in local language, island music, news, and identification. (Hickerson, AR)

Laos Radio National Lao on 6.130 at 1200 in Laotian during their home service. (Hickerson, AR)

Liberia ELBC, The Liberian Broadcasting System found on 3.255 around 0600 to 0615 but weak, with a lot of interference. ELWA on 4.765 noted in English following their 0700 sign on. (Mathieu, TX)

Libya Radio Jamahiriyah, heard from 2140 to 2215 on 11.816. Programs include "History of the Arabs," the "Happy Music Show," and many anti-American comments. (Pastrick, PA)

Mauritius The Mauritius Broadcasting Corporation logged on 9.709.4 at 1115 to 1132 in English with identification given by a woman. Indian music. (Hickerson, AR)

Mexico XEWW, La Voz de la America Latina, noted on 6.165 at 1230 to 1330 with a long program of news and sports. (Mathieu, TX)

Mongolia Radio Ulan Bator heard in Mongolian at 1000 on 12.070. (Mathieu, TX)

Nepal Radio Nepal, 9.590 at 1500, poor, man reading many items in English, only occasional words were understandable. (Ort, NY)

Netherlands Antilles Trans World Radio, Bonaire, "Caribbean Nightcall" program noted from 0510 to 0530 on 9.535, talking of tracking a hurricane. (Pastrick, PA)

New Caledonia Radio Noumea on 7.170 at 0728 in French with a variety of music, news at 0800. Ham interference. (Paszkiwicz, WI) At 0945 with rock. In French. Ham QRM. (Ort, NY)

Nicaragua Radio Zinica at Bluefields heard on 6.120 from 1100 with music and propaganda. (Mathieu, TX) From 0330 to 0345 with Latin pops, man in Spanish with identification. (Hickerson, AR) At 0413 with romantic ballads, man announcer, and ID. (Konen, WI)

Nigeria FRCN, Kaduna on 4.770 with English news at 0600 to 0615. (Mathieu, TX)

Norway Radio Norway International at 1908 on 17.840 with English news, music, interviews. Also at 1400 on 17.715 in English. (Paszkiwicz, WI)

Papua New Guinea Radio North Solomons on 3.322 logged at 1005 with light, island-type music. Heavy RTTY interference. (Ort, NY)

Peru Radio Los Andes at Huamachuco on 5.030 heard very well in the mornings between 0930 and 1130 with some QRM from Sarawak after 1030. Program of Andean music and commercials. Radio Andina on 4.996, fair to good many mornings around 0915 with Andean music and frequent time checks, splatter from WWV on 5.000. (Mathieu, TX) And beware Radio Baha', Ecuador also on 4.996. (Editor) Radio America, Lima on 6.010 heard at 1030, Radio Atlantida, Iquitos on 4.790 from 0930, Radio Inca del Peru on 4.762 with "Serenata Andina" (Andean Serenade) program from 0530 to 0600 closing with anthem. Radio Eco at 0315 on 5.112 with political rally to 0345, music to 0450. (Mathieu, TX) At 0956 with "Panorama de Radio Eco" and frequent IDs. Radio Oriente, Yurimaguas at 1042 on 6188.8 with Latin pops, man with ID cutting into the songs. Radio Moyabamba, 5.015 heard at 1037 with flute music, woman and man announcers at poor to fair level. (Konen, WI)

Portugal Radio Renascenca heard at 0001 on 11.730 with news and sports to 0100, at good level. (Mathieu, TX)

Saudi Arabia B.S.K.S.A. with its home service on 15.060 heard at 1515 with usual chanting and man announcer. Excellent signal although low modulation. (Ort, NY)

Senegal Dakar on 4.890 noted at 0705 with Koran recitation. (Mathieu, TX)

Solomon Islands Solomon Islands Broadcasting Corporation heard at 0945 on 5.020 with music and news from Radio Australia at 1000. (Ort, NY)

South Africa Radio RSA on 7.270 at 2150 with English news about Africa and "Africa Today." (Konen, WI)

South Korea Radio Korea with a Spanish program from 0930 to 9.570. Time and frequency announcements followed by news. (Ort, NY)

Spain Spanish Foreign Radio in English from 0601 to 0630 on 11.880 with news and Spanish language lessons. (Pastrick, PA)

Switzerland Swiss Radio International with "Dateline Monday" program at 1530 on 17.830. (Paszkiwicz, WI)

12-14713
GIORGIO SAVINI
Via delle Primule, 14
20086 - ROVERETO (VA) - ITALY

TO RADIO

DATE: 05. VIII. 1981

TIME: 19.00

FREQ: 14.700

MODE: USB

MY SHACK: KENWOOD R1000 2 EL WINDOW

3B VERTICAL PSE QSL DIRECT TO L. KUNZEL

P. BOX 2312 D4830 GÜTERSLOH 1 OF QSL VIA DARC DL-N07-1831528

BEST 55-73

YUGOSLAVIA
ZORAN NIKŠIĆ
SUMADINSKA 19
32000 ČAČAK
YUGOSLAVIA

YUARS-954

CFM TWO WAY GSO ENJE

TO: [redacted]

DATE: 05. VIII. 1981

TIME: 19.00

FREQ: 14.700

MODE: USB

MY SHACK: KENWOOD R1000 2 EL WINDOW

3B VERTICAL PSE QSL DIRECT TO L. KUNZEL

P. BOX 2312 D4830 GÜTERSLOH 1 OF QSL VIA DARC DL-N07-1831528

BEST 55-73

GERMAN SWL - STATION DL-N07-1831528

TO STATION

Observation in 10. Jahrhundert

DATE: 05. VIII. 1981

TIME: 19.00

FREQ: 14.700

MODE: USB

MY SHACK: KENWOOD R1000 2 EL WINDOW

3B VERTICAL PSE QSL DIRECT TO L. KUNZEL

P. BOX 2312 D4830 GÜTERSLOH 1 OF QSL VIA DARC DL-N07-1831528

BEST 55-73

The SWL cards are popular with listeners in all parts of the world. Here are a few from some European listeners. Why not send your card in to POP'COMM no matter where you're located.

Tahiti Radio Tahiti. 11.825 at 0730 with a call-in disc jockey program in French. (Ort. NY)

Thailand Radio Thailand on 11.905 at 1159 sign on with interval signal, anthem, and English ID. Interference from Taiwan on the same frequency. (Hickerson. AR)

Turkey The Voice of Turkey from 0305 to 0350 on 11.755 with news, Turkish music, and talk about the Turkish women's movement. Interference from the Russian "woodpecker." (Pastrick, PA) On 11.810 from 2215 to 2247 in English with many IDs. (Rempala, IL)

Ukrainian SSR Radio Kiev, on new 9.685 in English from 2330 to 2339, readable but surrounded by many stations. (Rempala, IL)

United Arab Emirates Radio Dubai heard at 1615 on 15.300 with a program on "Arab Centers of Civilization" followed by local and world news. (Bruckner, NJ)

Venezuela Radio 980/La Voz el Tigre, at El Tigre heard at 1000 on 3.255 Radio Occidente. Tovar on 3.255 also noted at 1000 with sign on. Radio Universidad, Merida, probably the one heard on 3.395 at 0600.

Radio Mara from 1000 sign on on 3.275 with classical music on Sundays til 1030, then news to 1045, all in Spanish. (Mathieu, TX)

West Germany Deutsche Welle at 0100 on 11.865 in English to North America. (Ort. NY)

Many thanks to: Mark Konen, Milwaukee, Wisconsin; Harold Ort Jr., Staten Island, New York; Robert C. Homuth, Phoenix, Arizona; Sheryl Paszkiewicz, Manitowoc, Wisconsin; Larry Rempala, Lisle, Illinois; Gary C. Hickerson, Ft. Smith, Arkansas; Robert Pastrick, Baden, Pennsylvania; Henry Lazarus, New Orleans, Louisiana; Paul A. Mathieu, San Angelo, Texas; Steven Kidd, San Francisco, California; and John H. Bruckner, Westfield, New Jersey. See you next month. 'Til then, good listening!

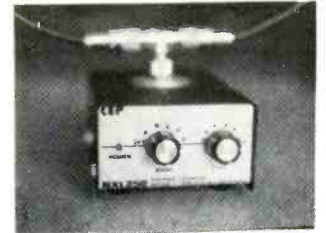
Press Time Flashes!

Thanks to the efforts of POP'COMM's military consultant, Harold Ort, Jr., the United States Armed Forces Radio and Television Service (USAFRTS) will resume QSLing North American listener reports providing a prepared QSL card is supplied for them to sign and return. Previously, the USAFRTS had announced they would no longer verify any reports from U.S. listeners. **DO NOT** send reports to Washington, D.C.; send reports to AFRTS-PC, 1016 N. McCadden Place, Los Angeles, CA 90038. Return postage not necessary.

At press time we were informed that Gilfer Associates (P.O. Box 239, Park Ridge, NJ 07656) is now offering a new 200-page computer printout of SW broadcasting schedules. Titled Radio Database International, this is intended to provide a convenient source for SWBC frequency information between 2.3 and 30 MHz. Key-language programs are identified by easily recognized symbols and the publication will eliminate the need to search text material for skeds and frequencies. RDI has been developed by International Broadcasting Services, Ltd., and compiled/edited by Larry Magne. The RDI staff includes well-known DXers including Sarath Amukotwa, Victor Goontilleke, Noel Green, Don Jensen, Tony Jones, and Prof. David Meisel. The cover price of the January '84 edition is \$11.95. A summer edition will be published in June. Contact Perry Ferrell at Gilfer for further details. Sounds like a useful publication for SWBC listeners!

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Beaming In (from page 4)

computers. The media reports that the FBI has been running around to confiscate their computers. One teenager in California was quoted as saying that there were seven agents in his house and that they entered after breaking his bedroom window!

The FBI charged that some of the 15 computers they seized last October had figured out the coded passwords which enabled them to connect up with the GTE Telemail Electronic Mail System, the MIT computer, the Los Amamos nuclear laboratory, and the computer at McClellan AFB in California. Other previously caught computer hackers have been accused of accessing computers owned by hospitals, banks, and various businesses.

What has never ceased to astonish me is that it's been the teenage hackers who have 100% borne the onus of these deeds while those whose computers have been invaded have been regarded as the innocent victims of these "crimes." That these companies and agencies were going about their business in a fully legal manner is true. However, I question the ratio of blame ascribed to the hackers versus the injured parties.

On the one hand, the hackers are high school and college students working with their own ingenuity and easily available consumer-oriented equipment. Somehow they have breached the security barricades erected to protect the information contained in highly sophisticated multi-million dollar computers designed and programmed by some really heavy professionals within the industrial and military communities. The question is whether the hackers are so talented and their equipment so versatile that nothing can escape their probing, or the computer systems which are being invaded (and those who program and run them) are somehow unworthy. Probably a little of both, and it certainly does (or should) bring up the question of how secure is any of the national defense or industrial data we have from professional espionage agents if that data can be accessed by teenagers with home computers?

Insofar as the hackers are concerned, it's probably more of a challenge than any serious attempt at doing harm. Obviously these are people who have transcended the thrills of "PAC-MAN" and "SPACE INVADERS" and have moved on to greener fields. It seems unfair of society to first complain about the poor quality of our educational system and then, in the very next breath, rise up in outrage at the boldness and acuity of these same youngsters when they have figured out how to pick through the data stored in a "protected" nuclear lab or Air Force computer by means of an Apple, IBM, Osborne, RadioShack, Heathkit, Commodore, or other microcomputer!

When you put a swimming pool in your backyard, you are also expected to erect an adequate fence around it to keep unwanted visitors out, even though the pool is on your own property. The pool, by its very nature,

is considered to be an "attractive nuisance"—that is to say, a lure for any or all neighborhood urchins unable to avoid the temptation of trespassing upon your property to take a dip. Should you have no adequate fencing up to protect the pool, you could easily be held responsible for any injuries sustained by those who use it even though they may have trespassed. These companies and government agencies have, likewise, created an attractive nuisance—especially since it seems that they simply leave their computers connected up to the telephone lines and subject to automatic access by means of some password. Determining what that password might be in order to get into the computer is considered to be an ultimate guessing game which is irresistible to hackers.

Those whose computers have been probed and invaded should almost appreciate learning that their precious information can be so easily laid bare by amateurs. You'd think so, wouldn't you? If they don't want unauthorized persons to access their data, why don't they simply disconnect their computers from the automatic dial-up and password procedures and, instead, hire a security person who can make an assessment of the authority of those who seek access to their computers? That would seem to be at least one reasonable step which they could be expected to take to discourage hackers.

Those who claim to store classified or otherwise protected data in their computers should share at least half of the blame when that information is accessed by hackers. While I do not in any way wish to imply any encouragement for hackers, I am not willing to get very worked up about their "crimes." Nor do I have any sympathy at all for those whose computer security is so lax that it can be violated by a teenager with a microcomputer. Let's face it, there are hackers and there are hackers. While some may well view it all as an intellectual and technical pursuit (seeing the accessing of the computer as their ultimate goal), others could maliciously or accidentally tamper with vital information stored in some of the computers involved. Besides the national defense aspects of this, you might not think it was very funny if it was your credit rating which was done in by a hacker! Could happen!

Compuscan

While I'm on the subject of computers, I wanted to mention that I saw a really interesting marriage of the home computer to a scanner. The people at Electra (makers of the Bearcat line of scanners) gave me a demonstration of a unique new product they're coming out with called *Compuscan*. This is a combination of hardware and software which is used in conjunction with any microcomputer (the hardware remains the same but the software will be different for different types of computers).

With the *Compuscan* connected to a home computer, the computer becomes a 200-channel scanner of truly heroic proportions. The scanner receiver is part of the

Compuscan's hardware and no additional equipment is required (except an antenna).

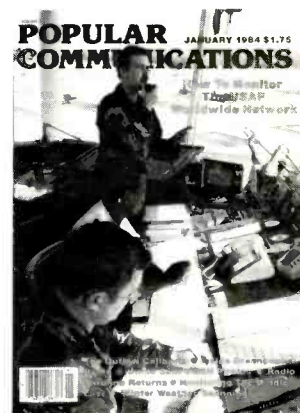
As you program your desired monitoring frequencies into the *Compuscan*, an image of the instructions for that particular channel appears on the computer's CRT screen. It shows the actual frequency; a "memo" notation of what that frequency is used for; whether the delay, lockout, or priority features are activated; and any special instructions for reception on that channel. For instance, the special instructions could turn on a tape recorder when that channel activates, or switch over to a special antenna, or flash a warning light, or whatever. Actually, you can program several special instructions into each individual channel. The *Compuscan* also features full search capabilities throughout the low, high, and UHF/UHF-T bands, plus the VHF aero band. The early prototype unit I saw demonstrated had the UHF band commencing at 420 MHz. However, there was talk of the band commencing at 406 MHz in production models.

I had seen the *Compuscan* demonstrated on a Commodore 64 computer and it gave a good account of itself. The software was on a floppy disc and required only one disc drive, although some versions for smaller computers such as the Vic 20 will probably be available on tape cassettes. The Electra people tell me that they hope to have software available for every microcomputer.

If you've got a home computer, here's a product to watch for!

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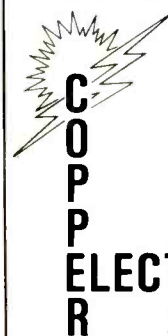
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SCADS is having a gathering and invites all SWL's and radio fans! The get-together will be 18 February, 1984, at the Mercury Bank Room, 4140 Long Beach Blvd., Long Beach, CA, 10 AM to 4 PM PST. There will be a potluck lunch, raffle awards, door prizes, auction. A film on the BBC will be shown and there will be equipment displays, plus a guest speaker, a Q & A session. Radio station giveaway goodies and local club displays are a part of the day. For more information, send a #10 legal size SASE to SCADS, 3809 Rose Ave., Long Beach, CA 90807-4334. Thanks to Stew MacKenzie of ASWLC and SCADS for letting us know about this. Hope you can be there, these gatherings are always interesting and enjoyable. All of us here at POP'COMM want to wish ASWLC all of the best on the club's 25th year as a hobby group!

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