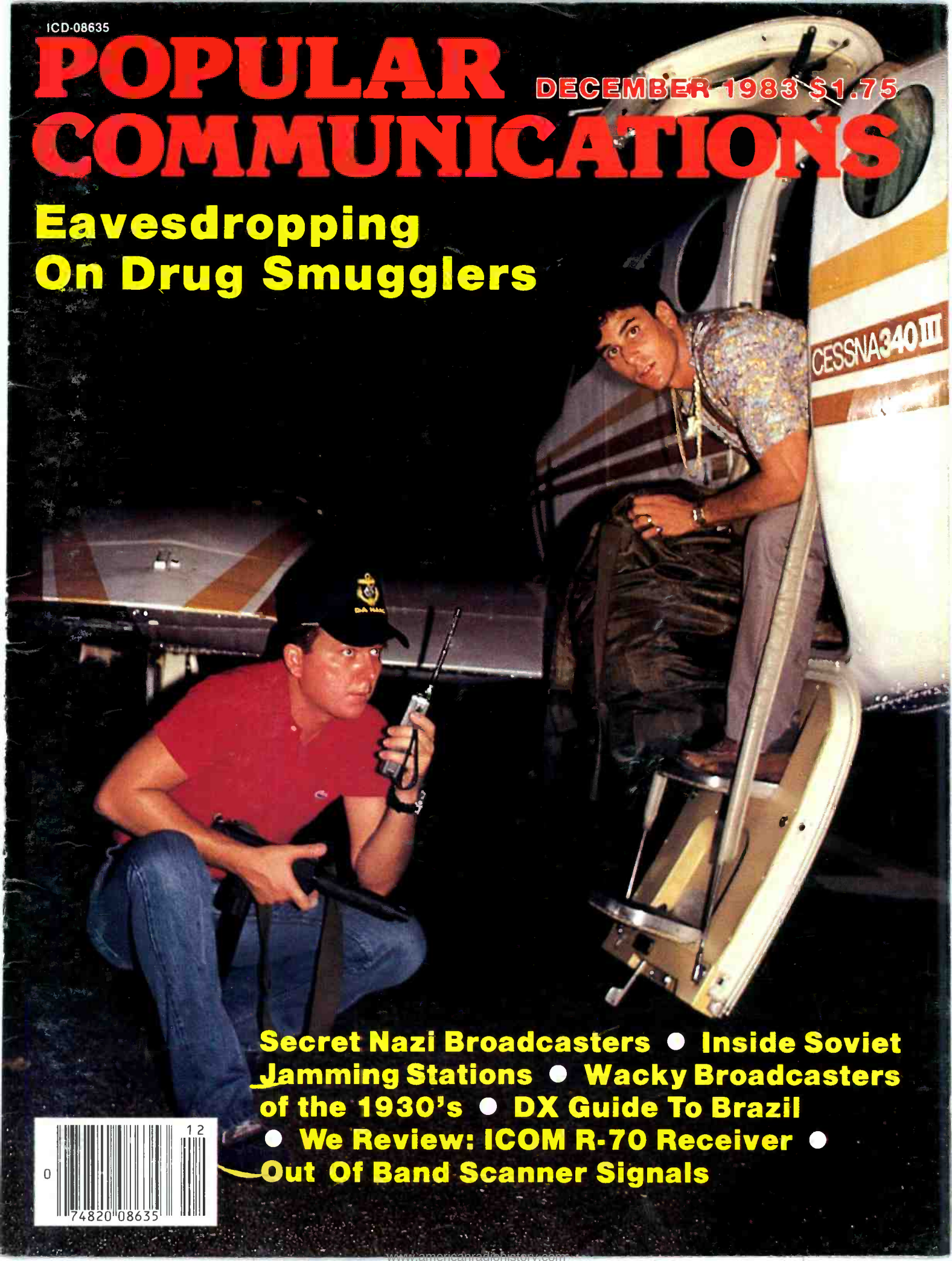
ICD-08635

POPULAR COMMUNICATIONS

DECEMBER 1983 $1.75

Eavesdropping On Drug Smugglers



Secret Nazi Broadcasters • Inside Soviet Jamming Stations • Wacky Broadcasters of the 1930's • DX Guide To Brazil • We Review: ICOM R-70 Receiver • Out Of Band Scanner Signals

0 74820 08635 12

Entirely professional level!
You'll find the difference the more you use it.

ULTIMATE QUALITY, NRD-515

Receiver, NRD-515

SPECIFICATIONS

Receiving frequency range:	100kHz to 30MHz continuous (30 bands)
Receiving modes:	USB/LSB/CW/RTTY/AM
Receiving system:	Up conversion type Double superheterodyne First IF: 70.455MHz
Sensitivity (S/N 10dB):	CW/SSB AM
1.6 to 30MHz	0.5μV 2μV
100 to 1600kHz	2μV 6μV
Selectivity:	6kHz/2.4kHz/0.6kHz/0.3kHz (*Option)
Stability:	Within 50Hz/one hour
Power requirements:	AC 100/117/220/240V, 50/60Hz, 50VA
Dimensions and Weight:	340mm(W)×140mm(H)×300mm(D); Approx. 7.5kg
Preset memory (Option):	24ch
Frequency stability:	Less than 50Hz per hour after warming up.
Image rejection ratio:	70dB or more
IF rejection ratio:	70dB or more
Input impedance:	50 to 75 ohms, unbalanced
AF outputs:	
Speaker output:	1W or more (4 ohms)
Record/line output:	1mW or more (600 ohms)

Highest grade all-wave receiver

NRD-515

Best for 59

Transmitter, NSD-515

SPECIFICATIONS

Rated output power:	100W NSD-515 (50W 28MHz band)
Frequency range:	1.8MHz-2.0MHz/3.5MHz-4.0MHz/7.0MHz-7.3MHz/14.0MHz-14.35MHz/21.0MHz-21.45MHz/28.0MHz-29.0MHz/29.0MHz-29.7MHz Optional new bands approved by WARC '79 10.1MHz-10.15MHz/18.068MHz-18.168MHz/24.89MHz-24.99MHz/
Mode of emission:	A3J (USB/LSB) A1 (CW) F1 (RTTY)

• For more information please contact to;

JRC Since 1915 **Japan Radio Co., Ltd.**

MAIN OFFICE: 5th and 6th Floors, Akasaka Twin Tower (Main), 17-22, Akasaka 2-chome, Minato-ku, Tokyo 107, JAPAN
Phone: (03) 584-2411 Telex: 242-5420 JRCTOK J

U.S.A. BRANCH OFFICE: T. Hayashi,
120 East 56th Street, New York, New York 10022
Phone: 212-355-1180 Telex: 230-645636 JAPANRADIO NYK

AUSTRALIA: N.S.W.—EMONA ELECTRONICS PTY LTD. Phone: 398-6378
Victoria—VICOM IMPORTS PTY LTD. Phone: (03) 62 6931
FINLAND: Kotka—VISI RADIO OY Telex. 53260 VISI SF
FRANCE: Paris—SOCIETE G.E.S. (GENERAL ELECTRONIC SERVICES) Phone: (1) 345 35 92
CANADA: Vancouver—GLENWOOD TRADING CO., LTD. Phone: 604 984 0404
GERMANY: Hannover—RICHTER & CO. Phone: (0511) 352 1111
ITALY: Milanese—TECHNOVENT, ITALIA, SRL Phone: 02 32 83 089

SWITZERLAND: SEICOM AG Phone: 064 515566
U.K.: Derbyshire — LOWE ELECTRONICS, LTD. Phone: 0629-2430

NEW ZEALAND: Dunedin MALVICOM INTERNATIONAL, LTD. Phone: 697-625

CIRCLE 38 ON READER SERVICE CARD

Actual slow motion frames from Ham MasterTapes

1. Larry, N2NY, Lee, KA2RNV, Virginia, N2EGJ

2. Lee discharges cap

3. In slow motion it's dazzling

4. Wow. Can we see it again?

You've never seen this, like this, before this!

And you can see it—in color—again and again when you own the N2NY Ham MasterTapes.

Ever see a cap discharge in slow motion? You will on Ham MasterTapes. Ham MasterTapes can perform the dozens of complicated demonstrations necessary for a beginner's understanding of Ham Radio Theory.

Finally, a step-by-step course in Ham Radio Theory is available on color videotape. The Larry Horne N2NY Ham MasterTapes video course is a unique, effective teaching technique expertly produced by New York's leading professionals in studio and field videotape.

☐ Video Graphics highlight important details.

☐ Carefully worked-out demonstrations on video avoid the problem of getting complex gadgets to work on command in front of a class.

☐ Working examples of every ham radio component, device, or system covered in the FCC guide can be clearly understood.

The N2NY Ham MasterTapes give you a basic grasp of concepts that build theory background—not only for passing the FCC tests, but for understanding electronics.

The hobby has long needed better, clearer, high-tech teaching aids to help newcomers into our wonderful world of Ham Radio.

These six-hour tapes cover completely all the material needed to understand Novice and Tech/General Theory and operations, and include the new 200-question FCC syllabus used beginning September 1983.

Only $199.95. Order direct and specify Beta or VHS format. Call or write: Larry Horne, N2NY or Virginia Hamilton, N2EGJ at
Ham MasterTapes
136 East 31st Street
New York, N.Y. 10016 212-673-0680.

Ham MasterTapes™
THE N2NY HAM RADIO COURSE ON VIDEOTAPE

CIRCLE 31 ON READER SERVICE CARD

NEW!

Regency®

Scanners

Communications Electronics,™ the world's largest distributor of radio scanners, introduces new models with special savings on all radio scanners. Chances are the police, fire and weather emergencies you'll read about in tomorrow's paper are coming through on a scanner today.

We give you excellent service because CE distributes more scanners worldwide than *anyone* else. Our warehouse facilities are equipped to process thousands of scanner orders every week. We also export scanners to over 300 countries and military installations. Almost all items are **in stock** for **quick shipment**, so if you're a person who prefers fact to fantasy and who needs to know what's *really* happening around you, order your radio today from CE.

NEW! Regency‡ MX3000

List price $299.95/**CE price $199.00**
6-Band, 30 Channel • No-crystal scanner
Search • Lockout • Priority • AC/DC
Bands: 30-50, 144-174, 440-512 MHz.
The *Regency* Touch MX3000 provides the ease of computer controlled, touch-entry programming in a compact-sized scanner for use at home or on the road. Enter your favorite public service frequencies by simply touching the numbered pressure pads. You'll even hear a "beep" tone that lets you know you've made contact.

In addition to scanning the programmed channels, the MX3000 has the ability to search through as much as an entire band for an active frequency. The MX3000 includes channel 1 priority, dual scan speeds, scan or search delay and a brightness switch for day or night operation.

NEW! Regency® HX650

List price $119.95/**CE price $84.00**
5-Band, 6 Channel • Handheld crystal scanner
Bands: 30-50, 146-174, 450-512 MHz.
Now you can tune in any emergency around town, from wherever you are, the second it happens. Advanced circuitry gives you the world's smallest scanner. Our low CE price includes battery charger/A.C. adapter.

NEW! Regency® MX7000

Allow 120-240 days for delivery after receipt of order due to the high demand for this product.
List price $599.95/**CE price $449.00**
10-Band, 20 Channel • Crystalless • AC/DC
Frequency range: 26-27, 30-108, 108-136 AM, 144-174, 440-512, 806-881 MHz., 1.0 GHz, 1.1 GHz.
In addition to normal scanner listening, the MX7000 offers CB, VHF, and UHF TV audio, FM Broadcast, all aircraft bands (civil and military), 800 MHz communications, cellular telephone, and when connected to a printer or CRT, satellite weather pictures.

NEW! JIL SX-200

CE price $269.00/*NEW LOW PRICE*
8-Band, 16 Channel • No-crystal scanner
Quartz Clock • AM/FM • AC/DC
Bands: 26-88, 108-180, 380-514 MHz.
Tune Military, F.B.I., Space Satellites, Police & Fire, D.E.A., Defense Department, Aeronautical AM band, Aero Navigation Band, Fish & Game, Immigration, Paramedics, Amateur Radio, Justice Department, State Department, plus thousands of other *restricted* radio frequencies no other scanner is programmed to pick up.

NEW! JIL SX-100

CE price $134.00/*NEW LOW PRICE*
6-Band, 16 Channel • Crystalless • AC/DC
Frequency range: 30-54, 140-174, 410-514 MHz.
The *JIL* SX-100 scanner is a mobile keyboard programmable scanner that puts you in the seat of the action at home or in your car. Compact and good looking, the SX-100 even gives you the time *and* date. It's small size will easily fit in most domestic or foreign cars and it's AC/DC adaptable for home use.

Regency® HX1000

Allow 90-180 days for delivery after receipt of order due to the high demand for this product.
List price $329.95/**CE price $209.00**
6-Band, 20 Channel • No Crystal scanner
Search • Lockout • Priority • Scan delay
Sidelit liquid crystal display
Frequency range: 30-50, 144-174, 440-512 MHz.
The new handheld *Regency* HX1000 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 20 channels at the same time. When you activate the priority control, you automatically override all other calls to listen to your favorite frequency. The LCD display is even sidelit for night use. A die-cast aluminum chasis makes this the most rugged and durable hand-held scanner available. There is even a backup lithium battery to maintain memory for two years. Includes wall charger, carrying case, belt clip, flexible antenna and nicad battery. Reserve your *Regency* HX1000 now.

Regency® R106

List price $149.95/**CE price $99.00**
5-Band, 10 Channel • Crystal scanner • AC/DC
Frequency range: 30-50, 146-174, 450-512 MHz.
A versatile scanner, The *Regency* R-106 is built to provide maximum reception at home or on the road. Rugged cabinet protects the advanced design circuitry allowing you years of dependable listening.

NEW! Regency® D810

List price $399.95/**CE price $259.00**
8-Band, 50 Channel • Crystalless • AC only
Bands: 30-50, 88-108, 118-136, 144-174, 440-512 MHz.
This scanner offers Public service bands, plus Aircraft and FM broadcast stations. You can listen to Bach or a Boeing 747, the Rolling Stones or the riot squad, or any of 50 channels. Plus special direct access keys let you listen to police, fire, emergency, or any of your favorite channels just by pushing a button.

Regency® R1040

List price $199.95/**CE price $129.00**
6-Band, 10 Channel • Crystalless • AC only
Frequency range: 30-50, 144-174, 440-512 MHz.
Now you can enjoy computerized scanner versatility at a price that's less than some crystal units. The *Regency* R1040 lets you in on all the action of police, fire, weather, and emergency calls. You'll even hear mobile telephones.

Programming the R1040 is easy. Merely touch the keyboard and enter any of over 15,000 frequencies on your choice of 10 channels.

TEST ANY SCANNER

Test any scanner purchased from **Communications Electronics™** for 31 days before you decide to keep it. If for any reason you are not completely satisfied, return it in original condition with all parts in 31 days, for a prompt refund (less shipping/handling charges and rebate credits).

OTHER RADIOS & ACCESSORIES

Regency® C403 Scanner	$59.00
***NEW!* Panasonic RF-B50** Shortwave receiver	$129.00
Panasonic RF-9 Shortwave receiver	$84.00
Panasonic RF-799 Shortwave receiver	$219.00
Panasonic RF-2600 Shortwave receiver	$199.00
Panasonic RF-2900 Shortwave receiver	$249.00
Panasonic RF-3100 Shortwave reciever	$269.00
Panasonic RF-6300 Shortwave reciever	$539.00
***NEW!* Bearcat® † 151** Scanner	$169.00
***NEW!* Bearcat® Five-Six** Scanner	$129.00
Bearcat® 300 Scanner	$349.00
Bearcat® 250 Scanner	$279.00
Bearcat® 200 Scanner	$189.00
Bearcat® 210XL Scanner	$229.00
Bearcat® 20/20 Scanner	$289.00
Bearcat® 100 Scanner	$289.00
Bearcat® Weather Alert	$49.00
Freedom Phone® 4000 Cordless telephone	$239.00
Fanon FCT-200 Cordless telephone	$139.00
Fanon 6-HLU Scanner	$99.00
CHB-6 Fanon AC Adapter/Battery Charger	$15.00
CAT-6 Fanon carrying case with belt clip	$15.00
SP55 Carrying case for *Bearcat* Five-Six	$15.00
MA-506 Carring case for *Regency* HX650	$15.00
SCMA-6 Fanon Moble Charger/Audio Amplifier	$49.00
AUC-3 Fanon auto lighter adapter/Battery Charger	$15.00
FB-E Frequency Directory for Eastern U.S.A.	$12.00
FB-W Frequency Directory for Western U.S.A.	$12.00
TSG "Top Secret" Registry of U.S. Government Freq.	$15.00
RRF Railroad Frequency Directory	$10.00
ESD Energy Services Directory	$10.00
ASD Frequency Directory for Aircraft Band	$10.00
SRF Survival Radio Frequency Directory	$10.00
TIC Techniques for Intercepting Comm. Manual	$12.00
CIE Covert Intelligence, Elect. Eavesdropping Man.	$12.00
B-4 1.2 V AAA Ni-Cad batteries (set of four)	$9.00
B-6 1.2 V AA Ni-Cad batteries (set of four)	$12.00
A-135c Crystal certificate	$3.00

Add $3.00 shipping for all *accessories* ordered at the same time.
Add $12.00 per shortwave receiver for U.P.S. shipping.

INCREASED PERFORMANCE ANTENNAS

If you want the utmost in performance from your scanner, it is essential that you use an external antenna. We have a base and a mobile antenna specifically designed for receiving all bands. Order **#A60** is a magnet mount mobile antenna and order **#A70** is an all band base station antenna. Price is $35.00 each plus $3.00 for UPS shipping in the continental United States.

BUY WITH CONFIDENCE

To ***get the fastest delivery from CE*** of any scanner, send or phone your order directly to our Scanner Distribution Center.™ Be sure to calculate your price using the CE prices in this ad. Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 30% surcharge for net 30 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on back-order automatically unless CE is instructed differently. Minimum *prepaid* order $35.00. Minimum *purchase order* $200.00. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. International orders are invited with a $20.00 surcharge for special handling *in addition* to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Non-certified and foreign checks require bank clearance.

Mail orders to: Communications Electronics,™ Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $7.00 per scanner for U.P.S. *ground* shipping and handling in the continental U.S.A. If you have a Visa or Master Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-521-4414. In Canada, order toll-free by calling 800-265-4828. Telex anytime 810-223-2422. If you are outside the U.S. or in Michigan dial 313-973-8888. Order today.

Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics.™
† *Bearcat* is a federally registered trademark of Electra Company, a Division of Masco Corporation of Indiana.
‡ *Regency* is a federally registered trademark of Regency Electronics Inc.

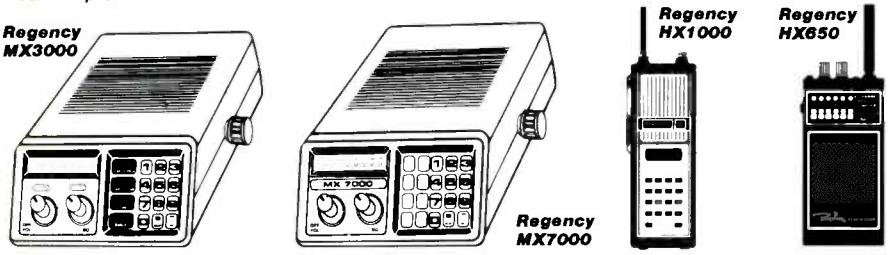
AD #092683

Order Toll Free . . . call 1-800-521-4414

COMMUNICATIONS ELECTRONICS™

Consumer Products Division

818 Phoenix □ Box 1002 □ Ann Arbor, Michigan 48106 U.S.A.
Call toll-free 800-521-4414 or outside U.S.A. 313-973-8888



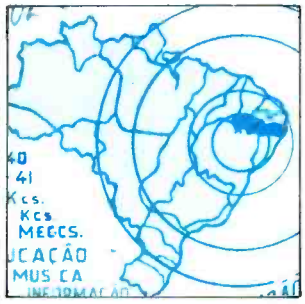
CIRCLE 32 ON READER SERVICE CARD

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone 516 681-2922. Popular Communications (ISSN 0733-3315) is published monthly by Popular Communications, Inc. Corporate officers: Richard A. Ross, Pres.; Thomas S. Kneitel, Vice Pres.; Alan M. Dorhoffer, Secretary. Application to mail at controlled circulation rates pending at Hicksville, NY and additional points. Subscription prices: Domestic—one year $12.00, two years $22.00, three years $32.00. Canada/Mexico—one year $14.00, two years $26.00, three years $38.00. Foreign—one year $16.00, two years $30.00, three years $44.00. Foreign Air Mail—one year $69.00, two years $136.00, three years $203.00. Printed in the United States of America. Postmaster: Please send change of address to Popular Communications, 76 North Broadway, Hicksville, NY 11801.

POPULAR COMMUNICATIONS

DECEMBER 1983 **VOL. 2, NO.4**

8



16

24

FEATURES

This month's cover: *Photo by Larry Mulvehill, WB2ZPI. Posed by models.*

DEPARTMENTS

BEAMING IN

BY TOM KNEITEL, K2AES

AN EDITORIAL

The Squirm Turns

My Old Man was a genuine radio fan. Guess he must have gotten interested in it way back in the mid-1920's. When I got interested in radio he was in his glory and his big joy was to march visitors into my shack and show off the kid with the assortment of Hallicrafters receivers.

To my dad, all radio equipment—regardless of the era in which it existed—consisted of *aerials, bulbs,* and *a horn.* Sometimes he would toss in the word *galena* if he really wanted to impress someone with his more advanced technical knowledge; one time he even insisted that I open the *box* of my receiver so that he could point out the *galena* and *honeycomb coils.* He rooted around the set's innards for a while and, failing to locate these components, he covered up his obvious embarassment by clearing his throat a few times and muttering a few additional of his more esoteric radio terms like *ballast bulbs, rheostats, grid leak,* and as a last desperate resort, *leyden jar.*

I was agog! Rheostat? Galena? Honeycomb coils? The old guy had flipped out for sure. All I could say, under the circumstances was, "Those little square things are in the i.f. stages, and that connector is for the coaxial cable." It was the wrong thing to say—I had really put him down.

He just stood there, silently, looking at me with a disbelieving expression on his face. Eventually he headed towards the living room with a slow shuffle. Pausing at the door, he mumbled something about if I bought some *spreaders* he'd help me hoist a *cage* on the roof. That was the end of the Old Man's interest in electronics—he never again mentioned the subject. I had given him a strong dose of one-upmanship.

I tell you this because sometime in the late 1950's, I went to a radio convention and some teenager with his Novice QSL card pinned to his shirt came over to me and asked my opinion on a new development, the transistor. *What?*

Yup, and he had one with him. Was a funny little thing like a metal aspirin with three long whiskers. Chuckling, I told him that he should stick to regular carbon resistors, the kind with two leads instead of this crazy one with three leads. Would you believe that this little snot wouldn't get off my case, insisting that it wasn't so much a resistor as a kind of replacement for a tube. Tube? HAH! I then put on my smuggest sneer and asked him to show me where the grid cap was located.

It was then that I realized just how the Old Man had felt with his damned galenas and honeycomb coils. The look on the kid's face was a mixture of stark horror and incredulity. At my mention of a *grid cap,* I felt the eyes of everyone within earshot turn to glare at me. "Well," I chortled, "heh-heh, a good jolt of the ol' B-plus sure ain't gonna do much good for this thing—it don't even have a loctal base to keep it from falling into one of the tuning condensers." I announced this in a loud voice so that all around me would know I was really "one of them" and knew about things like B-plus and condensers.

As you might imagine, I shut my eyes and wished that I could evaporate right there on the spot and be magically transported back to the old homestead where I could sit with the Old Man in front of the Victrola and blot out the whole cruel world with a good loud Shep Fields record. I had been one-upped by that rotten kid—my radio knowledge had become bogged down in a quagmire of BC-348's, dynamotors, 6SK7 tubes, and (gasp) bleeder resistors.

Vowing revenge, I determined to update myself. Selecting choice circuits which called for the newfangled gizmos, I started construction on some little nonsense projects using CK-722 and 2N35 transistors. My fingers were just too numbed from years behind a hefty high-wattage soldering iron to find it easy going, but I doggedly plodded on to their completion. Problem was that it didn't end with the transistor—I had to continue living through a myriad of successive embarrassments each time electronics designers would unleash upon the unsuspecting world some devilish new contraption—FET's, MOSFET's, Zener diodes, unijunction transistors, *Nuvistors, Compactrons, Varactors,* bipolar transistors, bridge rectifiers, LED's, PLL's flip-flops, and the rest (some long-forgotten by now). Actually, at some point in this parade of developments I began to boggle a bit, but it really didn't bother me at all because I had come to the realization that most other folks involved in communications were going through the same agonies I was experiencing. It had become apparent that it was really only the people who designed these gadgets who actually understood what they were all about. Most everybody else was in a state of shock and had figured out a way to bluff and phumpher their way through at least a brief discussion of these developments, and then get out of the conversation as quickly as possible by feining an important appointment or even an urgent call to the men's room.

Eventually, however, I realized that it wasn't necessary to actually know very much at all about any of these devices in or-

(Continued on page 73)

RECEIVE WEATHER CHARTS IN YOUR HOME!

You can DX and receive weather charts from around the world.

Tune in on free, worldwide government weather services. Some transmitting sites even send weather satellite cloud cover pictures!

You've heard those curious facsimile sounds while tuning through the bands—now capture these signals on paper!

Assemble ALDEN's new radiofacsimile Weather Chart Recorder Kit, hook it up to a stable HF general-coverage receiver, and you're on your way to enjoying a new hobby activity with many practical applications. Amateurs, pilots, and educators can now receive the same graphic printouts of high-quality, detailed weather charts and oceanographic data used by commercial and government personnel.

Easy to assemble—Backed by the ALDEN name.

For over 40 years, ALDEN has led the way in the design and manufacture of the finest weather facsimile recording systems delivered to customers worldwide. This recorder kit includes pre-assembled and tested circuit boards and mechanical assemblies. All fit together in a durable, attractive case that adds the finishing professional touch.

Buy in kit form and save $1,000!

You do the final assembly. You save $1,000. Complete, easy-to-follow illustrated instructions for assembly, checkout, and operation. And ALDEN backs these kits with a one-year limited warranty on all parts.

CIRCLE 112 ON READER SERVICE CARD

Easy to order.

Only $995 for the complete ALDEN Weather Chart Recorder Kit.

To order, fill out and mail the coupon below. For cash orders enclose a check or money order for $995. Add $5 for shipping and handling in the U.S. and Canada, plus applicable sales tax for CA, CO, CT, IA, MA, NY, WI. (Export price is $1250 F.O.B. Westborough, MA. Specify 50 or 60 Hz.) To use your MasterCard or Visa by phone, call (617) 366-8851.

ALDENELECTRONICS

Washington Street, Westborough, MA 01581

NAME: _____

CALLSIGN: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

☐ I've enclosed a check or money order for $995.00 and $5.00 for shipping and handling, plus applicable sales tax.

☐ Charge to: ☐ MasterCard ☐ Visa

ACCOUNT # (ALL DIGITS)

EXPIRATION DATE

SIGNATURE REQUIRED IF USING CREDIT CARD _____

POPCOMM

MAILBAG LETTERS TO THE EDITOR

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.

Firing Line

In the August letters column you ran some sharp words from a reader who was most critical of a story in *POP'COMM* about obtaining QSL cards from VHF stations. The August issue of a radio club (RCMA) newsletter also ran a similar letter from this same person, except that letter demanded that club members write to you en masse to complain about your running stories which reveal too much information (as defined by the person who wrote the letter). I was surprised to see your magazine be so bold as to publish such a harsh letter from a reader. I was wondering how many others wrote to complain about the story as a result of that fellow's call-to-arms, and if you normally receive letters saying that you dispense "too much" information about certain topics which are supposedly off limits. Personally, that information is one of the things I like best about *POP'COMM!*

Joe Montessano, KIL8RD
Trenton, OH

Despite what looked to be a concerted and all-out effort on the part of the August letter writer to generate a landslide of complaint mail about a story which he didn't think should have been published, it appears that his must have been a lone voice crying out in the darkness. Perhaps it was his belief that by generating a storm of controversy, we would somehow be intimidated into conforming the format of the magazine to his personal tastes, a tactic which wouldn't have worked even if his wasn't the only letter received complaining about that story. And yes, we do receive letters suggesting that this or that frequency or other information should not be published, but essentially we are a medium for the dissemination of information and we are dedicated to providing this service to our readers. We also believe that the majority of our readers seek out POP'COMM *for the purpose of obtaining information. For the most part, our incoming reader mail confirms this. Nevertheless, scarcely an issue goes by when we don't manage to outrage at least a couple of readers who feel that we have violated one or more of their own informational taboos. We would probably come to feel that we were slipping if we stopped getting these letters. —Editor*

North African Nasties

I am an American working in Tunisia and that puts me within monitoring range of Libya. Is there any way I can obtain any of the frequencies used by the military forces of that nation?

Roger Pancoast
Zarzis, Tunisia

According to the Golden Gate Communications Association's newsletter, the Libyan Air Defense Command operates as follows:

Tobruk	*1A*	*416.35, 411.35*
	1B	*418.625, 411.35*
Benghazi	*2A*	*417.725, 412.725*
	2B	*416.925, 412.725*
Tripoli	*3A*	*418.625, 413.625*
	3B	*416.925, 411.925*
Wattia	*4A*	*416.925, 411.925*
	4B	*418.625, 411.925*

Cold Comfort

I once heard that there is a European made radio which is intended to be carried by persons going into areas where there is a danger of an avalanche, and that this transmitter operates on a special avalanche frequency. The purpose of the transmitter is to be activated by persons who are trapped in an avalanche so that they can be located by means of a radio direction finder. I'd like to find out if it actually exists.

Bill Webb
Aspen, CO

Fact is that there really is such a transmitter. It operates on 457 kHz and is essentially just what you described. The set is called the VS-68 Barryvox and it's a small hand-held unit with a range of about 200 feet. It can also receive signals on any frequency between 420 to 510 kHz so that avalanche survivors can use the sets to listen for others who may be trapped. The unit can transmit a beep tone for 15 days continuously. The Barryvox is carried by the Swiss Army's mountain troops and also mountain rescue units in other nations and is recommended by the Swiss Federal Institute for rescue purposes. The Barryvox is made by Autophon AG, CH-4500 Solothurn, Ziegelmattstrasse 1-15, Switzerland. I don't know if it is sold or FCC authorized in the United States; you might wish to check with Autophon AG directly if you wish to pursue the matter. —Editor

Coming Up Short On A Long Wire

I've always wondered why AM broadcasting stations go to the great expense of erecting one or more steel transmitting towers. Seems to me that a plain long wire or a dipole strung between a couple of wooden poles would be a lot less expensive.

Peter Finney
Muskegon, MI

A number of years ago I worked as a DJ and studio engineer at a little 250 watt disaster of a radio station in Coral Gables, Florida. This station operated on 1490 kHz and went by the callsign WTTT (formerly WBAY). Our main (and, in fact, only) transmitting tower crumpled over during a hurricane and ended up looking like a huge inverted letter "V." We barely had enough money to pay the monthly electric bill for the transmitter, much less to fix or replace the tower, so we simply ran a cheap but resonant long wire from the highest point of what was left of the tower to a convenient tree. The resultant signal from this antenna was so feeble that the first night we tried to hear our own signal on the studio's "air monitor" (the studio was about 5 miles form the transmitter), all we could hear was another 1-lung station on the same frequency from 200 miles away; and our studio was in the wire antenna's best direction! Does that answer your question? —Editor

Simple Signal Security

I've appreciated the various items run in *POP'COMM* relating to signal security, but I was surprised that one old-time system has never been mentioned. Since it's so simple, and yet effective, I thought I'd pass it along. I know it goes back at least to World War II; we used it in the South Pacific to send secure CW traffic when we didn't have the time or ability to encrypt the message. Two transmitters are required, each set to different frequencies (we ran them about 1 MHz apart). The key was wired up so that the "di's" went into one transmitter and the "dah's" were fed into the other rig. Anyone tuning in either of the two transmitters would hear a series of "nonsense" dots or else dashes which made no sense at all. The station our messages were addressed to used two receivers. Each was tuned to one of our frequencies and fed into a common amplifier, speaker, or set of "cans" (headphones). The other station could copy the traffic as if it were being sent out over a single frequency. It was, of course, theoretically possible for unwanted listeners to eventually locate both frequencies, but by that time the traffic would have been sent.

Maurice Schechtel
Decatur, GA

You're right, it is simple. Guess it was the granddaddy of modern "frequency hopping" techniques used for voice security. Another CW security technique from WWII was devised by the Germans and is a second cousin to the system you described. That would be "up keying' (also known as "reverse keying"). The transmitter would operate only when the key was not depressed. At times when the operator would press down on the key, the transmitter would go silent. With proper receiving gear, it was a cinch to copy but on a standard receiving set up it was a jumble of sound. —Editor

Make It Easy On Yourself

The GLS-808 System Is Simple To Install

- SINGLE CABLE HOOKUP from downconverter to receiver (125' furnished)
- Integrated LNF (100° or better low noise amplifier, feed horn and polarity control) in one compact package
- LNF mounting hardware furnished

Special Features

- Automatic polarity seeking
- Full function infra-red remote control
- Crystal synthesized tuning for positive channel selection
- Tunable IF filter provides rejection of terrestrial interference signals

Here's What We Do For You!

The GLS-808 has the easy installation that you need — and the features your customers want. Best of all, the complete system is manufactured by Automation Techniques and backed by our one year (limited) warranty for parts and labor at service centers across the U.S. and Canada.

At Automation Techniques. . .
WE MAKE TECHNOLOGY AFFORDABLE!

AUTOMATION TECHNIQUES, INC.

1550 N. 105th E. Ave. Tulsa, OK 74116

1-918-836-2584

PIONEER MEMBER OF SPACE

CIRCLE 64 ON READER SERVICE CARD

Trespassers are not wanted around this fenced-in radio shack.

Pablo Escobar, kingpin in international smuggling ring which relies heavily upon communications.

American agents from customs service and the DEA fly control missions in an effort to spot smuggler aircraft and ships.

Monitoring Drug Smugglers

Radio Is Their Lifeline— Here's How To Hear Them!

BY TOM KNEITEL, K2AES, EDITOR

The new moon (or dark moon, as it is often called) used to be known as a *smugglers' moon*. That's because it made things all the easier for smugglers to sneak illicit materials across international borders. These days it seems that smuggling is taking place during all phases of the moon. Technology has been a boon to world smuggling; aided by computers, snooperscopes, aircraft, and radio communications. If it's something of value, it's a focal point of smugglers—narcotics, cash, film, tapes, electronics gear, gold, diamonds, furs, cameras, cigarettes, whiskey, art treasures, antiquities, ivory, exotic wildlife, plants and fruit, farming animals, military materials, industrial equipment, documents, rare stamps, and lots more. Even people are smuggled from one place to another. Although there are small private smuggling operations, when viewed in its overall scope it's a large international business operation, well coordinated and organized, with ties to organized crime, corrupt officials, and even to several governments.

If you've got a communications receiver you can eavesdrop on smugglers. While their operations aren't all that difficult to monitor, the problem is in knowing exactly what they're talking about. They try not to make it easy for the authorities to know their plans, and that includes the Drug Enforcement Administration, The Customs Service, The Border Patrol, The Immigration and Naturalization Service, INTERPOL, The Department of Agriculture, The Coast Guard, the FBI, The Department of Labor, The Department of State, plus countless state, county, and local enforcement agencies.

Most of the American public perceives smuggling primarily as a matter of trafficking in illicit drugs. For that reason we will take a close-up look at the communications operations of the drug smugglers. However, keep in mind that smuggling does exist in many other fields of endeavor and (to one extent or another) there are many similarities in the way the networks operate.

While many communications monitors have come to believe that drug smugglers confine their communications to perhaps three frequency ranges (6950 to 7000 kHz, 7300 to 7550 kHz, and 14335 to 14550 kHz), such an assessment hardly does justice to the wide ranging scope of their radio chatter. Actually, they can be monitored in many bands and transmission modes and in just as many languages (although to listeners

in the United States, the most commonly reported languages are Spanish and English).

Equipment

One of the main reasons that smugglers seem predisposed to relying heavily upon frequencies adjacent to the 7 and 14 MHz amateur radio bands is that amateur equipment is easy to obtain and much of it can be operated on frequencies just outside the authorized band edges. Perhaps it may take the addition of a few crystals, or some minor modifications, or maybe none at all. Some ham transceivers can actually operate on any frequencies within the entire HF range without any modifications—for instance the *Milspec 1030* made by Signal One of Phoenix, Arizona. The *Milspec 1030* operates between 1600 kHz and 30 MHz and puts out 150 to 200 watts PEP. The unit operates in SSB, AM, CW, and AFSK modes.

There are also commercial two-way transceivers which can operate on any frequencies and which are available on the world market—for instance the Kachina KC-100 (made by Kachina Communications, Inc. of P.O. Box 480, Sedona, Arizona 86336). This 130 watt (PEP) SSB/CW rig is made "for export only" and can operate on any 12 user selected (crystal controlled) frequencies between 2 and 12 MHz. A photo of this unit supplied by the manufacturer shows one apparently set up for operations on the following frequencies: 5165, 5300, 7737, and 7852 kHz; the significance of those particular frequencies is not known, except to note that they seem a bit odd for this type of unit.

Maritime SSB equipment is also available from many sources throughout the world. Some of these units can easily operate on any frequencies between 2 and 22 MHz, while some are designed for operation only on frequencies actually assigned for maritime purposes. For this reason, the 22 frequencies set aside for maritime simplex operation have become appealing to smugglers. Those frequencies are spread out between 2 and 22 MHz and can be selected (depending upon the time of day) to send a message almost anywhere on earth. Moreover, the frequencies are unmonitored by enforcement authorities and often appear to be little more than long range chit-chat channels roughly equivalent to CB radio. Mostly, almost anything goes on these frequencies!

It should also be pointed out that newer amateur transceivers may also be fully operable on the so-called *WARC bands*, three small amateur bands which have not been fully authorized for worldwide use. They are therefore relatively quiet hereabouts and some smuggler activity has been noted in these bands, which are located at 10, 18, and 24 MHz.

It's Worldwide

It's true that many of the drugs which enter the United States come via Central and South America, but we must not forget that just because they are the entry routes they are certainly not the exclusive points of origin. We should also remember that drugs enter the country from areas other than Central and South America.

Radio reports of current hashish prices are given over the air in Amsterdam, Holland. These broadcasts are made over a regular broadcasting station.

Part of the aircraft fleet of Roberto Suarez.

In Europe, Amsterdam and Marseilles are two major centers for illicit drug trade, and drugs from either city have entered the United States directly through New York or indirectly through Montreal. These drugs may originate in Morocco, Pakistan, Iran, Iraq, Syria, Turkey, or other nations. Drugs from Southwest Asia (Laos, Thailand, India) or China are trans-shipped through Hong Kong directly to San Francisco. Central and South American drugs may originate in or be trans-shipped through Colombia, Jamaica, Panama, Bolivia, Paraguay, or Mexico; some drugs from Marseilles and Amsterdam connections may also find their way here via the southern route.

The drugs may be secreted amongst legitimate cargo shipped on freighters or cargo aircraft or they may be carried on the persons or in the luggage of couriers ("mules") entering the country on international or even military carriers. They may also be dispatched by ships and aircraft whose sole purpose is to transport contraband.

Larger shipments come in via aircraft or vessels dispatched from South American or Caribbean ports. Some are sent aboard "mother ships" which lie offshore about 150 to 200 miles and await the arrival of smaller coastal vessels (trawlers, cargo vessels, or even pleasure boats), which can possibly make it into port without their cargo being detected. No longer confining their activities only to the Florida coast, drug smuggling vessels now ply the Atlantic coastline as far north as Maine, and this is why even low-powered transmissions have been reported by far more listeners than ever before! In 1982, 120,000 pounds of marijuana was seized aboard the Danish trawler *Grimar Kamban* off Georges Bank. A 110 foot freighter, the *Seatia*, was seized while moored at a maritime salvage yard in New Jersey—it contained 70,000 pounds of marijuana. The trawler *Ricardo* was seized a year ago, off the Long Island coast, carrying more than 4,100 pounds of marijuana.

One or two engine aircraft flying in from the Caribbean or over the Gulf of Mexico also play hide-and-seek with DEA, Customs, and Coast Guard patrols in order to enter with their goods. While some seek out isolated landing areas in the backwoods of Florida, many are attempting to land at air-

Fully armed and cocky, drug smugglers have moved in on any radio frequencies they feel like using.

ports in other areas of the country. Sometimes the aircraft may drop their cargo at a designated area without ever landing (drop areas may be over land or at a spot offshore). In some instances where the aircraft land, they attempt to load up on cigarettes and whiskey to smuggle to Central and South America on the return trip.

A stepped-up campaign to apprehend drug smugglers entering Florida was instituted in 1982; however, Coast Guard Commandant John Hayes estimates that his personnel impounded only about 20% of the marijuana sent into that area, and 80 to 90 per cent of the nation's marijuana comes in through Florida and (to a smaller degree) the Gulf states. Primary shipping point to the U.S. is the Guajira Peninsula of Colombia, which juts out into the Caribbean in the vicinity of the island of Aruba.

Vessels and aircraft apprehended on their way to the United States are confiscated by the authorities. Sometimes, the smugglers will attempt to jettison the cargo in an effort to avoid capture; the news media has reported many instances of huge bales of marijuana washing ashore at beaches and resort areas, frequently to the delight of the swimmers who carry off whatever samples they can before the authorities arrive on the scene. Even though huge amounts of drugs worth staggering sums of money (to say nothing of the value of the captured vessels and aircraft) are lost by the smugglers, they write it off as a part of the cost of doing business; the profits of the $80 billion per year (worldwide) illicit drug trade are obviously high enough to handle the loss of quite a few vessels, aircraft, and radio stations. The 500 bales of marijuana taken from the 85-foot sailing vessel *Glenda Lynn* (seized 85 miles southeast of Montauk Point, Long Island, this year) had a street value of $30 million; the value of the vessel itself paled by comparison to the value of the cargo!

Cast of Characters

Some of those whose operations are thought to be monitored on the shortwaves include Roberto Suarez, whose fleet of aircraft numbers about 1,000—and they fly from several thousand "unofficial" airstrips. Some of these airstrips are 10,000 feet long to facilitate landings and takeoffs without wasting any of the time normally required for returning the aircraft to the touch-down end of the runway so they can take off.

Another whose operations require complex communications is Colombia's Pablo Escobar, kingpin in a complex and widespread international smuggling ring specializing in cocaine.

Drug transmissions from the Southeast Asia area were, until very recently, a mainstay of the notorious Lau Su of Thailand. Unfortunately for Mr. Su and those who liked to hear his transmissions on 14.503 kHz, he was ambushed by members of the Thai Border Patrol and killed while engaged in transporting drugs through the Chiang Mei district. Since his 1977 escape from captivity, there had been a reward equivalent to $45,000 for him, dead or alive.

Covered in non-reflective paint and minus registration numbers, airplanes such as this are difficult to identify or trace.

For quite some time, one of the stations monitored in the smuggler communications networks was known as "Monsieur Andre" and "El Commandante." His station was monitored on a number of frequencies in contact with land, sea, and aeronautical stations in many areas. This station was located at the Paris-Nice Motel on the outskirts of Asuncion, Paraguay. The operation was finally ended when El Commandante (real name: Auguste Joseph Ricord) was captured by authorities and extradited to the United States for trial. The charge was attempting to smuggle drugs into this country. He was convicted and given a 20 year jail sentence, throwing a kink into one of the major sources of heroin entering the United States from Europe via the South American connection.

You can thus see why drug smuggling involves a large cast of characters on a worldwide basis. Spanish language radio traffic is more easily monitored in the United States because it is the language of most of those who bring in the drugs from the area of maximum supply, but you can see that communications traffic relating to drug smuggling operations can actually be in a dozen or more other languages.

Uses Of Radio By Smugglers

A few of the main uses of radio by the smugglers include:

A) *Price quotes.* The world drug market is big business—billions of dollars are involved. In many ways, it is like the international finances which surround the dealing in legitimate commodities. Prices rise and fall daily for heroin, marijuana, and all other drugs. It's a matter of supply and demand and is affected by seasonal factors, the affect of weather upon the crops, the size of the harvest, and enforcement activities. Prices for the same drug in markets such as Lebanon, Morocco, or Nepal may vary considerably. Buyers and sellers alike need to have this information before any business may be transacted—not the street buyers and sellers, or even *their* suppliers, but the international syndicates which control the flow of the world supply and establish the street prices. In the Netherlands (Amsterdam), this data is presented weekly over a local broadcasting station in full view of the authorities. On an international level it's not done so openly. Some of the mysterious "spy numbers" stations often reported by listeners are actually a medium for presenting these world prices for illicit drugs.

B) Ordering. Orders must be placed, deals accepted, and arrangements made for the transfer of funds. Radio is one of the methods used for handling this. It's not the only way; information may be disguised and exchanged by Telex or overseas telephone circuits too. A message as innocuous sound-

Kachina Communications, Inc. produces this 100 watt transceiver, which can operate on any frequency between 2 and 12 MHz.

SWL HEADQUARTERS

ELECTRONIC EQUIPMENT BANK THE NAME IN SHORTWAVE LISTENING

NEW FROM KENWOOD

Kenwood R-2000 **VC-10 VHF Converter**

Now you can extend the R-2000 frequency range to cover the VHF bands 118 to 174 MHz with this new VC-10 VHF converter. Easily installed in your R-2000 or EEB will install it for you with R-2000 VC-10 purchase.

VC-10 **$149.95**

Kenwood R-2000* **$499.95**

List $599.95

- 150KHz to 30MHz
- All mode AM-CW-SSB-FM
- 10 Memories (Memorizes Mode)
- Memory Backup
- Memory Scan
- Programmable Band Scan
- 24 Hour Clock-Timer

Option 1—Mechanical Filter **$95**

Option 2—RIT modification **$35**

*Free 90 day extended EEB warranty

SPECIAL PURCHASE

Save $208.00

Yaesu FRG-7700* **$499.95*** **Limited Quantity**

FREE MU-7700 12 Channel Memory
FREE FRT-7700 Antenna Tuner

EEB's best buy now only $499.95 with FREE MU-7700 and FRT-7700 tuner—a $707 value.

*Free Extended 90 day EEB warranty.

Kenwood R-600*

AM-SSB-CW Modes, noise blanker, 30 bands 200KHz to 30 MHz wide/narrow I.F. Filtering. Excellent performance at a budget price.

R-600 ..... List $399.95

Sale $329.00

*Free 90 day extended EEB warranty.

NEW FROM SONY ICF-2002

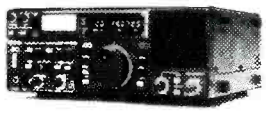
A new generation receiver. The best features of the famous ICF-2001 PLUS!

- Less than 1/3 the size of 2001
- Low battery drain (4) AA cells (2) AA cells for memory/clock
- 10 station memory presets
- 12/24 hour clock (local or GMT)
- Synthesized PLL tuning—most accurate, drift free method known
- AM, SSB, CW 153KHz to 30MHz
- FM 76 to 108MHz

$249.95

ICOM R-70* **Special purchase $599.95**
Save $150.00

You have read the details on this revolutionary receiver. It's getting rave reviews.



- Frequency Range 100KHz-30MHz
- Pass Band Tuning
- Notch Filter
- Fully Synthesized
- AGC Control Fast/Slow/Off
- Noise Blanker Wide/Narrow

The **Best** just got **Better**

EEB offers the upgraded R-70 SWL Receiver tailored to your needs:

Option 1— AM Wide/Narrow. Switch between AM 6KHz filter and the 2.3KHz SSB filter while in the AM mode.

*Option 2— 2.3KHz Mechanical Filter. Replaces ceramic SSB filter to give much sharper skirt selectivity, wider dynamic range. $95 installed

*Option 3— 8 Pole Crystal Filter. Replaces 2.3KHz ceramic SSB filter—allows you to experience the full potential of this fabulous receiver. $179 installed

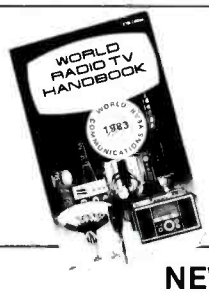
(*Option 1 required for use in the AM mode)

All EEB modified R-70's are realigned for optimum performance.
*Free 90 day extended EEB warranty.

G.E. World Monitor II **SALE $169.96**

Best Buy under $250

- 6 Bands 3.5 to 31 MHz-SWL-MW-FM
- World Power 120/220 V 50/60 Hz
- DC operation from internal batteries
- EEB test results show this receiver to be superior to many selling up to $250. Physical layout and electrical specifications similar to the popular Panasonic RF-2900.



World Radio TV Handbook

1983 SWL Bible In Stock

Reserve your 1984 WRTVH now.

Order by December 31st—Free postage and 1983 pricing.

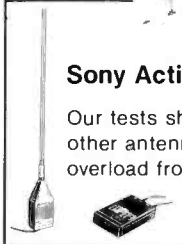
$17.50

postage paid (USA) book rate

NEW FROM SONY

Sony Active Antenna

Our tests show the Sony AN-1 antenna equal to or better than other antennas costing twice as much and less susceptible to overload from strong signals.



Why pay $159? **SONY AN-1** **$79.95**

EEB

- We ship world-wide
- SASE for FREE Catalog
- Foreign 3IRC's Air Mail
- Shipping charges not included
- Prices & specifications subject to change without notice

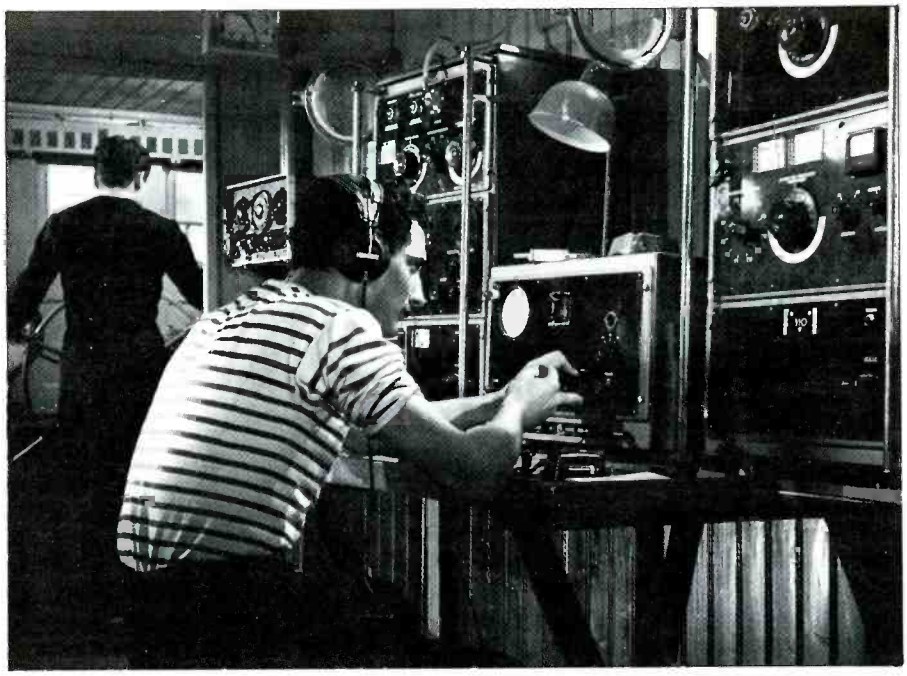
VISA MasterCard

10 Miles West of Washington, D.C.
Sorry—No COD's
10-5 Tues., Wed., Fri.
10-9 Thursday
10-4 Saturday
Closed Sunday and Monday

Electronic Equipment Bank
516 Mill Street, N.E.
Vienna, Virginia 22180
Order Toll Free 800-368-3270
Virginia 703-938-3350

EEB

CIRCLE 51 ON READER SERVICE CARD



"Motherships," lying offshore, communicate with shore stations and smaller vessels to arrange pick-ups.

ing as, "We are visiting my cousin next week," could actually initiate the shipment of hundreds of kilos of heroin to a specific destination. A message such as, "Will you visit my brother tomorrow?" could summon a courier carrying several hundred thousand dollars worth of cocaine from Marseilles to New York. A private radio network can accomplish this faster and with more convenience, and a business dealing in huge financial transactions would find the cost of assembling a deluxe station to be an infinitesimal part of their operating expenses.

C) *Logistics.* Ships and aircraft require instructions and coordination, routing, landing/docking arrangements, pick-up or dropping information. This involves communications between base stations, portables, mobile units, aircraft, and ships. These communications could also relate to evading the authorities. Shipments transported by couriers traveling aboard airliners require information to be sent relating to their arrivals

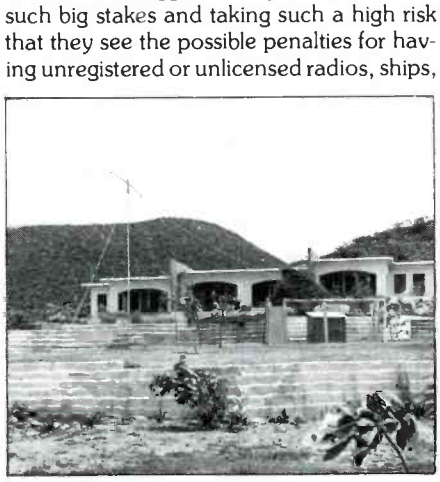
As you can see, there are uses for communications which make radio a very appealing tool in the hands of smugglers. There are other uses too, but these examples should give you some general idea of the diverse applications for radio in the smuggling game.

Licenses?

Land stations may possibly be licensed (depending upon the local circumstances), but for the most part they are unlicensed. They probably don't see any reason to try to obtain a license and may not be able to think up a respectable reason for a license to be issued. Not all of the world's nations are as fussy about radio licensing as the FCC is in the U.S., and in more than a few areas of the world the officials seem to ignore unlicensed communications operations.

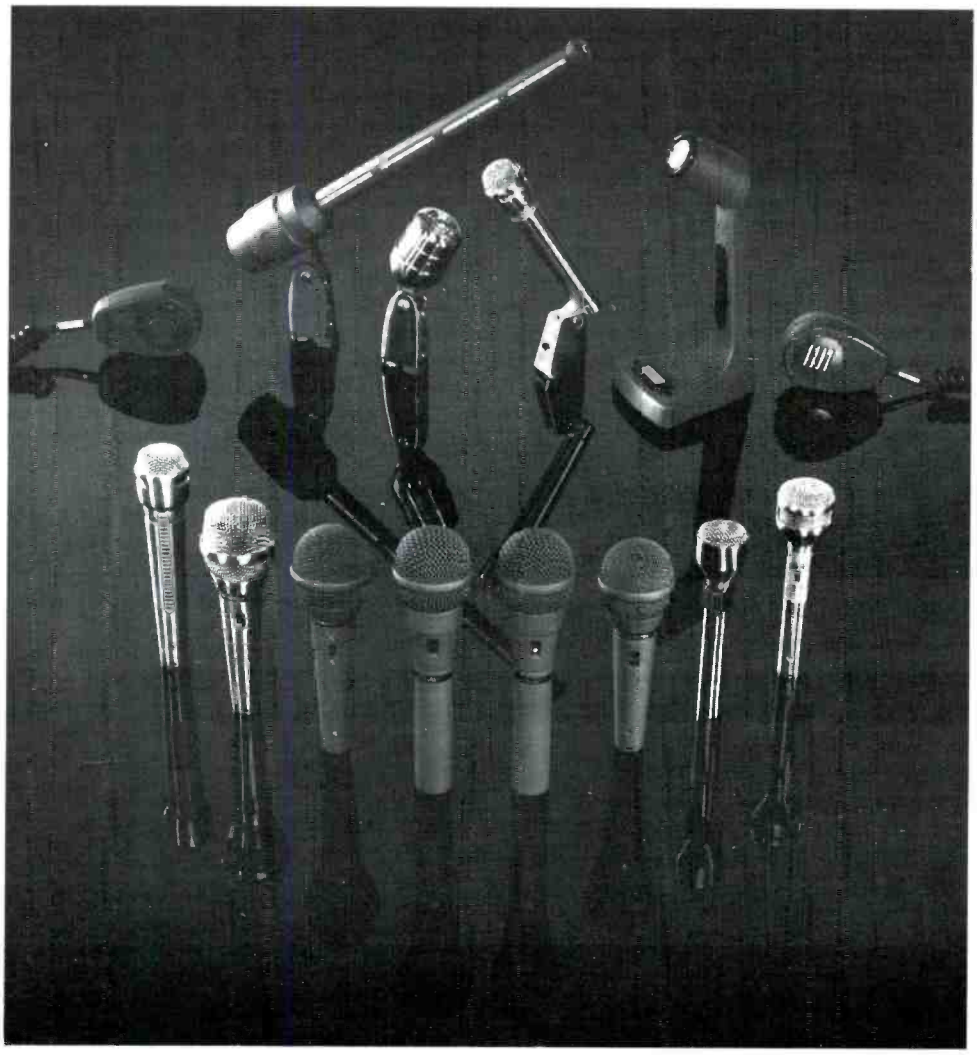
The communications facilities aboard ships and aircraft used by the smugglers would probably be licensed by those nations under whose flags those units either sail or fly. The problem is that not all of them are actually registered to sail or fly under the flag of any particular nation and therefore have no noticeable nationality or home port. One smuggling aircraft I saw, for instance, was painted a flat non-reflective black and bore no registration markings whatsoever. Some smuggling aircraft have been known to use fictitious or "borrowed" registration numbers from various nations, changing them from time to time as the need arises. Likewise, some smugglers' vessels have the ability to fly any number of flags and display an assortment of vessel names, all without any official sanction.

Fact is that licenses and registrations of transmitters, ships, aircraft, etc., are of little concern to smugglers. They are dealing with such big stakes and taking such a high risk that they see the possible penalties for having unregistered or unlicensed radios, ships,



Many luxurious homes throughout the Caribbean and South America now sprout large beam antennas, all pointed towards North America.

Think of EV as your mike expert.



The EV Commercial Microphone Catalog has a full line of products designed to meet all of your microphone needs. EV quality microphones, known for their durability, are backed by a great warranty and speedy service. For your free catalog please write to Jim Edwards, Market Development Manager/Commercial Markets, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107.

Electro-Voice®
SOUND IN ACTION™

a gulton company

CIRCLE 94 ON READER SERVICE CARD

Suspected Drug Smuggler Two-Way Networks

Frequency (kHz)	Mode	Language	GMT	Remarks
2065	USB			Maritime simplex
2079	USB			Maritime simplex
2096.5	USB			Maritime simplex
4125	USB			Maritime simplex
4143.6	USB			Maritime simplex
4419.4	USB			Maritime simplex
5320	USB	English	0100	"NR" calling "QJ"
5415	USB	Spanish	0115	
6218.6	USB			Maritime simplex
6221.6	USB			Maritime simplex
6521.9	USB			Maritime simplex
6813.4	USB	Spanish	0330	
6955	USB	Spanish	0300	
6977	USB	Spanish	0300	
6994	USB	Engl./Span.	0300	
7340	LSB	Spanish	0300	
7385.5	LSB	Spanish	0100	
7390	LSB	Spanish	0300	
7450	LSB	Spanish	0420	
7470	USB	Spanish	0105	
7575	AM	Spanish	0200	Coded messages
7705	USB	English	0300	"Charlie" and "Bravo"
	USB	Spanish	0200	
	LSB	Spanish	2305	
7790	USB	Spanish	2310	
7802	USB	Spanish	0425	
7896	USB	English	1300	
8175	USB	Spanish	0445	
8291.1	USB			Maritime simplex
8294.2	USB			Maritime simplex
8915	USB	English	0100	"Alan"
8927	USB	Spanish	0105	
8935	USB	English	0110	"Cappy 1" "Aurora" "Magic"
9010	LSB	English	0130	
9275	USB	Spanish	0300	
10100 to 10150	USB			Proposed amateur band
10610	LSB	Spanish	2320	
11155	LSB	Spanish	2325	
12300	USB	Spanish	2345	
12389	USB	Spanish	2345	
12381	USB	English	0010	
12429.2	USB			Maritime simplex
12432.3	USB			Maritime simplex
12435.4	USB			Maritime simplex
13560	USB	Various		Industrial frequency
14350	USB	Arabic	2050	Lots of yelling
	USB	Spanish	0100	
14352	USB	Spanish	0057	
14356	USB	Spanish	2300	
14360	USB	Spanish	0330	
14362	USB	Spanish	0340	
14364	USB	Spanish	0315	
14371	USB	Spanish	0203	

and planes as being miniscule and almost laughable when compared to the penalties that they'll receive for smuggling if they get caught. Of course, if they should happen to get caught in some nations, friendly officials can easily be persuaded to forget about many things.

On The Air

Smugglers seem to take a breezy and informal approach to their communications. Calls are frequently made by repeating the other station's identification anywhere from three to ten times, often punctuated by melodic whistling performances by the operators. A favorite expression used by the Spanish speaking operators is "OK-OK-OK," which is their own equivalent of the worn-out expression "10-4." Other commonly heard words include *adelante* (come in), *cambio* (over to you), and *ola* (hello).

Frequencies for specific smuggling operations tend to change from time to time, and they do seem to always have an operating capability consisting of several frequencies. I heard one station (in English) seeking out his contact without any success—first frantically calling him on 14390 kHz, then switching to 14450 kHz, and finally hopping over to 14455 kHz before hooking up with "Jerry." The fun really goes into full gear when more than one group of smugglers pops up on a popular frequency (such as 14430 kHz) and then fights it out with another group for the right to use the frequency! One especially interesting frequency has been 7705 kHz,

Frequency (kHz)	Mode	Language	GMT	Remarks
14373	USB	Portuguese	2235	
14375	USB	Spanish	0227	
14376	USB	English	1242	"Oscar Sierra Charlie" (also 14542 kHz)
14387	USB	Spanish	1230	
14390	USB	English	0000	"Jerry" (also 14450 kHz)
	USB	Russian	2200	
	LSB	Arabic	0200	
	USB	Spanish	0315	
14400	USB	Spanish	0205	"Limon" "Pina" (also 14500 kHz)
14405	USB	Spanish	0105	
14425	USB	Spanish	0205	
14430	USB	Spanish	1900	
14436	USB	Spanish	2300	
14400	USB	Spanish	0005	
14450	USB	Spanish	0100	
	LSB	Spanish	1205	
14455	USB	Spanish	0020	
14460		Engl./Span.	0245	
14465	LSB	Spanish	0255	
	USB	Spanish	0010	
14470	USB	Spanish	2050	
14485	USB	Spanish	0200	
14491	USB	Spanish	0105	
14494	USB	Spanish	0245	
14500	USB	Spanish	0240	Same stations as 14400 kHz
14505	USB	Spanish	0125	
14515	USB	Spanish	0200	
14526	USB	Spanish	0015	
14531	USB	Spanish	0210	
14542	USB	English	1254	Same stations as 14376 kHz
14544	LSB	Spanish	0320	
16587.1	USB			Maritime simplex
16590.2	USB			Maritime simplex
16593.3	USB			Maritime simplex
18068 to 18168	USB			Proposed amateur band
20120	USB	Spanish	2145	
22124	USB			Maritime simplex
22130.2	USB			Maritime simplex
22130.2	USB			Maritime simplex
22133.3	USB			Maritime simplex
22136.4	USB			Maritime simplex
24890 to 24990	USB			Proposed amateur band
26655	AM	Spanish	2100	
27120	LSB	English		Industrial frequency
26995	LSB	English		Radio control allocation
27045	LSB	English		Radio control allocation
27095	LSB	English		Radio control allocation
27120	LSB	English		Industrial allocation
27145	LSB	English		Radio control allocation
27195	LSB	English		Radio control allocation
27415 to 27995	SSB	English		So-called "Free band"
40680	FM	English		Industrial allocation
145.10 MHz	FM	English		Light aircraft noted coordinating operations by smugglers. Many other 144-148 MHz band frequencies also in use.

which has been noted with CW "numbers" transmissions (5 digit groups) and also English/Spanish SSB communications. Two often reported stations here are known as "Charlie" and "Bravo."

Forget anything resembling actual callsigns; without licenses there are no officially assigned callsigns. The rule of the day is names, nicknames, or code number or letters; these also seem to change from time to time. Some of the odd nicknames noted include *Gusano* (worm), *Paloma* (dove), *Bobo* (dumbell), and *Descalzo* (barefoot). One guy calls himself *Nariz* (nose), but the name I like best is the smuggler known as *Elefantito* (little elephant).

By the way, don't assume that all Spanish language communications you hear are smugglers; many are authorized commercial, military, police, etc. operations. Same with the things you'll hear on the maritime simplex frequencies—most of it is coming from ship/shore stations which aren't in any way connected with illegal activities.

Other legit users which are to be found while you tune around in the bands smugglers like are Military Affiliate Radio System (MARS) networks. Typical MARS frequencies include 7377, 7392, 7540, 14401, 14441, 14467, 14469, 14484, and 14605 kHz. These are on USB.

I've listed here some of the recently noted communications frequencies which are suspected of being related to drug trafficking. You may find others. If so, please pass them along.

The entire staff of Radio A Voz D'oeste took time out to pose for this photo, which they included with their QSL.

Bossa Nova Beat

A Guide To DXing Brazil BY GERRY L. DEXTER

Like "The Girl From Ipanema," Brazil is very difficult to catch. So many faces, so many personalities, facets, diversity that it's impossible to capture it all even if you spend a lot of time actually in the country, exploring it firsthand.

What, then, can be done in just a couple of paragraphs? Perhaps just a few words to trigger pictures in the mind's eye. Words like "samba," "Sugar Loaf," "Amazon," "Jobim," "Gilberto." Words like "carnival," "foreign debt," "inflation," "coffee," "favelas," "bossa nova," and many more.

From the sophistication of Rio, that "cidade marvilhosa" to the swirling madhouse that is Sao Paulo, to the ultra modern capital of Brasilia, to the plantations producing coffee, rubber, sugar, to the dark of Amazon jungles and Indian tribes, Brazil encompasses over 100 million people. It's a wide spectrum of races and mixes that seem to get along together admirably well.

For the shortwave listener, Brazil presents many challenges—the first of which is simply the size of the place. Brazil probably has more shortwave stations on the air at any one time than any other country in the world, with the possible exception of Indonesia. A conservative estimate places the number at well over 100 stations!

Shortwave in Brazil runs across the entire dial—from the under one kilowatt minis on 120 meters that are seldom, if ever, heard to the big government outlets up on 16 and 19 meters.

Unfortunately, like so many other places, information on Brazilian shortwave broadcasting is often confusing, frequently incomplete, and occasionally even over-complete since stations that are still in the planning stages are often reported as actually on the air. It's easy to find yourself tuning for something that doesn't yet exist!

Further complicating matters is the fact that stations which have existed for years go through occasional periods of inactivity as far as their transmitters on the higher frequencies in particular are concerned. These outlets are fairly easily heard when they're on, but often as not, silent transmitters are the rule for Brazilians listed for operation on 49 meters and above. That leaves us with 60, 90, and 120 meters as the most reliable, profitable hunting grounds.

There are still more complications. Several stations are often authorized to use the same frequency, making it even more important than usual for the listener to be sure of the station's identification.

And there are dozen's of "Radio Clube . . . ," "Radio Culturas . . .," "Radio Nacionals . . .," "Radio Educadoras . . ." so even a partial ID does not always provide a complete answer as to what station is in the headphones.

The listener who has tended to skip over Brazilian stations will find that it takes more time and effort to get the feel of Portuguese and to be able to pick out the station identifications, usually spewed out at a mile-a-minute rate. Portuguese sounds like a perfect mix of Spanish and French—harder than the latter, softer than the former, as though a mouthful of marbles were required. The sound is soft and flowing.

Station identification announcements can be rare, too, especially during broadcasts of futebol (soccer). The sportscaster describes the action at a frantic clip, slowing down only to drag out the word "gooaaallll" over a period of several seconds when one team scores.

Like the country itself, Brazilian stations come in a diverse catalog of types. The government's international voice, "Radiobras" and "Radio Nacional" outlets are designed to cover large segments of the country from Brasilia and other major cities. There are commercial stations using shortwave to extend their coverage areas, and there are stations run by the state governments as well as others operated by religious and cultural groups.

Sign on and sign off times vary widely too. Some begin their broadcast day as early as 0700 GMT, others at 0800, 0830, 0900, or 1000. The wrap-up can arrive as early as 0100. Others are never silent. These varying sign on or sign off times can become a useful tool in identifying stations operating on frequencies where several are assigned. A station that's an early riser may be all alone on a frequency until the others are scheduled to come on.

With its great physical area, Brazil covers more than one time zone. The states of Mato Grosso, a part of Para, Eastern Amazonas, and the territories of Rondonia and Roraima are all at GMT −4 hours. Western Amazonas and Acre are at GMT −5, all others are GMT −3 hours (except Fernando da Noronha at GMT −2 but as far as we know there are no shortwave stations here). This is standard time, effective during our summer. During the Brazilian summer (our winter) clocks are advanced by one hour.

All Brazilian stations are supposed to carry the government program "A Voz do Brazil" at 2300 weekdays. The program is designed to get official news and announcements out to the populace and you won't hear any local station identifications during this period.

Sending reception reports to Brazilian stations is, like the rest of Latin America, a chancy affair. Using English in your reports will work marginally better than in the rest of Latin America. But, you'll still be better off if you send your reports in Portuguese. The serious Brazilian listener will want to develop his own report form or report form letter and get it translated into Portuguese. Meantime, we've provided a few commonly needed program item descriptions to help you get started.

Be forewarned though. Even with the use of Portuguese and IRCs or mint stamps as return postage, your reply rate is unlikely to be much better than that from Peru or Ecuador or any of the other Latin American countries.

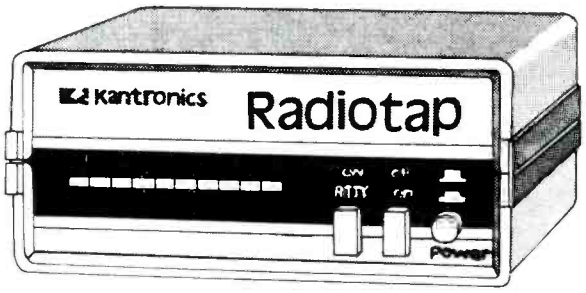
When you do receive a reply, you'll often

EAVESDROP ON THE WORLD WITH RADIOTAP™

Shortwave listening can be much more exciting than just monitoring voice broadcasts. The airwaves are full of coded signals; Morse code, Radioteletype, and ASCII. These types of encoding are used to send Government Broadcasts, Weather Data, News Services, and Military Information, to mention just a few.

With an inexpensive VIC-20 or Commodore 64 computer and RADIOTAP you can eavesdrop on these coded transmissions and read the messages on your monitor screen. You can even print received messages on a Commodore serial printer.

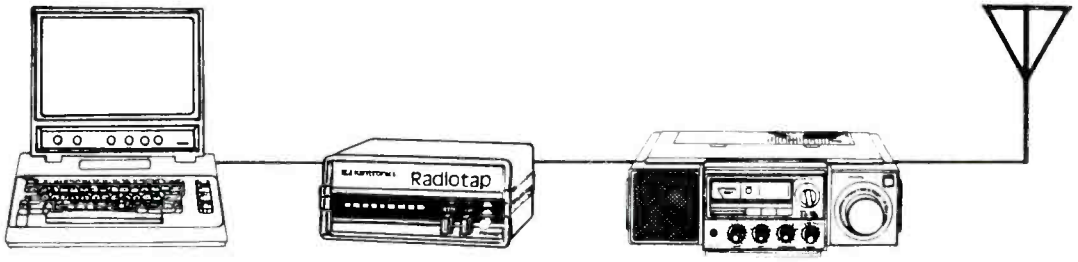
The RADIOTAP system is easy to set up. Simply connect the external speaker output of your receiver to the RADIOTAP tuning unit and connect the tuning unit to the computer. Then plug the RADIOTAP software cartridge into the computer and turn on the power. All necessary cables are provided, and we have included the CONFIDENTIAL FREQUENCY LIST to help you find coded signal frequencies.



RADIOTAP lets you try different ways to decode unconventional signals too. You can use the program to decode inverted, bit-inverted, and signals with altered bit order. RADIOTAP also has a special "SCOPE" feature that lets you use the computer monitor to measure the timing of signals, and then change the baud rate to capture unusual speed signals.

RADIOTAP lets you eavesdrop on a sky full of information with your home computer. Shortwave listening will never be the same.

Radiotap™ System Diagram




```
                                    00:00:00
KANTRONICS RADIOTAP
COPYRIGHT   1 MAY 1983
CHOOSE
   M (MORSE)
   R (RTTY)
   A (ASCII)
   T (TIME)
   S (SCOPE)
   B (BASIC)
```

Main Menu

Sugested Retail $199.95

For more information contact:
Kantronics 1202 e. 23rd street Lawrence, Kansas 66044 913-842-7745

CIRCLE 15 ON READER SERVICE CARD

be treated to colorful pennants, tourist brochures, picture postcards, and occasionally even gifts. Whether the frequent disappointments in receiving no reply at all makes the answers you do get worth the frustration is something you have to decide.

Our *POP'COMM* Brazilian Shortwave Station List can be used as a general guide to give you an idea of what to listen for in identifying a station. But no list is perfect, none totally accurate. Even lists published by the Brazilian government are not fully complete! So, like any station list, it should not be looked upon as an infallible map. Many of the stations on the higher frequencies are on the air only occasionally.

Still, there's a lot to hear. Our starter plan for Brazil is designed to net you at least one station from each of the Brazilian states and territories. Here comes the tour.

Espirito Santo is a coastal state north of Rio de Janeiro. Radio Espirito Santo at Vitoria is a fair opportunity on 4.765, although that's one of those multiple assignment frequencies with three stations holding rights to that spot on the dial. ZYO28 is a cultural station which says it can cover the entire state with its 60 meter band signal. It features popular Brazilian hits and worldwide pop songs based on *Billboard Magazine* surveys. Their address is Nossa Senhora de Penha 2141, 29000 Vitoria, Espirito Santo.

Sergipe is still further north and also on the Atlantic coast. Radio Cultura de Sergipe at Aracaju on 4.775 operates on another multiple station frequency. Radio Cultura doesn't pop out of the pile too frequently but consistent tries will bring it home. ZYM22 is listed for 2.5 kilowatts from 0730 to 0400. Reception reports can be sent to Rua Simao Dias 643, 49000 Aracaju, Sergipe.

Rio Grande Do Norte occupies the Brazilian beak that jets out into the Atlantic. One of the better bets from this area is Radio Poti (named after the river). ZYI21 uses 1 kilowatt on 4.965 and you should hear it with some work, particularly if the Colombian, Radio Santa Fe, happens to be off the air. It's scheduled from 0800 to 0430 from Natal and is part of a big chain that includes 25 newspapers, 24 radio and 12 TV stations, as well as six magazines. Reports go to Av. Deodoro 245, 59000 Natal, Rio Grande do Norte.

Mato Grosso takes up a huge area in the central and western parts of Brazil. A few years ago it was divided into North and South, creating two very big states out of what had been only one huge one. In the North, try 4.755 for ZYF904, Radio Educacao Rural at Campo Grande, operating from 0800 to 0400 with 1 kilowatt. C.P. 261, 79100 Campo Grande, Mato Grosso do Norte will get your report to them!

In the south, check 4.795 for Radiodifusora Aquidauana, ZYX24, a station proud of reception reports, its received from all over the world on its one kilowatt transmitter. It's scheduled from 0800 to 0300. Reports on this one should go to C.P. 18, 79200 Aquidauana, Mato Grosso do Sul.

Parnaiba, south of Rio Grande do Norte, on the Brazilian "beak" area, provides a good possibility in the form of Radio Borborema, ZYB38 on 5.025. A staff of 50 keep this one going over its one kilowatt shortwave outlet. Music, local, national, and international news and a heavy dose of sports make up the bulk of the program fare. Reports go to C.P. 160, 58100 Campina Grande, Parnaiba.

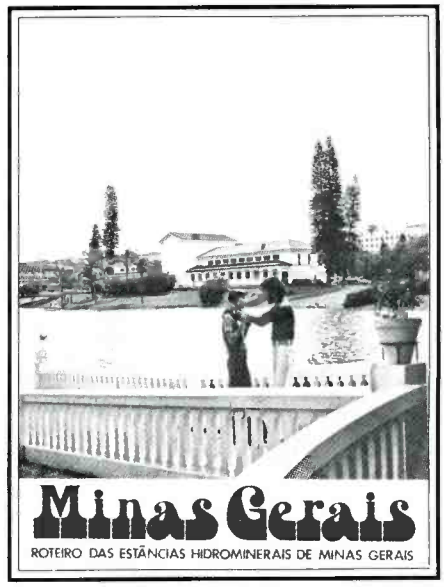
Piaui, in the center of the northeastern area of the country, can be heard via Radio Tabajara on 4.797 (although listed for 4.795, the frequency is usually slightly higher). This one is fairly often heard in the United States, using 1,000 watts from 0730 to 0400. You can write the station at Rua Joao Machado 938, 58000 Joao Pessoa, Paraiba.

Pernambuco is another coastal state which contains the large city of Recife. Emissora Rural—A Vox do Sao Francisco in Petrolina—is a cultural outlet featuring educational programs, music, and information. A Voz do Sao Francisco is on 4.945 scheduled from 0755 to 0300 with 2,000 watts. It can be reached at C.P. 8, 65300 Petrolina, Pernambuco. A much easier station to log (when it's on!) is Radio Journal do Commercio at Recife on 6.085 and 15.145.

Goias in the southern part of Brazil, just north of Brasilia, offers Radio Brazil Central on 4.985 (although recently it's varied up to 4.992). Compared to those we've discussed so far, Radio Brazil Central is a powerhouse, using 10 kilowatts on a 24 hour a day schedule. Your report can be sent to C.P. 330, 74000 Goiania, Goias.

Sao Paulo offers a dozen or more possibilities, one of the better ones being Radio Aparecida. ZYR83 is a reasonably consistant user of 9.635 with ten kilowatts and is scheduled from 0900 to 0300. Their address is Av. Getulio Vargas 185, 12570 Aparecida, Sao Paulo.

Brightly colored banners, flags, bumperstickers, and other great souvenirs often accompany Brazilian QSLs.



Minas Gerais is one of the most beautiful areas in Brazil. This travel brochure came along with Radio Inconfidencia's QSL.

English To Portuguese Program Elements

Commercial Announcement	- anuncio comercial	Time Check	- aviso da hora
Male Announcer	- locutor masculino	Vocal Music By Man	- numero musical presentado por um cantor
Female Announcer	- locutor feminina	Vocal Music By Woman	- numero musical presentado por uma cantora
News	- noticias	Sign On	- comeco de transmissao
Drama	- programa dramatico	Sign Off	- fim de transmissao
Sports Event	- cronica esportiva	Chimes	- carrilhao
Station ID	- identificacao da estacao	Drama	- representacao teatral
Variety Program	- variedades	Political Program	- programa politico
Sign Off Announcement	- anuncio do encerramento das emissoes	Song(s)	- cancao (cancoes)
Sign On Announcement	- anuncio do comeco da transmissao	Speech	- discurso
Religious Service	- servicos religiosos	Instrumental Music	- musica de instrumentos
Classical Music	- musica classica	Orchestra	- orquestra
Piano	- piano	Shortwave	- ondas curtes
Organ	- orgao	Good	- boa
Drum	- tambor	Fair	- quase
Violin	- violino	Poor	- pobre

Maranhao Watch out for utility station interference when you aim for Radio Timbira in Sao Luiz, Maranhao state. Sao Luiz is up on the northern coast, actually located on an island between two bays. The studio is on the eighth floor of a building downtown and operates on 4.975 with 2.5 kilowatts between 0900 and 0300. Reports can be sent to Rua de Cerreio s/n, Barrio de Fatima, 65000 Sao Luiz, Maranhao.

Rio de Janeiro state, wrapped around that great city on the southern coast, offers lots of targets. One of these is the government-run Radio MEC (Ministerio da Educacao Cultural) and also identifying as Radio Cultural. It's not always active but has been heard recently on 11.950 and 17.875. If you hear it, report to the Ministry of Education and Culture, Praca de Republica 141-A, 20000 Rio de Janeiro.

Ceara, located on the northern coast between Maranhao and Rio Grande do Norte, provides Ceara Radio Clube from Fortelaza, which is occasionally active on 15.165 and 6.105 with 5 kilowatts. 6.105 is scheduled from 0900 to 1900, 19 meters from 1900 to 0300. Reports to C.P. 222, 60000 Fortelaza, Ceara.

Para, in the north where a number of rivers make their way through to the Amazon, serves up Radio Cultura do Para in Belem on 5.045. ZYG360 is listed for 10 kilowatts from 0700 to 0300. This is a tricky frequency where two stations are parked. If you can sort them out, your report goes to C.P. 6600, 66000 Belem, Para.

Roraima up in the far northwest Guiana region borders on Venezuela and Guyana. Radio Nacional Boa Vista from the city of that name used to be Radiodifusora Roraima until it became part of the Radiobras network. The station was founded in 1957 as a state station and became part of Radiobras, with accompanying name change, in 1977. It's on 4.835 from 0900 to 0300. The address is C.P. 171, 69300 Boa Vista, Roraima.

Amapa, through which the Amazon flows to meet the Atlantic is, like Rondonia and Roraima, a territory rather than a state. Radio Nacional Macapa is another link in the fairly new and still developing Radiobras network designed to cover the country more effectively. Before joining Radiobras, the station was called Radiodifusora de Macapa. Then, as now, it operates on 4.915 with call letters ZYE2. A non-directional antenna takes a signal froma ten kilowatt transmitter. Watch out for Radio Anhanguera also operating here. The Macapa station is a very poor verifier but you can try anyway. Write Av. Candido Mendez 525, 68900 Macapa, Amapa.

Santa Catarina, occupying a segment of the southern coast, provides Radio Marumby on 9.675 with 10 kilowatts from Florinapolis. Music, news, and commercials make up a large part of the programming during its scheduled 0830 to 0300 broadcast day. This one is a fairly good verifier and you can write C.P. 62, 88000 Florinapolis, Santa Catarina.

Parana, to the north of Santa Catarina, contains the large city of Curitiba which, in turn, contains Radio Universo on 6.020, 9.545, and 11.905 with a different operating schedule for each frequency. Try 6.020

Radio Rural's QSL card.

from 1000 to 1200 and 2100 to 0300, 9.545 from 0900 to 2200, and 11.905 from 1000 to 0100. QSLs from this one are not often reported, but from time to time someone does get lucky. Write C.P. 7133, 80000 Curitiba, Parana.

Amazonas, a large state in the northwest, is another site for a Radiobras station—Radio Nacional de Tabatinga from the city of that name. Tabatinga is on the far western border where the fingers of Colombia and Peru touch Brazil. The station has been heard fairly well on 4.815 with its 10 kilowatts when the frequency is clear of other Brazilian and Latin broadcasters. It's scheduled from 0800 to 0300. It verifies reports only occasionally. Write Cleve Tocantinslote 15, Districto Benjamin Constant, 69630 Tabatinga, Amazonas.

Rondonia, straight south of Amazonas, is another territory rather than holding state status. Checks of 4.785 between 0730 and 0300 will occasionally bring in Radio Caiari

POP'COMM's Brazilian Log

Frequency	Station	City	State
2.310	Radio Progresso	Souza	Pernambuco
2.340	Radiodifusora Itacoatiara	Itacoatiara	Amazonas
2.340	Radio Educadora	Guajara Mirim	Rondonia
2.380	Radio Educadora	Limeira	Sao Paulo
2.400	Radio Educadora Sao Jose	Macapa	Amapa
2.410	R. Transamazonica	Senador Guiomard	Acre
2.420	R. Sao Carlos	Sao Carlos	Sao Paulo
2.420	Radio Caraja	Anapolis	Goias
2.450	R. Cultura Aracatuba	Aracatuba	Sao Paulo
2.470	Radio Cacique	Sorocaba	Sao Paulo
2.470	Radio Cidade Cancao	Mandaguacu	Parana
2.480	Radio Clube Rondonopolis	Rondonopolis	Mato Grosso
2.490	Radio Educadora Rural	Coari	Amazonas
2.490	Radio Oito de Setembro	Descalvado	Sao Paulo
3.205	Radio Ribeirao Preto	Ribeirao Preto	Sao Paulo
3.225	Lins Radio Clube	Lins	Sao Paulo
3.225	Radio Liberal	Belem	Para
3.235	Radio Clube Marila	Marila	Sao Paulo
3.245	R. Educadora Palmares	Maceio	Alagoas
3.245	Radio Clube Varginha	Varginha	Minas Gerais
3.245	Radio Aruana	Barra do Garca	Mato Grosso
3.255	R. Educadora de Cariri	Crato	Ceara
3.255	Rdf. Uberlandia	Uberlandia	Minas Gerais
3.265	Radio Tamandare	Recife	Pernambuco
3.265	Radio Cultura	Pocos de Caldas	Minas Gerais
3.275	Rdf. de Alagoas	Maceio	Alagoas
3.275	Bauru Radio Clube	Bauru	Sao Paulo
3.275	Rdf. Caceres	Caceres	Mato Grosso
3.285	Radio Clube Teresina	Teresina	Piaui
3.285	Radio Atalaia	Obidos	Para
3.295	Radio Tapuyo	Mossoro	Rio Grande do N.
3.295	Radio Iguatemi	Osasco	Sao Paulo
3.315	Radio Assuncao	Fortaleza	Ceara
3.325	Rdf. Universitaria	Guarulhos	Sao Paulo
3.325	Radio Gazeta de Alagoas	Maceio	Alagoas
3.335	Radio Clube Conquista	Vitoria de Conquista	Bahia
3.335	Radio Alvorada	Londrina	Parana
3.335	Radio Educadora Rural	Natal	Rio Grande - N.
3.345	R. Educadora Uberlandia	Uberlandia	Minas Gerais
3.345	Radio Caiari	Porto Velho	Rondonia
3.345	R. Cultura de Sergipe	Aracaju	Sergipe
3.355	Radio Industrial	Juiz de Fora	Minas Gerais
3.365	Radio Educadora Parnaiba	Joao Pessoa	Parnaiba
3.365	Radio Cultura Araraquara	Araraquara	Sao Paulo
3.375	R. Nacional	Sao Gabriel	Amazonas
3.375	Radio Clube Dourados	Dourados	Mato Grosso-S
3.375	Radio Educadora Guajara	Mirim	Rondonia
3.385	Radio Congohas	Congohas	Minas Gerais
3.385	Radio Juazeiro	Juazeiro	Bahia
3.385	Radio Educadora Rural	Tefe	Amazonas
2.405v	Radio Educadora 6 de Agosto	Xapuri	Acre
3.570v	Radio Treze de Junho	Brasileira	Acre
4.115	Rdf. Cruzeiro do Sul	Cruzeiro do Sul	Acre
4.755	Radio Educadora Rural	Campo Grande	Mato Grosso
4.755	Radiodifusora Sao Luiz	Sao Luiz	Maranhao
4.765	Radio Nacional	Cruzeiro do Sul	Acre
4.765	Radio Emissora Rural	Santarem	Para
4.765	Radio Espirito Santo	Vitoria	Espirito Santo
4.775	Radio Cultura de Sergipe	Aracaju	Sergipe
4.775	A Voz do Oeste	Cuiaba	Mato Grosso
4.785	Radio Ribamar	Sao Luiz	Maranhao
4.785	Radio Brazil	Campinas	Sao Paulo
4.785	Radio Caiari	Porto Velho	Rondonia
4.795	Rdf. de Aquidauana	Aquidauana	Mato Grosso-S
4.797	Radio Tabaraja	Joao Pessoa	Parnaiba
4.805	Radiodifusora de Amazonas	Manaus	Amazonas
4.812	Radio Itatiaia	Belo Horizonte	Minas Gerais
4.815	Radiodifusora de Londrina	Londrina	Parana
4.815	Radio Nacional	Tabatinga	Amazonas
4.815	Radio Iracema	Fortelaza	Ceara
4.825	Radio Mundial	Rio de Janeiro	Rio de Janeiro
4.825	Radio Educadora Braganca	Braganca	Para
4.835	Radio Nacional	Boa Vista	Roraima
4.835	Radio Nacional Amazonas	Brasilia	Districto Federal
4.835	Radio Evangelica	Corumba	Mato Grosso - S.
4.845	Radiodifusora Teresina	Teresina	Piaui
4.855	R. Por um Mundo Melhor	Governador Valadares	Minas Gerais
4.865	Radio Sociedade	Feira de Santana	Bahia

Frequency	Station	City	State
4.875	Radio Journal do Brazil	Rio de Janeiro	Rio de Janeiro
4.875	Radio Nacional	Manaus	Amazonas
4.885	Radiodifusora Acreana	Rio Branco	Acre
4.885	Radio Clube do Para	Belem	Para
4.895	Radio Bare	Manaus	Amazonas
4.895	Radio Cultura de Bahia	Salvador	Bahia
4.905	Radio Relogio Federal	Rio de Janeiro	Rio de Janeiro
4.905	Radio Araguaia	Araguaia	Goias
4.915	Radio Nacional	Macapa	Amapa
4.915	Radio Anhanguera	Goiania	Goias
4.925	Radio Dragao do Mar	Fortelaza	Ceara
4.925	Radiodifusora Tabaute	Tabaute	Sao Paulo
4.935	Radio Capixaba	Vitoria	Espirito Santo
4.935	Radiodifusora Jatai	Itajai	Santa Catarina
4.935	Radiodifusora Merim	Caxias	Maranhao
4.935	Radio Independencia	Manaus	Amazonas
4.945	Rdf. Pocos de Caldas	Pocos de Caldas	Minas Gerais
4.945	Em. Rural-Voz do Sao Francisco	Petrolina	Pernambuco
4.945	Radio Nacional	Porto Velho	Rondonia
4.955	RadioMarajoara	Belem	Para
4.955	Radio Clube Rondonopolis	Rondonopolis	Mato Grosso
4.965	Radio Poti	Natal	Rio Grande - N.
4.965	R. Sociedad Triangulo Mineiro	Uberaba	Minas Gerais
4.965	Radio Alvorada	Parintins	Amazonas
4.975	Radio Timbira	Sao Luiz	Maranhao
4.975	Radio Iguatemi	Osasco	Sao Paulo
4.985v	Radio Brazil Central	Goiania	Goias
5.015	Radio Copacabana	Rio de Janeiro	Rio de Janeiro
5.015	Radi Cultura	Cuiaba	Mato Grosso
5.015	R.Pioneira de Teresina	Teresina	Piaui
5.015	Radio Cultura de Cuiaba	Cuiaba	Mato Grosso
5.025	Radio Borborema	Compina Grande	Paraiba
5.025	Radio Vi-toria	Vi-toria	Espirito Santo
5.027	R. Journal Transamazonica	Altimara	Para
5.045	Radio Aparecida	Aparecida	Sao Paulo
5.045	Rdf. Presidente Prudente	Presidente Prudente	Sao Paulo
5.045	Radio Cultura do Para	Belem	Para
5.055	Radio Maua	Sao Jose do Merti	Rio de Janeiro
5.955	Radio Gazeta	Sao Paulo	Sao Paulo
5.965	Radio Guaiba	Porto Alegre	Rio Grande - S.
5.975	Radio Guaruja	Florinapolis	Santa Catarina
5.990	Radio MEC	Rio de Janeiro	Rio de Janeiro
6.000	Radio Inconfidencia	Belo Horizonte	Minas Gerais
6.010	Radio Aparecida	Aparecida	Sao Paulo
6.015	Radio Clube Pernambuco	Recife	Pernambuco
6.020	Radio Universo	Curitiba	Parana
6.025	Radio Educadora da Bahia	Salvador	Bahia
6.035	Radio Globo	Rio de Janeiro	Rio de Janeiro
6.045	Radio Clube Paranaense	Curitiba	Parana
6.055	Radio Record	Sao Paulo	Sao Paulo
6.065	Radio Nacional	Brasilia	Districto Federal
6.080	Radio Caicara	Porto Alegre	Rio Grande - S.
6.085	Radio Journal do Comercio	Recife	Pernambuco
6.085	Rdf. Sao Paulo/R. Tupi	Sao Paulo	Sao Paulo
6.100	Radio Cultura	Foz de Iguacu	Parana
6.105	Ceara Radio Clube	Fortelaza	Ceara
6.115	Radio Tupi	Rio de Janeiro	Rio de Janeiro
6.125	Radio Globo	Sao Paulo	Sao Paulo
6.135	Radio Gaucha	Porto Alegre	Rio Grande - S.
6.155	Radio Cultura da Bahia	Salvador	Bahia
6.165	Radio Guarani	Belo Horizonte	Minas Gerais
6.185	Radio Bandeirantes	Sao Paulo	Sao Paulo
6.195	Radio Capital	Rio de Janeiro	Rio de Janeiro
9.505	Radio Record	Sao Paulo	Sao Paulo
9.515	R. Educadora da Bahia	Salvador	Bahia
9.520	Radio Caicara	Porto Alegre	Rio Grande - S.
9.520	Radio Itiaia	Belo Horizonte	Minas Gerais
9.545	Radio Universo	Curitiba	Parana
9.585	Radio Globo	Sao Paulo	Sao Paulo
9.595	Radio Cultura de Bahia	Salvador	Bahia
9.612	Radio Tamoio	Rio de Janeiro	Rio de Janeiro
9.635	Radio Aparecida	Aparecida	Sao Paulo
9.645	Radio Bandeirantes	Sao Paulo	Sao Paulo
9.665	Radio Nacional	Brasilia	Districto Federal
9.675	Radio Marumby	Florinapolis	Santa Catarina
9.685	Radio Gazeta	Sao Paulo	Sao Paulo
9.695	Radio Rio Mar	Manaus	Amazonas
9.705	Radio Nacional	Rio de Janeiro	Rio de Janeiro

from Porto Velho. Watch out though, there's a lot of Brazilian activity here with Radio Ribimar and Radio Brazil also clamoring for attention. Radio Caiari can be reached at C.P. 104, 78900 Porto Velho, Rondonia.

Acre, back in the west, occupies another "beak" area which butts up against Peru and Bolivia. Another Radio National (Radiobras) station can be found at Cruzeiro do Sul and it's heard fairly often on 4.765 with 10 kilowatts from 0800 to 0100, although two other stations also use the frequency so reception of this one will take care and patience. Like most of the Radio Nacional local outlets, it rarely verifies reports, claiming there is not enough staff time available. If you hear it and want to try for a reply, your report goes to Rua Rui Barbosa, 69980 Cruzeiro do Sul, Acre.

Alagoas, back on the east coast south of Pernambuco state, is one of the smaller divisions and you'll have to drop down to 90 meters to get a reasonable chance at hearing this state. Try 3.275 for Radiodifusora de Alagoas at Maceio with 1,000 watts. Early morning around 0900 or early to mid evening (2300 to 0200, depending on when darkness arrives at your location) are the best times. There are two other Brazilians on the frequency as well. Radiodifusora de Alagoas is at Av. Fernandes Lima 1047, Farol, 57000, Maceio, Alagoas.

Minas Gerais (General Mines) is in the east central part of the country and known for its vast mineral production. Radio Inconfidencia from Belo Horizonte, one of Brazil's

most beautiful cities, can often be heard on 6.000 or 15.190 when the frequencies are clear. 15.190 is less often used than 6.000. 6.000 uses 25 kilowatts from 0700 to 0300, 15.190 uses 5 kilowatts. Radio Inconfidencia is at Av. Amazonas 491, 30000 Belo Horizonte, Minas Gerais.

Bahia on the central Atlantic Coast can be logged in the form of Radio Educadora de Bahia from Salvador, the main port city. It's on 6.025 with 10 kilowatts and signs on around 0800. It's another unreliable verifier but try Rua Predo Gama 413-E, alto do Sobradinho Federacao, 40000 Salvador, Bahia.

Rio Grande do Sul, as far south as you can go along the Atlantic coast and still be in Brazil, provides Radio Guaiba at Porto Alegre on 5.965. ZYE852's ten kilowatts are supposedly on the air 24 hours a day, although it's had periods of inactivity. The address is Rua Caldas Jr. 219, 90000 Porto Alegre, Rio Grande do Sul.

Brasilia, the federal district and capital, and designed for the purpose of providing a capital city, is starkly modern and sits in its 21st century glory in virtually the middle of the country. Radio Nacional Brasilia and Radio Nacional Amazonas are headquartered here. Brazil's international voice can be heard on 17.830, 15.445, 15.290, and 11.780 during much of the day and evening hours. QSLs for accurate reports are usually provided. Write the International Department, P.O. Box 04/0340, 70323 Brasilia, Districto Federal.

Admittedly, many of the stations we've listed here are rather difficult to hear, but we chose what we felt were the most logical ones and not by any means impossible. As we mentioned, stations listed for the higher frequencies are much better heard, but their operations are far less reliable. The targets we've listed in our survey are much more likely to be on the air and one can't expect much success without that basic ingredient.

If you decide to have a go at Brazilian DXing, be prepared to sort out stations from a pile of three or four speaking the same language on the same frequency. Expect to wait interminably for station identifications and, often as not, to miss them when they do come since they're often given rapidly.

Building up a log of Brazilians heard and verified takes time, determination, and effort. But it's one of the greatest challenges in DXing.

"Seja bemvindo." Welcome to Brazil!

POP'COMM's Brazilian Log

Frequency	Station	City	State
9.745	Radio Cultura	Sao Paulo	Sao Paulo
9.755	Radio Brazil Centro	Goiania	Goias
9.770	Radio MEC	Rio de Janeiro	Rio de Janeiro
11.735	Radio Clube Goiania	Goiania	Goias
11.765	Radio Tupi	Sao Paulo	Sao Paulo
11.780	Radio Nacional Amazonas	Brasilia	Districto Federal
11.785	Radio Guaiba	Porto Alegre	Rio Grande - S.
11.805	Radio Globo	Rio de Janeiro	Rio de Janeiro
11.815	Radio Brazil Central	Goiania	Goias
11.855	Radio Aparecida	Aparecida	Sao Paulo
11.865	Radio Clube Pernambuco	Recife	Pernambuco
11.875	Radio Sociedad Bahia	Salvador	Bahia
11.895	Radio Caicara	Porto Alegre	Rio Grande - S.
11.905	Radio Universo	Curitiba	Parana
11.915	Radio Gaucha	Porto Alegre	Rio Grande - S.
11.925	Radio Bandeirantes	Sao Paulo	Sao Paulo
11.935	Radio Clube Paranaense	Curitiba	Parana
11.950	Radio MEC	Rio de Janeiro	Rio de Janeiro
11.965	Radio Record	Sao Paulo	Sao Paulo
15.125	Radio Nacional	Brasilia	Districto Federal
15.125	Radio Sociedade da Bahia	Salvador	Bahia
15.135	Radio Record	Sao Paulo	Sao Paulo
15.155	Radio Tupi	Sao Paulo	Sao Paulo
15.165	Ceara Radio Clube	Fortelaza	Ceara
15.175	Radio Bandeirantes	Sao Paulo	Sao Paulo
15.190	Radio Inconfidencia	Belo Horizonte	Minas Gerais
15.215	Radio Timbira	Sao Luiz	Maranhao
15.245	Radio Nacional	Brasilia	Districto Federal
15.265	Radio Globo	Sao Paulo	Sao Paulo
15.280	Radio Nacional	Brasilia	Districto Federal
15.290	Radio Nacional	Brasilia	Districto Federal
15.325	Radio Gazeta	Sao Paulo	Sao Paulo
15.370	Radio Tupi	Rio de Janeiro	Rio de Janeiro
15.415	Radio Clube Ribeirao Preto	Ribeirao Preto	Sao Paulo
15.445	Radio Nacional Amazonas	Brasilia	Districto Federal
17.805	Radio Nacional	Brasilia	Districto Federal
17.815	Radio Cultura	Sao Paulo	Sao Paulo
17.830	Radio Nacional	Brasilia	Districto Federal
17.875	Radio MEC	Rio de Janeiro	Rio de Janeiro

SCANNER WORLD, USA

10 New Scotland Ave., Albany, NY 12208 518/436-9606

BEARCAT® 100

List Price $449.95

Scanner World Price $279.99

Handheld digital programmable, no crystal portable scanner. 16 channels, search feature. plus more! Frequency range: 30-50, 138-174, 406-512 MHz FM. Included in the package is a flexible rubber antenna, earphone, battery charger/AC adapter, 6 AA Ni-Cad rechargeable batteries and a heavy duty carry case. All for the low price of $279.99.

BEARCAT® 300

List Price $549.95

Scanner World Price $335.99

50 Channel, 7 band, digital programmable, no crystal scanner, AM aircraft and public service band, AC/DC priority channel, search feature, plus more! Frequency range 32-50 FM, 117-136 AM, 144-174 FM, 421-512 MHz FM

BEARCAT® 151

List Price $249.95

Scanner World Price $154.99

10 Channel, 5 band, AC only, digital, programmable, no crystal base scanner. Frequency range: 30-50, 144-174, 440-512 MHz.

BEARCAT® 210XL

List Price $349.95

Scanner World Price $214.99

18 Channel, 6 Band, digital programmable, no crystal AC/DC scanner. Search feature, scan delay, lockout, plus much more! Frequency range: 32-50, 144-174, 421-512 MHz.

RCD LISTEN-IN

Scanner World Price $38.99

Hand held, pocket sized, one channel portable professional FM Pager type receiver with 10 to 30 mile receiving range. Includes telescopic antenna, squelch & volume controls, and crystal. Uses standard 9 volt transistor battery (battery not included). Available in high, low, or UHF Band. Specify frequency needed when ordering. (Optional rubber antennas also available).

REGENCY® MX-3000

List Price $299.95

Scanner World Price $186.99

30 Channel, 5 band, digital programmable, no crystal, AC/DC scanner, mobile design, includes mobile mounting bracket. Priority, delay and much more. Optional mobile cord with cigarette lighter plug $4.95 each. Frequency range: 30-50, 144-174, 440-512 MHz.

JIL SX-100

List Price $269.99

Scanner World Price $138.99

16 channel, 5 band, digital programmable, no crystal scanner. Frequency range 30-54 MHz, 140-174 MHz, 410-514 MHz. AC/DC for base or mobile use, fast-slow scan speed, variable scan delay, quartz digital clock, automatic search, dimensions 8¼"x x 3¼" h x 9 1/8 D. All of the above plus more for the low price of $138.99.

JIL SX200 *only* *$269.99*

Monitor Crystals—$2.95 each

We stock thousands of crystals for all brands of scanners. Order by frequency number and brand of scanner. If crystal is out of stock, we will supply crystal certificate for prepaid delivery direct to you.

NOTICE

As new items become available in the future, we will add these to our monthly advertisements. If you would like information or prices on merchandise not released as yet by manufacturer, give us a call. For the past 15 years Scanner World has been the #1 Scanner Distributor with the largest on-hand inventory anywhere.

BEARCAT® 250

List Price $429.95

Scanner World Price $265.99

50 Channel, 6 band digital, programmable, no crystal scanner of public service bands. AC/DC. Frequency range: 32-50 FM, 146-174 FM, 420-512 MHz FM. Search, delay, lockout, recall, priority, clock plus much more for only $265.99.

Super Special Package Sale!!

REGENCY HX-650

Pocket Scanner

6 CHANNELS — 4 BANDS

VHF-Lo	30 to 50 MHz
VHF-High	146 to 174 MHz
UHF	450 to 470 MHz
UHF-T	470 to 512 MHz
Small Size	3¾"W x 5½" H x 1"D

Quality features included in the Regency HX-650 are 6 channels - 4 band coverage, lockout switches, manual step switch, scanning speed of 15 channels per second, long lasting LED's, volume & squelch controls, AC adapter/charger jacks.

Scanner World's Special Package Deal Includes the Following:

- Regency HX-650 Pocket Scanner
- MA-506 Carry Case
- Set of 4 AAA Nickel Cadmium Batteries
- 6 Monitor Crystals (specify frequencies needed or we will include certificates for unknown frequencies)
- Flexible Rubber Ducky Antenna
- AC Adapter & Charger

Scanner World Package Price

$109.99

(Plus $5.50 Shipping)

WILSON WH-2510

List Price $663.00

Scanner World Package Price $479.99

CITI-COM Plus Transceiver, 2-way radio fully programmable in transmit or receive mode plus CTCSS, Private Line, Channel guard. No crystals to buy. 10 channels, high band (134 to 174 MHz) maximum frequency spread 6 MHz, transmit output 25 watts, priority, 10 channel scan, plus more. Comes with mobile microphone, mobile mounting bracket, mobile antenna, easy programming instructions, and cable assemblies for hookup. (UHF model available package price $569.99) Plus $5.50 Shipping.

RADAR DETECTORS

Whistler Spectrum*	$214.99
Whistler Remote Spectrum*	214.99
Whistler Q2000*	189.99
Whistler Q1000*	169.99
Whistler Q1200*	116.99
Fox XK	84.99
Fox XK Remote	99.99
Superfox Vixen*	139.99
Superfox Remote*	189.99
Fox Super-Trucker*	229.99
Fox XKMR (Motorcycle)	119.99
Regency RS1	94.99
Regency RS2*	142.99
Regency RS3 Remote*	173.99

*Above units marked with * are superheterodyne type*

All Band Monitor Antennas

For added receiver gain, includes cable and connectors for scanning monitors.

Magnetic Mobile Antenna (ANT-1)	29.99
Trunk Mount Mobile Antenna (ANT-2)	27.99
Mirror or Light Bar Mount Mobile Antenna (ANT-3)	25.99
Gutter Clip Mobile Antenna (ANT-4)	25.99
Hole Mount Mobile Antenna (ANT-5)	22.99
Base Antenna with 50' Cable & Connectors (ANT-6)	29.99

For Shipping, please add $2.50 per antenna in Continental USA

MOST MERCHANDISE IN STOCK FOR IMMEDIATE SAME DAY SHIPMENT

REGENCY M100 AC/DC 10 Channel LHU Digital	$179.99
REGENCY HX-650 Pocket Scanner with AC Adapter, Rubber Antenna & Charger	82.99
REGENCY MA-506 Carry Case for HX-650 & H-604	12.99
REGENCY K-100 AC/DC 10 Channel HLU	148.99
REGENCY POLARIS MT-5500 Marine	259.99
REGENCY R1040 AC 10 Channel Programmable Base Scanner	128.99
REGENCY D100 AC 10 Channel LHU Digital	154.99
REGENCY C403 AC 4 Channel Crystal HLU	66.99
REGENCY E106 AC/DC 10 Channel HLU Crystal	114.99
REGENCY R106 AC//DC 10 Channel HLU Crystal	96.99
REGENCY D810 AC 50 Channel HLU & Air Digital	249.99
REGENCY D300 AC/DC 30 Channel HLU Digital	179.99
FANON M8HLU 8 Channel Mini Mobile Crystal	99.99
FANON PSK-1 AC adapter for M8HLU	12.99
FANON SlimLine 6-HLU Handheld Crystal Scanner	103.99
FANON CHB-6 Charger/AC Adapter for Slim 6	12.99
FANON CAT-6 Carrying Case with Belt Clip	11.99
FANON AUC-4 Autolighter Adapter//Charger	12.99
FANON SCMA-6 Mobile Adapter/Charger/Amplifier for Slim Line 6 HLU	39.99
FANON PSK-6 Base Power Supply for SCMA-6	14.99
FANON FCT-200 Cordless Telephone	124.99
BEARCAT® 20/20 40 Channel Digital Scanner	275.99
BEARCAT® 200 16 Channel Digital Scanner	174.99
BEARCAT® 5 HLU AC Crystal Scanner	88.99
BEARCAT® Weather Alert BC-WA	39.99
BEARCAT® 160 HLU 16 Channel Base Scanner	159.99
BEARCAT® FIVE-SIX Pocket Scanner	126.99
BEARCAT® SP-55 Carry Case for BC 5/6	12.99
BEARCAT BC-260 AC/DC Scanner	269.99
BEARCAT® DX-1000 Shortwave Radio	519.99
FBE BEARCAT Frequency Directory Eastern USA	10.99
FBW BEARCAT Frequency Directory Western USA	10.99
Air Scan Directory	7.95
Railroad Frequency Directory	7.95
Covert Intelligency: Electronic Eavesdropping	8.95
Covert Techniques for Intercepting	9.95
Top Secret Registry of US Gov't Frequencies	9.95
Energy Scan Directory	5.95
Survival Radio Frequency Directory	6.95
Complete Guide to Scanners and Monitors	9.95
B-4 Set of 4 Triple AAA Ni-Cad Batteries	8.99
B-6 Set of 4 Double AA Ni-Cad Batteries	7.99
A-20 Replacement Telescopic Antenna for Bearcat® Base Scanner	4.95
Motorola Type 1.3 volt Ni-Cad Pager Battery	4.59
Wilson WAH-2080 High Band 100 Watt Amplifier	209.99
Russell Rubber Duckie Hi-Lo-UHF	15.99

BEARCAT 20/20

List Price $439.99

Scanner World Price $275.99

40 Channel, (2 banks of 20 each), 7 band, digital programmable, no crystal scanner. Frequency range 32-50 MHz FM, 118-136 AM Aircraft, 144-174 MHz FM, Public Service, 421-512 MHz Public Service. AC/DC, Search, Mobile Mounting Bracket an AC & DC Cords included.

VISA MasterCard

CIRCLE 18 ON READER SERVICE CARD

Ordering Information

Call (518) 436-9606 to place orders by phone or mail orders to ***Scanner World,*** 10 New Scotland Ave., Albany, NY 12208. Orders will be shipped same day received by United Parcel Service. ***Scanner World*** accepts VISA, MasterCard. C.O.D. shipments by United Parcel will be for cash or certified checks only. Mail orders with personal or business checks will be held 3 weeks for bank clearance. Orders with cashiers checks or money orders shipped same day received. Prices, specifications and terms subject to change without prior notice. If items are out of stock we will backorder and notify you of delivery date. All Shipments are F.O.B. ***Scanner World*** warehouse in Albany, NY. We are not responsible for typographical errors. All merchandise carries full manufacturers warranty. Bid Proposals and Purchase Orders accepted from Government agencies. Free full line catalogue available upon request. No minimum order. New York State Residents add 7% sales tax.

Shipping Charges

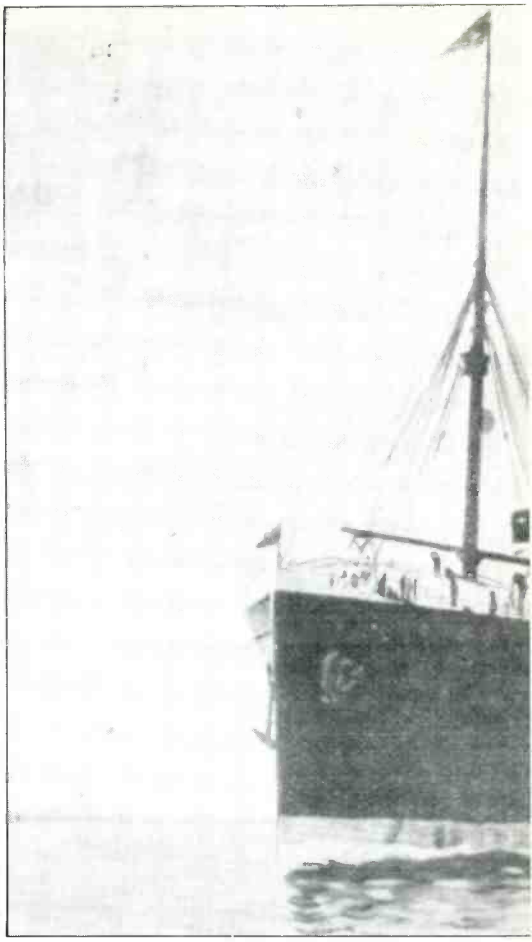
Add $3.00 per scanner, $2.50 per antenna and $2.50 for all accessories ordered at same time. (Example: 1 scanner and 1 antenna has total shipping charge of $5.50.) C.O.D. shipments will be charged an additional $2.50 per package. Full insurance is included in shipping charges. All orders are shipped by United Parcel Service. Shipping charges are for continental USA only. Outside of continental USA, please ask for special shipping quote.

Those Wild & Wacky

Oddball Radio Stations of The 1930's!

They Had 'Em On Trains, Ships, Trucks, Aircraft & Even Card Tables!

BY TOM KNEITEL, K2AES, EDITOR



As soon as kids reach their adolescence, they start doing crazy things. After the first faltering experiences of early childhood, they branch out into experiments intended (they say) to give them some values in their later life. When a person looks back on those experiments, especially those which were tried and discarded, they look especially strange and alien.

It's not really all that different with new technologies. After we figure out how to invent them, then we start trying them in ways which we think will make them more useful and/or enjoyable. After the technology for practical home TV had been developed, we were treated to things such as direct TV broadcasting from aircraft. Does anybody out there remember the "Stratovision" tests, or the USAF C-47 aircraft which tried broadcasting TV while flying above New York?

Although beyond the direct memory of many folks today, radio broadcasting was not unfamiliar with the strange and unusual once it got past its initial birth pains in the 1920's. By the time the late 1920's and the 1930's rolled around there were all sorts of bizarre broadcasting stations installed at oddball locations—like ships and trains! All of these ideas seemed worthy of exploration at the time but somehow they never did click to the point where they remained a vital part of the broadcasting scene.

As early as 1926, someone had a licensed broadcasting station aboard their private yacht! This was station WRMU, which ran 100 watts on 1270 kHz. The station was located aboard the yacht "MU-1" owned by A.H. Grebe. Grebe was a well-known manufacturer of expensive broadcast receivers. All Grebe ads showed a drawing of a fictitious gentleman known as *Dr. Mu*—so the callsign WRMU stood for "Radio Mu."

The year 1933 saw the arrival on the scene of the infamous pirate broadcasting vessel *City of Panama*. Its broadcasting career on 815 kHz, using the callsign RXKR, was described in the August '83 issue of *POP'COMM*. It was one of the factors which led to eventual regulations forbidding broadcasting from ships at sea—but there were a couple of other ocean-borne broadcasters anyway.

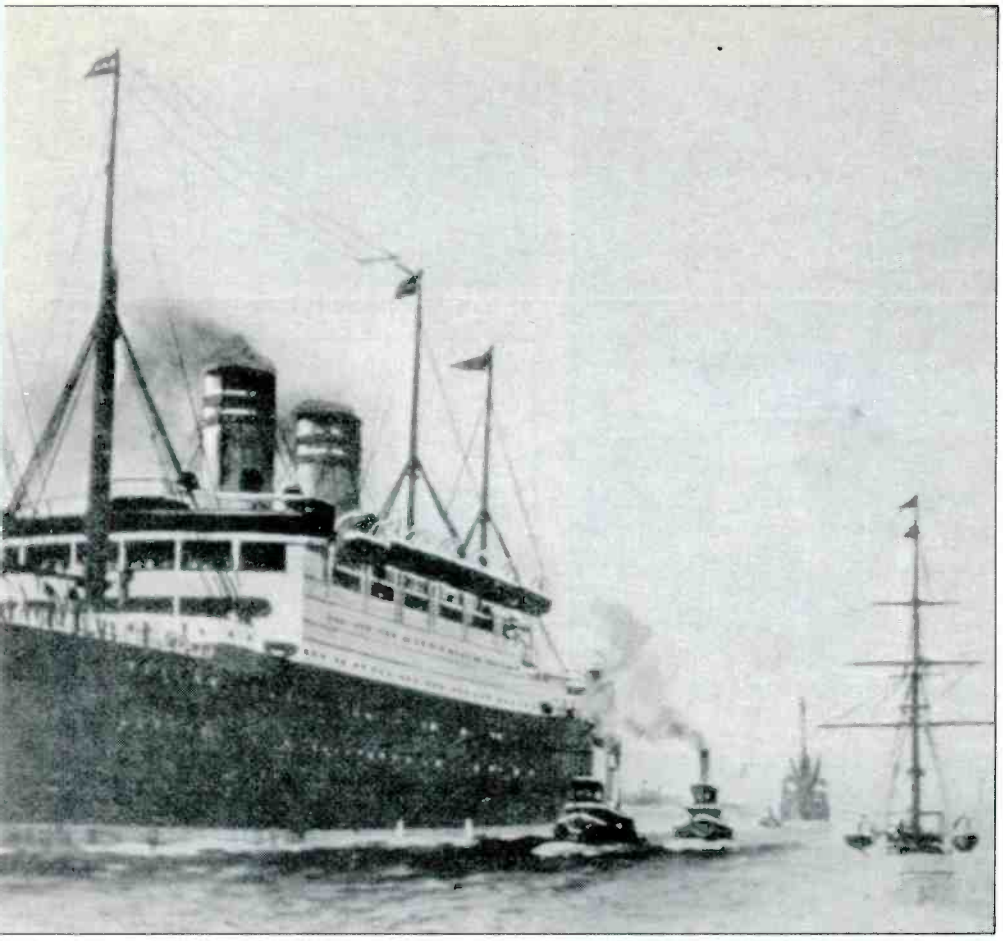
One such station was VK9MI, which seemed to be active and widely reported between 1936 and at least 1943. VK9MI was located aboard the Motor Vessel *Kanimbla*, a passenger ship which sailed between New Zealand and Australia. Operating on 6053 and 11710 kHz with 50 watts, VK9MI had a daily schedule and was palming itself off as "the world's first ship broadcaster." Although that claim may not have been fully accurate, they were certainly one of the first stations to use a female disc jockey. Each day the station would sign on with the sound of a ship's bell, followed by the tooting of the *Kanimbla's* whistle. At the sign-off, "God Save The King" was played. This station freely distributed QSL cards to verify all reception reports. The *Kanimbla*, which was owned by McIllwraith & McEacharn, Ltd., of Melbourne, Australia, weighed 11,000 gross tons and was 494 feet in overall length. She carried 400 passengers and was built in 1936. It isn't known how long the ship was engaged in broadcasting, but the vessel was still listed in shipping records as late as 1943. A publication of 1943 clarified the vessel's questionable boast of being the world's first ship broadcasting station by specifying that it was the "first passenger vessel in the British Empire to be licensed for broadcasting."

Another ship-borne broadcaster of this same era was ZMBJ aboard the *T.S.S. Awatea*, owned by the Union Steam Ship Company of Aukland, New Zealand. This ship was also built in 1936, but it was larger than the *Kanimbla*, weighing 13,500 gross tons and extending to 520 feet in length.

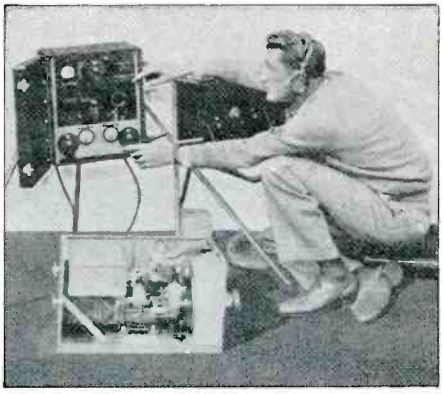
The *Awatea's* broadcasting station, ZMBJ, calling itself "The Ears and Voice of the Tasman," was considered an "easy catch" for DXers between 1937 and into the early 1940's. The station operated on 8840, 13200, and 13600 kHz with 300 to 400 watts, although it was also heard with two-way traffic on 9760 and 10520 kHz. Chief Radio Operator, Lionel H. Jones, signed many hundreds of QSL cards to verify listener reports which arrived from all areas of the world.

Of course, VK9MI and ZMBJ were certainly early ocean-going broadcasters, but they did not pre-date either WRMU nor RXKR. They also came several years after station KNRA, located aboard a sailing vessel called the *Seth Parker* that went on several "round the world cruises," including one in 1934 when it carried station KNRA aboard. KNRA operated on 6160, 6660, 6670, 8230, 8820, and 13200 kHz and in addition to its use as a method of two-way communication with the world, KNRA was used for broadcasting purposes. The *Seth Parker's* skipper was well-known explorer Phillips Lord and his broadcasts mostly concerned the documentary films he was shooting during his voyage. Most of these broadcasts were picked up by NBC, with whom Lord had a contract, and rebroadcast over the NBC network for the delight of those who didn't have a shortwave receiver to hear the broadcasts directly from the vessel.

Yet another 1930's sea-borne broadcaster was the world's largest passenger liner, the *SS Normandie* (1,027 ft., 83,400 gross tons) of the French Transatlantique Co. Built in '35, she was licensed as FNSK on 4390, 4413, 8830, and 13210 kHz. Al-



WHBM, a 20 watt mobile broadcaster.



WEBL was a 10 watt portable broadcaster.

February 2, 1929, NBC provided the first radio broadcasts from an aircraft in flight.

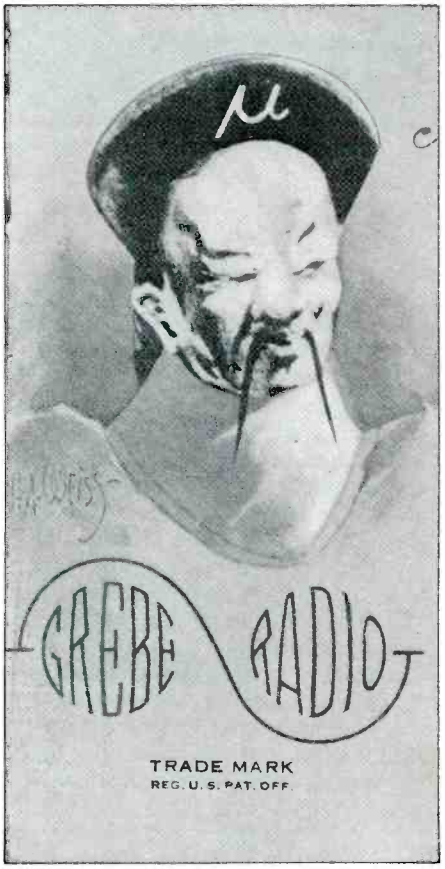
though most of FNSK's transmissions were ship/shore telephone, the vessel had a large and complete broadcast studio from which live music and other entertainment was sometimes beamed to the world. The vessel was destroyed by fire at its New York dock in 1942 (sabotage was suspected).

These and a few other floating broadcasters came and went, followed by several military broadcast ships during the war, and the U.S. Coast Guard Cutter *Courier* which served as a *Voice of America* relay in Greece in the 1950's. International regulations deemed shipboard broadcasters illegal after 1938, although a number of stationary location sea-borne broadcasters have been noted on the air since 1960.

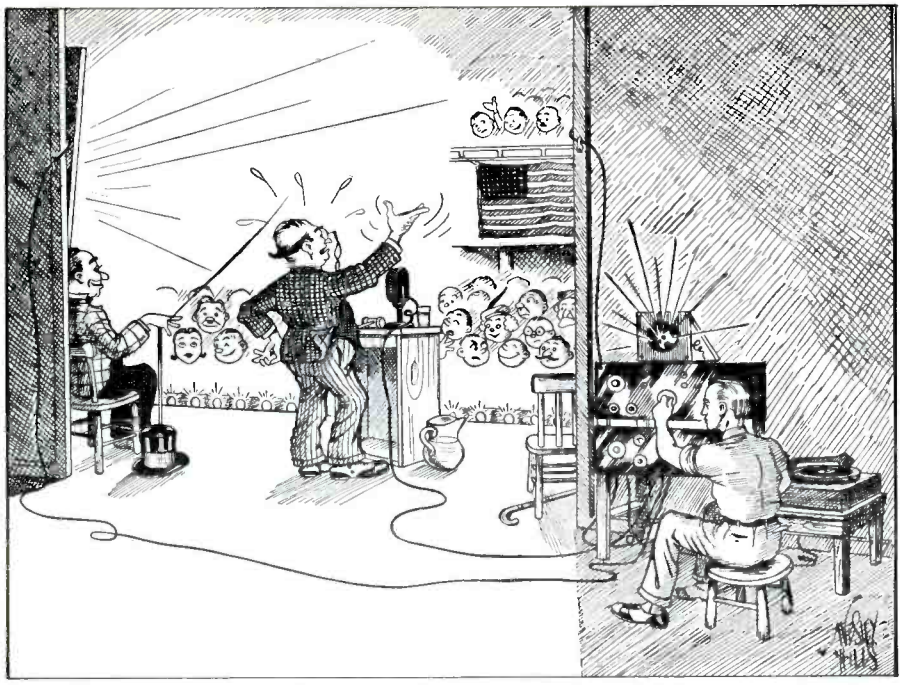
On The Right Track?

On the other hand, 1930's broadcasters tried many other experiments. For instance, there was a temporary broadcaster located aboard a train. That was KIED which ran 250 watts on 1518 kHz. It was aboard a special train chartered by Warner Brothers and was sent across the countryside to ballyhoo their new film *42nd Street*. The train would stop in each city where the film was to open and KIED would do a program. Although listeners could hear the low-powered station directly on 1518 kHz, the station's signals were also rebroadcast over a regular broadcast station in each city for the benefit of those outside of KIED's transmitting range. Programs consisted of interviews with the stars of the film and endless playing of the film's music as recorded on 78 RPM discs.

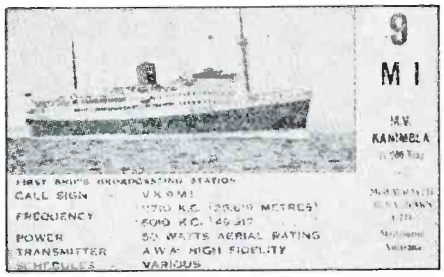
A far more fascinating approach to radio on a rail was taken in Australia in 1937. Station 3YB was certainly one of the most unique broadcasters to ever come along in that period. The station was installed in a



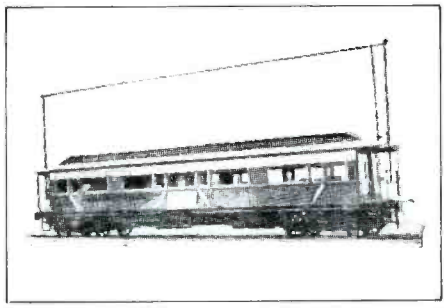
Grebe Radio's famous Dr. Mu inspired the call letters WRMU.



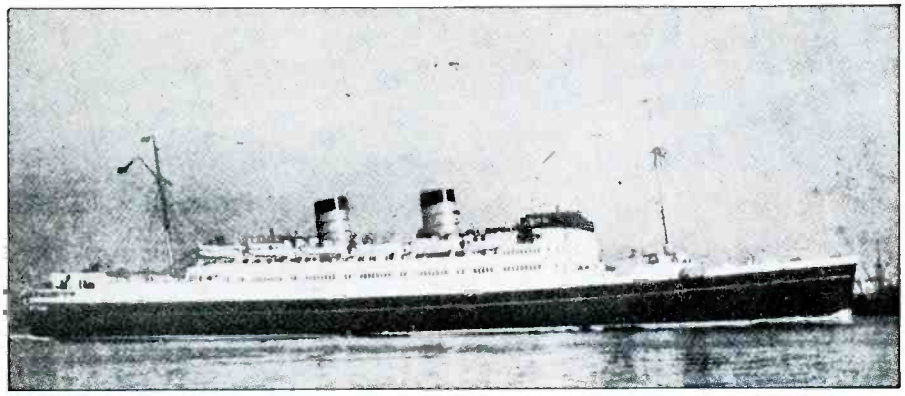
One of the potential uses to which a portable broadcast station might be put was shown in an early advertising brochure from WCWS.



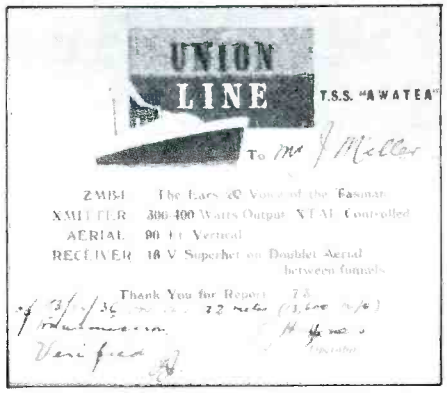
QSL card sent out by VK9MI.



Australia's station 3YB was located in a railroad car and was known to change its location once a week.



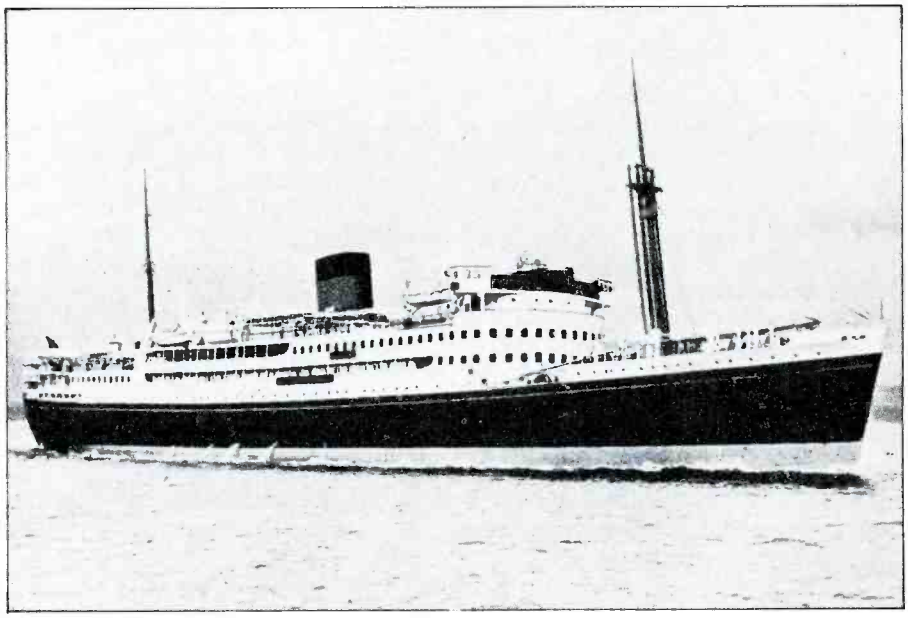
The vessel Awatea of the Union Steamship lines was well-known on the shortwave broadcast bands.



QSL from ZMBJ aboard the TSS Awatea.

railroad car which rode the rails in Australia commencing in 1937. The broadcaster, which ran 50 watts on 1060 kHz, was licensed to the Mobile Broadcasting Service of 430 Little Collins St., Melbourne, Victoria.

In operation, 3YB's train would travel to a number of communities which didn't have local broadcasting stations. This was a regular circuit which took it to the same communities for a one week stay in each town where the station would broadcast for 4 hours per day. While the station was in one town, commercial representatives from 3YB were working ahead in the towns the station would be moving towards. These reps would be selling commercial time to local advertisers, and the station seemed to get to almost every small town in the state of Victoria which had train tracks. This station may possibly be the ancestor of present-day station 3YB (880 kHz, 2000 watts) which is licensed to Associated Broadcasters Services, Ltd., and located in Warrnambool, Victoria, since Warrnambool was one of the stopover cities along the train's route.



The Motor Vessel Kanimbla, otherwise known as VK9MI, was a popular shortwave broadcaster in the 1930's.

Connect your computer to the air!

The "AIRWAVES" that is, they're literally crackling with interesting things to listen to. Did you know that you can get local and overseas news a day ahead of your daily paper's publication? Weather stations, news services, ships and "HAM" radio operators all use the SHORT-WAVE radio bands daily for radio-teleprinter and Morse code communication. The Microlog AIR-1 plugs into your computer just like a "game cartridge." The single board AIR-1 contains both program in ROM AND radio interface circuit. All you need is a typical short-wave receiver, with CW capability (BFO). Connect your radio speaker and off you go . . . tuning in the world of digital communications. Instead of "COSMIC BLIVETTES" on your video screen, you'll be watching text readout from all sorts of stations around the world . . . free for the listening . . . a whole new use for your home computer . . . SHORT-WAVE DXing on RTTY and Morse. The manual lists some suggested times and frequencies, and your standard printer can provide a permanent record of copy. The AIR-1 will even tell you what Morse speed you're copying and provide built-in send/receive code practice! For HAM radio use the AIR-1 will also send and receive RTTY/CW with AFSK/PTT and CW keying outputs. Convenient plug-in jacks make connection to your radio a snap. "On-Screen" tuning indicator and versatile program make it easy to use. The simple, one board design makes it inexpensive. And Microlog know how makes it best! If you've been looking for something to spice-up your computing, try the ultimate "peripheral" and connect your computer to the AIR-1.

The complete AIR-1 for the VIC-20 or "64" is $199. (With 4 mode AMTOR, $279.) See it at your local dealer or call Microlog Corporation, 18713 Mooney Drive, Gaithersburg, Maryland 20879.
TEL (301) 258 8400. TELEX 908153.

Note: VIC-20 is a trademark of Commodore Electronics, Ltd.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

CIRCLE 7 ON READER SERVICE CARD

On The Highways, Too

In the late 1920's and early 30's, there were also a spate of curious broadcasters located in various types of vehicles ranging from cars to trucks, and there were even stations which could be transported from one place to another in steamer trunks. The Dept. of Commerce (which licensed broadcasters in those days) simply classified them all as "portable," and although some of these stations were authorized for operation in a specific area (some could operate anywhere), records presently available do not indicate that the license grant required the disclosure of the mode of transportation involved.

For instance, there was KFYJ (10 watts on 1260 kHz) which could operate portable anywhere in Houston, Texas. It was owned by the Houston Chronicle. Station WCWS owned by C.W. Selden (1430 kHz, 100 watts could roam about in Massachusetts. But RCA's station, WEBL (1330 kHz, 100 watts) was permitted operation in every state, as was station WKBY (1363 kHz, 50 watts) owned by Fernwood Quick.

In Chicago, a man named C.L. Carroll owned two portable broadcasters, WHBL (50 watts) and WHBM (20 watts), both authorized for broadcasting on 1390 kHz. In another case of an all-portable network, a chap named C.H. Mester operated a portable station called WCBR (1220 kHz, 5 watts) in Providence, R.I. Somehow he met up with H.L. Dewing, who owned portable broadcaster WCBS (1239 kHz, 250 watts) in Illinois. They went into business together at 400 East Jefferson St., Springfield, IL and Mester moved his operations to Illinois, modifying the WCBR license to 100 watts on 1430 kHz. WCBS then moved from 1239 kHz to 1210 kHz and became the flagship station of the mighty Mester and Dewing broadcasting empire!

In Massachusetts, the Edison Electric Illuminating Company took out a license for a portable broadcasting station to run 100 watts on 1230 kHz. With a flair for the catchy, the Dept. of Commerce assigned the station the callsign WATT!

High Flying Radio

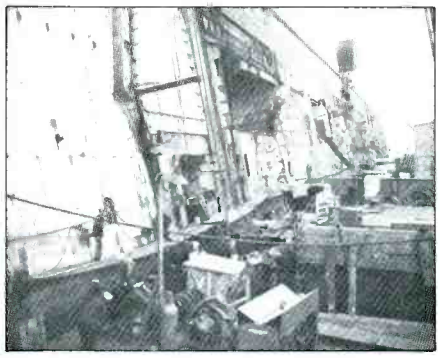
Along about 1929, someone got the idea of broadcasting from a parachute; so, a portable transmitter was handed to a guy who promptly jumped from an airplane door and proceeded to describe the sensations of drifting to the ground. Audiences were astonished. The whole idea of broadcasting from interesting and unusual places was a winner. The year 1929 also marked the first broadcast from an aircraft in flight. NBC put a portable broadcast transmitter in an Army aircraft and listeners were treated to a detailed description of the Big Apple from high above the skyscrapers.

NBC struck again in 1935, this time with station W10XFH which was aboard a manned high-altitude balloon called the Explorer II, which ascended to 72,395 ft. The 8-watt transmitter could broadcast on either of two frequencies, 13046 or 13055 kHz. Signals from the flight (which was between Rapid City and White Lake, SD), were heard by DX monitors from coast to coast. The men in the craft, Capt. Albert W. Stevens and Capt. Orvil A. Anderson (Army) described their flight and then held two-way conversations with ground stations and also a Pan American Airways' China Clipper which was flying over the Pacific. All transmissions were rebroadcast by NBC.

The first in-flight broadcasting to really capture major attention was done by the outrageous and flamboyant multi-millionaire playboy, Howard Hughes. On July 8th, 1938, Hughes was granted special temporary authority to operate an already licensed aircraft radio transmitter as a shortwave broadcast station. This was for operation aboard his aircraft NR-18973. The callsign assigned for this use was KHRH (his initials), and the frequencies authorized were 4797, 6525, 8655, 12863, 17310, 23100 kHz. Transmitter power was 100 watts.

The authorization was for a one month period (July 15th to August 13th, 1938) while Hughes was flying around the world. This flight took DX listeners, via direct radio pickup, to places such as Paris, Berlin, Danzig, Moscow, Siberia, and Alaska. Both NBC and the Mutual Network rebroadcast these transmissions, but DX listeners were tuned in for on-the-spot reception. Hughes even sent out some QSLs!

Station WEE was billed as the world's smallest broadcaster and was located in its entirety on a small table. This is the only known photograph of this station.



The S.S. Normadie, *callsign FNSK, during salvage operations after she burned in New York Harbor during WWII. The 110-foot-wide deck rests at a 79° angle in this photo.* Normandie *was renamed the* U.S.S. Lafayette *in the hopes that after being salvaged she would sail as a naval vessel. This was not to take place as the vessel was used for scrap.*

The Ultimate Of The Era?

Chances are that the pinnacle of 1930's infatuation with novel broadcasting stations was reached with a station using the self-awarded callsign WEE.

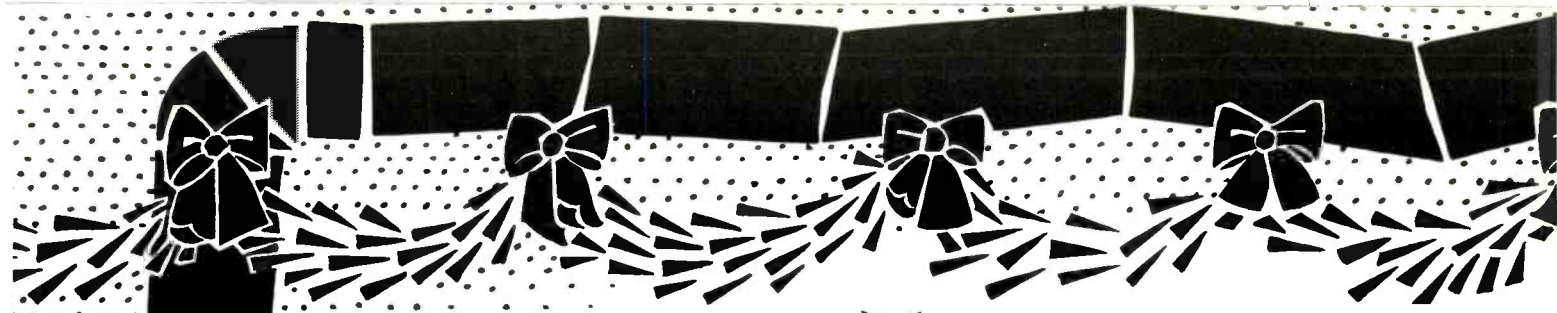
WEE was without any doubt the smallest radio station in the entire world, and boldly claimed that honor. The station was built in 1931 by someone calling himself the "Mystery Announcer" of Philadelphia radio station WPEN, aided by a radio engineer named John R. Boyle. Owned by the "Tiny Broadcasting Company," WEE operated on 900 kHz and ran four one-hundredths of a watt (.04 watts)! The entire station was located on a table only slightly larger than might be used for playing cards.

Requiring ten months to design and build, WEE was entirely hand-made. It was a complete broadcasting station in miniature with a 200 foot transmitting range. The little transmitting towers intermittently flashed a red beacon light in accordance with federal regulations and the whole station, including the towers, stood 24 inches in height and was 52 inches long by 19 inches wide. Batteries supplied all power required. The transmitter was made up of several type 199 tubes. Even the studios were accurate in miniature scale.

When it was first built, it was placed on display and in full operation in the lobby of the Mastbaum Theatre in Philadelphia, and its owners were talking about the possibilities of establishing a shortwave channel and running the .04 watts into a larger antenna so that WEE "might be heard in Europe." Eventually, WEE was taken on a tour of larger Pennsylvania cities and by 1933 was operating in Easton. When last heard from (or of), in 1935, the station was the property of the Crosley Radio Corp., owners of WLW which (at that time) was the world's most powerful radio station, having received permission to test with 500,000 watts. Under WLW's ownership, the station had even issued miniature souvenir QSL cards.

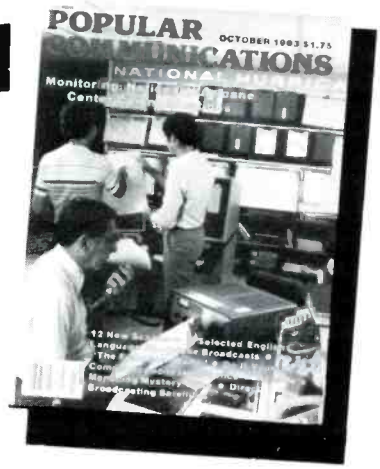
When I first mentioned WEE in a story I wrote back in 1979, I received a flood of mail from readers who wanted to know the present location and status of WEE. Alas, despite considerable effort on my part to ascertain the fate of the mini-broadcaster, I was unsuccessful in tracing WEE after 1935 even though it had received considerable publicity prior to that. Possibly some ambitious reader in Cincinnati (home of WLW) might try to pursue the mystery via the local news media or from WLW's files. My guess is that WEE was primarily used by WLW to contrast with and promote their 500,000 watt transmitter tests, and when those tests ended there was no further use for the little station. At that point it probably suffered some ignominious fate—such as being thrown in the garbage.

And so ended the wild and sometimes wacky world of oddball broadcasting stations of the 1930's. It's certainly an era worth remembering!



. . . . from the publishers of CQ

LISTEN UP!



Here's what you've been looking for – an all new hard-hitting monthly magazine which gives a unique insider's view of what's really going on in the world of communications. POP' COMM is your primary source of information – bigger and better than any communications magazine, with exciting coverage of scanners, shortwave broadcast & utility stations, spy stations, pirate and clandestine broadcasters, RTTY monitoring, survivalist communications systems, FCC news, wiretapping and bugging, voice scrambling/unscrambling, surveillance/undercover communications, satellite & cable TV, sophisticated telephones, & more. What you've been looking for all along! Take advantage of substantial savings over the newsstand price by subscribing now. Don't miss out on even one single issue of POPULAR COMMUNICATIONS – order your subscription now.

Twelve Issues $12

POPULAR COMMUNICATIONS 76 N. Broadway, Hicksville, NY 11801

Yes! The **NEW POPULAR COMMUNICATIONS** is just the magazine I've been looking for. Start sending it to me now! I understand that I may cancel at any time for any reason, and receive a full refund on my unused subscription.

Paid by: ☐ **Check** ☐ **Money Order** ☐ **MasterCard** ☐ **Visa**
My account number is:

Name _____

Street _____

City _____ State _____ Zip _____

☐ **1 Year (12 issues) $12.00**
Newsstand price $21.00

☐ **2 Years (24 issues) $22.00**
Newsstand price $42.00

☐ **3 Years (36 issues) $32.00**
Newsstand price $63.00

Canada/Mexico – one year $14.00, two years $26.00, three years $38.00; Foreign – one year $16.00, two years $30.00, three years $44.00; Foreign Air Mail – one year $69.00, two years $136.00, three years $203.00.

A Great Gift Idea

Send the following gift subscription to my friend at my expense.
Please indicate your name above. A gift card will be sent.

Paid by: ☐ **Check** ☐ **Money Order** ☐ **MasterCard** ☐ **Visa**
My account number is:

Name _____

Street _____

City _____ State _____ Zip _____

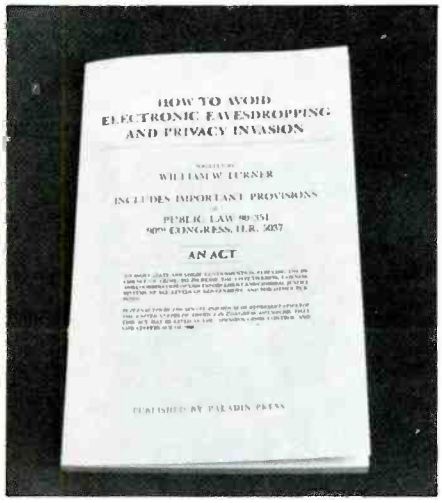
☐ **1 Year (12 issues) $12.00**
Newsstand price $21.00

☐ **2 Years (24 issues) $22.00**
Newsstand price $42.00

☐ **3 Years (36 issues) $32.00**
Newsstand price $63.00

Canada/Mexico – one year $14.00, two years $26.00, three years $38.00; Foreign – one year $16.00, two years $30.00, three years $44.00; Foreign Air Mail – one year $69.00, two years $136.00, three years $203.00.

Christmas Goodies For Communications Users



Eavesdropping Avoidance

How To Avoid Electronic Eavesdropping and Privacy Invasion, by William W. Turner, is a 192 page handbook on bugging—how it's done and how to combat attempted invasions of your privacy. It tells how to detect homing devices, have a free check of your phone line, prevent placement of a bug and foil the eavesdropper.

Contents include: Bugging in Nazi Germany and Russia, bugging by U.S. Government agencies, FBI bugging in Las Vegas, telephone taps, wired mikes and bugged telephones, wireless bugs, bumper beepers, etc. A separate section covers industrial espionage; another chapter discusses the various laws relating to bugging and wiretapping. Laws relating to bugging and wiretapping are reprinted in full.

This is a serious, no-nonsense handbook written by a man who was, for ten years, a Special Agent of the FBI.

It is available from Paladin Press, P.O. Box 1307, Boulder, CO 80306. The book is $14.95 including shipping/handling to addresses in the USA. Persons interested in ordering this book from outside the USA should write to Paladin Press for further information on ordering. The book may also be ordered on MasterCard or VISA by calling 1-800-824-7888.

White's Radio Log: New Edition

Between the years 1924 and 1981, and through several formats and publishers, *White's Radio Log* was the authoritative guide to callsigns, frequencies, and locations of North American broadcasting stations. In the early days, of course, it covered only AM (broadcast band) stations, but as time went on it included FM and TV stations, and incorporated listings for Canadian broadcasters.

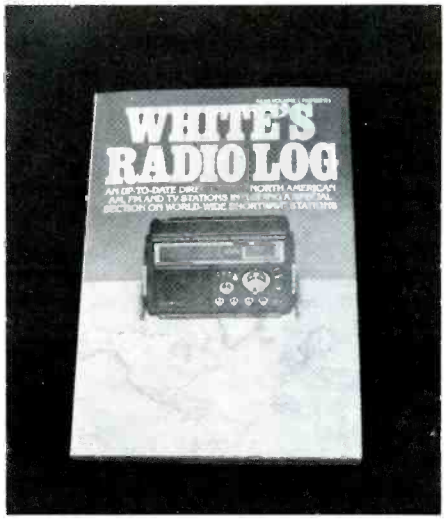
When last heard from, *White's Radio Log* was incorporated into the semi-annual publication, *Communications World*, where it continued to provide vital up-to-date information needed by many listeners. Unfortunately, *Communications World* ceased publication in 1981 and the large number of listeners who had come to depend on this useful and concise source of data became stranded, so to speak. It seemed almost inconceivable to many listeners that *White's Radio Log*, which had (after almost 60 years of continuous publication) become an institution unto itself, was simply no longer available. No other publication exactly duplicated White's!

It is now time for rejoicing amongst the multitudes. *White's Radio Log*, in a revamped and updated version, is back in print! The ghosts of C. DeWitt White (the book's founder) and *Communications World* would be proud, too! One of the former staff members of *Communications World*, Don Gabree, obtained the publishing rights for *White's Radio Log* and decided to continue its publication. His new edition has just come out.

The book has 136 pages and contains the following information for listeners: U.S. AM broadcasters according to frequency, callsigns, and locations; U.S. FM broadcasters by call letters and location; U.S. TV stations by location; Canadian AM stations by frequency, callsigns, and location; Canadian FM stations by callsigns and location; Canadian TV stations by location. There is also a special 12-page section listing worldwide shortwave stations (according to frequency).

The new *White's Radio Log* is decked out in a bright 4-color cover (remember the prim black/white covers on the early editions?) and it's good to see this old and handy friend back again!

Copies of *White's Radio Log* are available at only $4.95 each, plus $1 for First Class Mailing to addresses in USA/Canada/APO/FPO. For Book Rate (4th Class) mailing, send $4.95 for the book plus 75¢ postage and handling. Order from CRB Research, Box 56, Commack, NY 11725.



Speedx Strikes Again!

Those of you into utility station ("ute") monitoring for any length of time are probably familiar with the *Speedx Utility Guide*, a useful book which appeared several years back down the line. Speedx has now redone this interesting publication under the direction of ute expert Mike Chabak, and they call the new edition the *Speedx Reference Guide To The Utilities (SRGU* for short), covering 0 to 30 MHz.

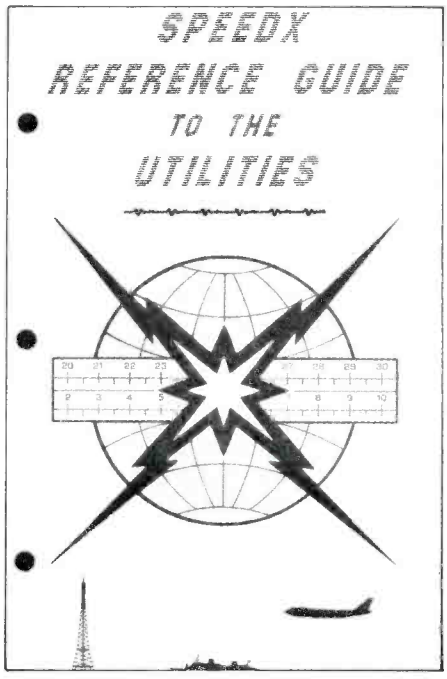
SRGU is being presented in several self-contained installments and the complete publication will comprise a very comprehensive ute manual covering a wide range of topics. Some of the topics to be covered in the complete *SRGU* include the USCG, "Numbers" transmissions, U.S. and foreign military, single letter HF "beacons," U.S. Government, commercial aero, radio telephone, maritime mobile, Interpol, embassies, radio basics, QSLing, CW, VLF, RTTY, HF space satellites, and more. Callsigns and mailing address information is included.

The *SRGU* is offset printed on various colored paper, about 5 by 8 in size, and 3-hole

punched in a special SRGU 3-ring binder.

We have seen the *SRGU* and feel that it is certainly something which will offer any ute enthusiast a wealth of very valuable data. Chabak knows his stuff and this publication offers the average ute monitor (beginners and old timers alike) lots of insights and unusual aspects to the material covered, the result of his many years of experience in this field.

SRGU is available in the USA/Canada/APO/FPO by Book Rate at $12.00, or by First Class for $14.00. Write to Speedx for prices in other areas. As additional sections of the *SRGU* are issued, they will be available for about $3 or $4, depending upon the number of pages. The *SRGU* is available from Speedx, P.O. Box E, Lake Elsinore, CA 92330.



EQUIPMENT REVIEW:
Icom R-70 Receiver

BY MARK MANUCY, W3GMG

To all BCB DXers and SWLs, HARK! The new Icom R-70 is a radio man's radio. This receiver has been a long time in coming. It is a commercial grade receiver surpassing other receivers on the market . . . even receivers costing more than twice as much. Using Icom's DFM (Direct Feed Mixer), the R-70 is virtually immune to intermodulation distortion or cross modulation and maintains superior sensitivity, except perhaps in the .1 to 1.6 MHz range. This range isn't as "hot" in the R-70 but the sensitivity of the two lowest ranges can easily be improved. More on that later.

Basically the R-70 tunes 100 kHz to 30 MHz in 30 bands one MegaHertz wide. The Up-conversion system has a 70 MHz first IF and the receiver uses a Microcomputer System to control the operation of the receiver. Reception is AM, upper and lower sideband, CW and RTTY. FM reception is possible with an optional accessory detector which sells for under $40.

This receiver can be used with AC voltages from 100 to 240, 50/60 Hz and 13.8 volts DC with an optional DC cord. For DC operation the user must install a small bracket to hold the chassis mounted jack. The jack and jumper plug for AC operation are already inside the R-70! A small panel is removed from the rear apron and a small bracket is put in its place to which the DC jack is snapped. A very easy conversion and the DC cord is long, the entire kit sells for under $10.

The R-70 has two VFO's which can be used together or one may be used as a memory. The VFO are digital and triple looped, Phase locked loops all linked back to the Microcomputer Control System. The memory remembers the band as well as the frequency which makes DX hunting faster. There are separate bands for general coverage and amateur. This facilitates the ham in QSY'ing between the nine ham bands. With an optional accessory, the R-70 may be used to control the IC 720 transceiver. Band changing is done electronically with push buttons to raise or lower frequency in one MegaHertz segments. Tuning is accomplished in three steps: 1 kiloHertz per knob revolution, 10 kHz or 100 kHz; the steps being 10 Hertz, 100 Hertz, and 1 kiloHertz respectively. The 1 kHz is good for fast QSY'ing and for AM reception. The 100 Hz works well with SSB and CW reception and for those who want to tune "on the nose," the 10 Hz makes for very slow tuning. If you are one to split hairs, the RIT will go between 10 Hz. There is an electronic dial lock also.

This is a quadruple conversion superheterodyne receiver with continuous bandwidth control. The first IF is 70.45 MHz, the second and fourth is 9.0115 MHz, and the third is 455 kHz.

Icom's new IC-R70 receiver is a hairy chested winner.

Selectivity is automatically switched by the mode buttons. FM is 15 kHz (only has 3 IF frequencies also); AM is 6 kHz; SSB, CW, and RTTY are 2.3 kHz; RTTY and CW Narrow is 500 Hz. Additional selectivity is provided with passband tuning. This is a unique way of shifting an oscillator so as to move the passband of the IF to one side or the other of the filter slope to effectively narrow the bandwidth of the IF. In the AM position, the IF is narrowed to a minimum of 2.7 kHz from 6 kHz. The SSB/CW will narrow to 500 Hz from the nominal 2.3 kHz. The optional filters are an SSB crystal filter for $159 and a 250 Hz CW filter for $48.50.

Also standard equipment is a 30 dB notch filter which will knock out just about any heterodyne. The other standard feature sorely needed today is a "woodpecker" filter which is included with the R-70. The noise blanker switches between wide and narrow. The AGC switch selects fast or slow AGC times and OFF, which is rare on today's receivers, but a nice thing to have when needed.

The squelch is AGC derived and functions in all modes. With the squelch advanced slighty and the AGC on slow for reception of SSB signals, the receiver goes quiet when the frequency is not busy.

The squelch is AGC derived and functions in all modes. With the squelch advanced slighty and the AGC on slow for reception of SSB signals, the receiver goes quiet when the frequency is not busy. This makes for easy monitoring and true "arm chair copy." The RIT (receiver incremental tuning) control can be handy if you have the dial "locked" but want to adjust the frequency slightly. As shipped from Icom, the RIT turns itself off when the tuning is moved. However, Icom provides instructions to keep the RIT active until turned off if that type of operation is desired. The RIT does not display the change on the six digit luminescent display tube, but there is an indicator to show when the RIT is in operation. The RIT range is ± 800 Hz from center.

Other displays on the dial show which VFO is in use and the MODE. There are four LEDS which show RIT operation, on/off; FM on tune; signal or "busy" (squelch); and mute, which shows when an associated transmitter (or switch) has the receiver muted. This used to be the "send/receive" switch that usually opened the B- lead to the power transformer! Icom has included a monitor circuit to use for monitoring a transmitter on the frequency to which the R-70 is tuned. This is especially handy if the QSO is recorded. It makes it possible to balance the audio level between transmit and receive. Also, if the R-70 is used with a transmitter and not a transceiver, it provides monitoring for CW, giving a sidetone without reducing the RF gain as was done in years gone by. The R-70 recorder jack allows for tape recording all modes and the level is fixed, not affected by the volume control.

The audio quality from the R-70 is clean and full. The bass is better than I've heard in a long time from a communications receiver. The internal speaker has a very good sound for its size but even a six inch external speaker in a cabinet is a big improvement. The phone jack accepts stereo or monaural headphones without rewiring the phone's plug or using an adapter.

With the flat IF bandpass, AM reception has reached a new plateau in communication type receivers. The IF bandpass is so flat that the receiver may be set ± 3 kHz of the station and receive a full 6 kHz of audio. This becomes "single-sideband AM" by tuning 3 kHz above or below the station. The carrier frequency is set on the edge of the IF passband and 6 kHz of audio is passed to the audio system rather than 3 kHz by tuning on center as is normally done. This is also a good way to see if the sidebands of the transmitter are equal. If you enjoy good tone from AM, then the Icom SP3 speaker might be worthwhile at $49.50. The tone control cuts the treble only.

The R-70 has an RF gain control along with a three position slide switch which turns the RF amplifier on and off and provides about 20 dB attenuation. The sensitivity with the pre-amp on from 1.6-30 MHz in SSB, CW, RTTY is less than .15 microvolts for a 10 dB s + n/n. AM sensitivity is less than .5 microvolts. Below 1.6 MHz the RF amp is switched off by the 4 bit microcomputer and the .1-1.6 MHz antenna circuit has a pad built in which additionally reduces the input level of this range. Another 20 dB attenuation is available with the ATT position on the slide switch. Most receivers have intermod problems on this range in metropolitan areas and this is Icom's way of reducing the problem. If you use a long wire antenna, there is a switch on the rear apron to select a separate Hi-Z input for the .1-1.6 MHz ranges.

I found using large loop antennas did not give enough signal for the R-70 to hear many signals I was used to hearing with other receivers. To overcome this problem, I modified my R-70 to allow the preamp to operate in the .1-1.6 MHz range from the front panel on/off switch.

The Ultimate Test?

I have two loop antennas; one is a four foot shielded loop using RG-59 and the other is a two foot wound with 120 feet of stranded wire. When using the loop antennas (50 ohm input), I experienced no intermod problem with the preamp turned on (modified R-70 .1-1.6 MHz range). What would the R-70 do if a 50 kilowatt broadcast station was next door? I took my R-70 to the transmitter building of WBAL (50 KW, 1090 kHz) along with my loop antennas.

I found no spurious signals or other problems with reception using the loop antennas. I was able to receive WBZ (1030), KYW (1060), unidentified (1070), WNEW (1130), and WRVA (1140) in the shadow of 50 KW 1090, WBAL. Actually, I was in the room next to the transmitter! Turning on the preamp presented no problem. On 1090 kHz with the ATT on and the 4 foot loop oriented toward the WBAL array (3 towers), the "S" meter went to full scale. All I can say is, "What a dynamic range this receiver has!" Using a 65 foot wire with a tuner at WBAL I did experience some intermod on certain channels when I turned the preamp on. My receiving location was about 1000 feet from the 500 foot towers of the station.

The results at the WBAL transmitter were very flattering for the Icom. I expected to hear WBZ, but not WNEW or KYW, as the latter two do not have near the signal in Baltimore as WBZ. And only 30 and 40 kHz away and to hear anything at all 20 kHz from 50,000 watts is amazing. I must also say it speaks well of the clean signal of WBAL.

If any changes could be made to improve the R-70, what would one suggest? The R-70 is an excellent A+ receiver that has been thought out very carefully and the only change I would suggest is a different arrangement when the sidebands are switched so that the dial frequency does not have to be reset. Such a modification would make it easier when checking stations with independent sidebands.

The other change I was able to make myself. Although I understand Icom's probable reasoning for disabling the preamp on the .1-1.6 MHz range, there are those of us serious DXers who look for every dB. The casual SWL or BCL near a large city without a tuned antenna would have objectional intermod on these ranges with the preamp turned on which would be a normal situation in switching from the shortwave ranges down to the broadcast band. However, as I mentioned before, with a tuned loop (without a preamp), more gain is necessary to pull in the weak ones. An external preamp could be used, but by clipping one wire in the R-70 the preamp operates the same as on the SW bands (from the front panel). The preamp is a pair of push-pull junction FET's with about 10 dB gain. There is also a resistive pad in the antenna circuit of the .1-1.6 MHz range.

How I Modified The Pre-Amp Circuit Of The R-70

Referring to the R-70 board layout for the RF unit in the instruction manual, the bottom edge (1) between D & E has a symbol (G) with an arrow. The matching (G) is located in the (F2) block just above L-80. This pair of arrows represents a wire between these two points. By matching the board layout with the photo of the RF unit on page 18 of the manual, figure 7-2, the wire can be seen just inside the dotted line. From the upper left corner, counting down from the top, the wire runs between the second and third bandpass filters. In two R-70's modified (by hams at WBAL) the wire was red in color. Clipping this wire will allow the preamp to operate when turned on from the front panel switch in the .1-1.6 MHz ranges. The pad in this circuit is shown on the board layout in (C 1) consisting of r18, r19, and r20. By putting a small jumper between the top of r18 to the top of r19 (gently scrape the paint off first) and clipping the top of r20 (do not remove), the board would have to be removed to get to r19 and I did not want to do this. About an S unit is gained with the jumper and of course the 10 dB gain of the preamp can now be realized also.

To run a check on the procedures, tune in a signal at 1600 kHz; tuning rate at 1 kHz, AM mode. Tune the R-70 between 1599 and 1600 kHz. Notice the difference in "S" meter readings with and without PRE turned on and before and after modifications.

This unit is true to Icom standards, the quality and performance are first class and the receiver is to be compared with units costing much more, not less. The R-70 lists for $749.00. This is a real radio! One of the best values to come down the pike in a long time. It will hold its own against receivers costing hundreds or even a thousand dollars more for a long time to come.

Some might call 36 knobs and switches so many bells and whistles, but in this day of fancy computers it's nice to have a computerized receiver respond to one's fingertips. It's a real joy to master the operation of the R-70 and see it perform.

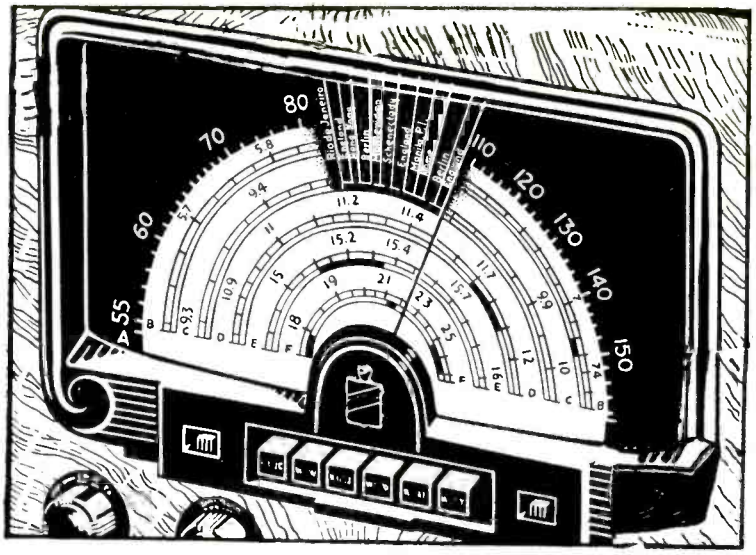
The R-70 was on vacation with my family and me last summer operating from both 12 volts and 120 volts. Never has DXing been so much fun! Never has hamming been so much fun! I don't think I'll say never was a vacation so much fun! With the R-70, the guessing which frequency you're on is eliminated so concentration may be devoted to getting an "ID" of the station and digging it out of the interference and noise; a job made easier with the R-70. I used my R-70 in an R-V with a 40-10M ham antenna (Anixter-Mark). The small amount of engine noise present (I expected more) was easily stopped with the noise blanker. The Anixter-Mark provided great "reach" even on the broadcast band and I had no intermod problems even around the large cities of Baltimore, Washington, Richmond, and Miami. Miami has quite a few high power stations along U.S. 41 and I-95. I passed many multi-tower high power arrays with no overload or intermod problems. It was great to be able to identify the array you were passing by having an accurate "S" meter that did not run off the top of the scale. The PRE/OFF/ATT switch gives an extra 30 dB of range to the "S" meter making close-in station ID easy. The "S" meter is calibrated 0 to S9 (at center scale) and then to +40. The lower scale is 0 to 5 for SINPO reporting.

With the digital dial and the high overload (I have not had the R-70 overload yet) limit the R-70 would make harmonic hunting for the broadcast engineer much easier than it has been in the past. I know I'm looking forward to that aspect myself.

The R-70 measures 4⅜" high, 11¼" wide, and 10⅞" deep, has a handle on one end with rubber feet on the other end as well as the bottom and has a tilt bail on the bottom. At just over 10 pounds, it is a very portable rig. The sides have 10-32 threaded holes for use with the Icom mobile bracket or one of your own design.

One other thing; the knobs on the R-70 are much larger than the earlier Icom gear. These knobs are easy to use even with large hands!

I think you can assume I am pleased with this radio, so if I may take my leave from you . . . my R-70 and I have another proof of performance to do for a station in Delaware!



Cursed And Ignored By Most Listeners, They Aren't Going To Go Away!

Inside Soviet Jamming Stations

BY HARRY CAUL, KIL9XL

It's hard to imagine that one of the heaviest users of the international broadcasting bands transmits almost nothing but noise which not only provides no news or entertainment but which has been created to prevent the reception of broadcasting. However, it's true. Just such a network is carefully maintained by the Soviets and their satellite nations in Eastern Europe. Are they broadcast stations? *Maybe*. Are they "utility" stations? *Possibly*. Although many of these noise transmitters can (and are) also used at times for actual broadcasting purposes, it is in their mode as anti-broadcasting stations that they are most often encountered by the world's listeners. These stations are jamming transmitters, and the majority of those who hear their signals skip over them and try to ignore their irritating buzzsaw-like sounds, generally cursing the noise—not only because it sounds so awful, but also because of what it stands for.

What does jamming stand for? It was defined very well by Tom Kneitel in his report entitled *Jamming: The Electronic Iron Curtain (POP'COMM*, January '83). Kneitel described jamming as, "deliberate noise transmission with the intent of preventing listeners from hearing whatever is being broadcast on that frequency." Such tactics, when used in connection with broadcasting operations, strike a very sour note in the ears of free-world people—it amounts to a form of censorship.

Kneitel pointed out that there are "more than 2,000 jammers in operation in the USSR, Bulgaria, Czechoslovakia, and Poland." He noted that "the intent of these stations is to silence certain selected broadcasts directed towards listeners in those nations. The jamming targets are Soviet language broadcasts of Deutsche Welle; the Polish, Bulgarian, and Soviet language broadcasts of The Voice of America; the Czech, Bulgarian, and Polish language broadcasts of Radio Free Europe and Radio Liberty; Russian and Polish broadcasts of the BBC; Czech, Yiddish, Hebrew, and Russian broadcasts of Kol Yisrael."

The Soviets justify jamming by claiming that outside governments are trespassing over international borders when they attempt to introduce broadcasts beamed to, and in the local languages of, the USSR and its Warsaw Pact nations. This is apparently a one-way street since the Soviets and their satellite nations devote a considerable amount of effort to broadcasting their messages to the rest of the world on all international bands and in practically all languages—and without any invitations to do so from those nations whose borders these signals cross. Yet, the Soviets and other Eastern European nations are the primary source of long-term noise jamming at this time. It's been said that the Soviets spend more money operating their jamming stations than the United States does to run The Voice of America!

Jamming, as you might imagine, is profoundly illegal according to all international broadcasting agreements. According to many who have heard it, it is also utterly unethical and probably immoral. Nevertheless, like them or not, these signals are here in a big, bold, and blatant way. Neither cursing them nor ignoring them has any affect on making them go away. My theory is to make the most of them since they are a reality of modern-day broadcasting. Personally, I've been checking out the jammers for several years now and have observed that while they are definitely annoying, they are probably no more illegal, unethical, or immoral than some of the "acceptable and legal" things I've heard on the air. Some might even say they are no less annoying than some of the things you can hear on many local FM stations. Ever hear the music of Kiss, The Clash, or The Ramones? Believe me, the Soviet jammers sound better (or at least no worse).

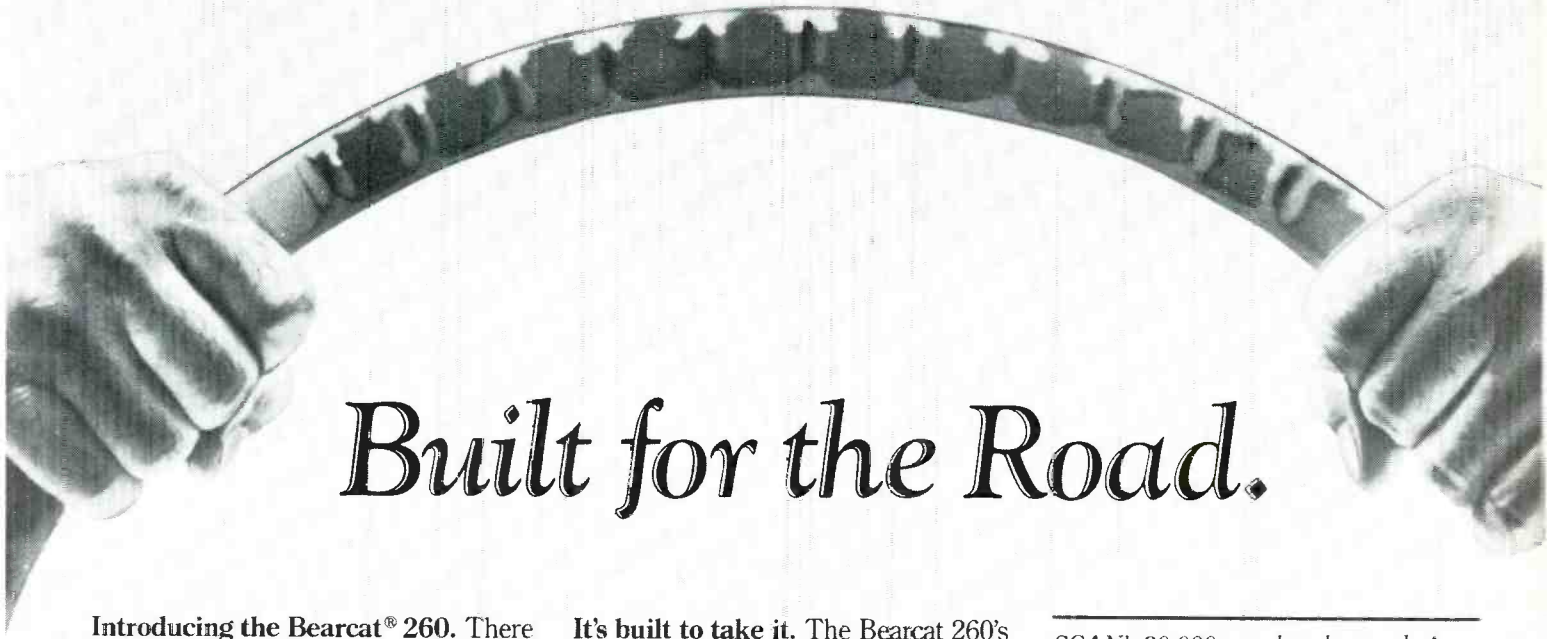
Lots Of Noise!

There are actually several types of broadcast jamming; some are quite subtle. The subtle kind exists when the nation which is attempting to obliterate a broadcast simply establishes a broadcast station of its own right on top of, or directly adjacent to, the signal to be blocked. This doesn't interest me—too mundane.

Noise broadcasts are my own prime interest in the field of jamming. Mostly this consists of a hash somewhat like a buzzsaw or the sound a fluorescent light makes in a nearby receiver. Often these signals are quite wide. Sometimes there is a vague pulsating rhythm to this noise, other times it may be accompanied by assorted whining sounds. Okay I'll admit that this isn't much to monitor, but it gets better.

Noise jammers don't actually have callsigns such as you or I might recognize a callsign assigned to a more orthodox inhabitant of the international broadcasting bands—like HCJB or HVJ, but they do have identification (ID) signals which they transmit several times a minute in very slow code (CW). These ID's generally consist of either two letters or a letter and a number, and are repeated twice ("AA AA" or "FW FW"), and almost all of the time are transmitted right in the midst of the noise jamming sound (one exception noted, for instance, is "U7" on 15290 kHz which shuts down its buzzsaw noise momentarily each time the ID is transmitted). The CW is sent so slowly that even if a person can't "copy" CW, it's still possible to read these ID's, especially since they are repeated so frequently.

It isn't always easy to pry this ID out from the jamming noise and at times some effort is involved in order to get a clear shot at the ID. I have had luck in many difficult cases by putting my receiver into USB or LSB receiving mode and then fine tuning ("clarifying") to see if I can find the best spot to extract the ID from the noise. The narrower bandwidth



Built for the Road.

Introducing the Bearcat® 260. There have always been tabletop scanners that you can hook up to your car—one way or another. But now comes the first Bearcat Scanner *designed* for mobile use. Designed as a tool—not a toy.

It's easier to use. Because the people who use it have other things to worry about. Mount the compact Bearcat 260 on the hump or under the dash. Either way, every control is in easy reach. The keyboard is even illuminated for easy visibility in darkness.

It's easier to hear. Front-facing speaker and three full watts of power let you hear the Bearcat 260 above the engine—even at speed.

It's built to take it. The Bearcat 260's heavy metal case keeps it going when the going gets rough.

It's a Bearcat Scanner. And that means all the latest technology—including 8-band coverage and 16 channel capacity. Priority channel. Weather bulletins at the push of a button. Automatic and manual search. Lockout. Direct channel access. Automatic squelch. There's even an external transformer and telescoping antenna for home use.

No stay-at-home scanner can do what the Bearcat 260 does. So take it with you. And stay on top of the action. To find the address of your nearest Bearcat Scanner Dealer, call 1-800-S-C-A-N-N-E-R.

SCAN's 30,000 members know what others miss! Insider news. Frequency info. Tech tips. Awards. SCAN Magazine and more. Send $10 for a 1-year membership to the Scanner Association of North America, 111 East Wacker Drive, Chicago, IL 60601.

The use of this radio in a motor vehicle may be regulated or require a permit in certain states.

BEARCAT® SCANNERS

Electra Electra Company
Division of Masco Corp. of Indiana
300 East County Line Road
Cumberland, Indiana 46229

CIRCLE 78 ON READER SERVICE CARD

Table 1 Jamming Stations

ID	Frequencies (kHz)
A5	17855
AA	7398, 15120, 15370
AD	17885
AK	15115
AL	11635
AS	17855
AW	15300
B1	7115, 7150, 11827
B7	15585
BA	6560, 9860, 9965, 15485, 17855
BB	17875, 25100
BC	25150
BG	15460, 21933
BK	15108
BL	17700
BP	15200
BQ	17840
BR	7150
BT	15195, 17705
CB	15375, 17630
CU	11710
CV	9490
D3	9555
D8	15230
DA	6560, 15290
DI	15235
DK	17760
DR	15235, 15290, 17865
DU	15340
DW	11810
EUS	15250
FA	6560
FB	11885, 15585
FD	11730
FG	15355, 17885
FH	9690
FI	9725
FL	15130
FM	11635
FR	15290
FU	6125
FW	21735
GI	17780, 17895
GM	15235, 17815
GN	21735
GR	15355
GU	11740, 17685
GZ	21735
HK	9685
HM	15485, 17630, 21735
HS	15485
IG	11875, 15345, 15400, 15410
IR	15285
IW	21735
JB	17880
K3	21575, 21745
KB	9505, 11625, 11635, 11970, 15165, 15350, 15360
KD	9650
KG	11725
KH	17770
KV	17725
KZ	15355, 17685
L1	9730
LI	7120, 15235
LK	17765
LL	15115, 15200
LM	17855, 16545
LR	15400, 15420
LS	7400, 17740
LZ	20020
MA	9530, 9555, 15280, 15370
MF	15145, 15370
MI	7155
ML	6560, 9525, 15355
MP	11725, 17895
MQ	17750
MR	9860, 9965
MSM	5960
MU	15345
NA	17770
NO	15140
NS	11770
NU	6425, 6560, 7400, 9860, 15140, 15585, 17685
NW	6560
NY	15130
OU	15235
P0	12900
P2	15400
P3	15115
PB	9505, 11885, 15588
PD	11935, 20100
PF	6200, 15130, 15170, 15290, 15340, 15355, 15370, 17585, 17635, 17685, 17750, 17885, 17895
PL	9505
PP	15250
PQ	9615
PT	15460
PU	15235
PZ	9530
QB	9200
QG	9605
QQ	11825
QT	8829, 17760
R7	17720, 21740
R9	15340
RA	17885
RM	8300, 15130
RR	15585
RT	17770
RU	17685
S2	15205
S7	17895
SB	17685
SC	15108
SD	11915
SF	17760
SM	17815, 18315
SS	15108
ST	17745
SY	21765
TH	11335
TK	9505, 11970
TR	9555, 17825
TT	15460
TU	9505, 9510, 9520, 11875, 15447, 17630, 17808, 17895
TV	11875
U7	15290
UA	11965, 15447
UB	9945, 21988
UD	11725
UG	15375
UI	17898
UN	9725
UR	17723
US	17750
UT	11875
VG	15235
VR	5919, 9540, 9555
VS	21745
VV	11600
WA	15130
WI	15175, 17855, 17865, 17895, 21540, 21745
WK	21735
WL	6560, 11805, 11845, 15380, 17855
WM	15130, 15170, 15355, 17750
WN	17895
WQ	9960, 15230
XI	17880
Z2	15115, 17715, 21575
Z3	15260
ZG	21500
ZK	6560, 15400
ZL	15130, 17745
ZQ	11675
ZR	11865
ZT	9520
00	15010
1G	11725
1T	12000
1Z	17735
2F	17740
2Q	15115
2Z	18000
4F	21651
4R	17808
6B	17865
7K	9720

granted by this technique cuts out much of the unwanted buzzsaw noise and makes reception easier. Still, there are some ID's which are virtually impossible to extract from the noise, despite repeated heroic efforts. It's a challenge.

One thing noticed when monitoring the noise jammers is that very often there are several different stations doing the jamming and more than one station's ID can be copied on the same frequency, sometimes 3 or even 4! Sometimes it helps to tune slightly off frequency to separate one from the other. Several frequencies appear to be most heavily jammed, such as 9505 kHz and 9555 kHz, and they will usually reveal an interesting assortment of ID's operating simultaneously in a single evening.

It would seem to be odd that jammers use ID's, but actually there's a reason for the practice. The ID's permit Soviet jamming engineers to monitor the signals to see which jammers are effective in various areas considered vital. Skip and propagation conditions common to shortwave require this technique since a specific jammer which is totally effective in one region may be ineffec-

tive in blocking a signal from entering other regions, leaving weak spots or even gaping holes in the jamming coverage. By checking out which ID's are being copied in a certain city, they may decide to change the location, power, antenna, or operating schedule of a particular jamming transmitter, or they decide to establish one or more additional jammers to bring about the desired signal blocking in a given area.

Some jamming ID's have been noted on only a single frequency, while others (such as "PF" and "WI") have been copied on many frequencies simultaneously. It is doubtful that the ID letters represent abbreviations for city or other location names, more than likely they are arbitrarily assigned without any attempt to give them any particular significance. Indeed, "WI" monitored on 21540 kHz at 1210 GMT recently displayed no less than two different stations operating simultaneously on the frequency using that same ID!

Changing propagation conditions will also provide the monitor on this side of the Electronic Iron Curtain with a changing picture of the varied array of different jammers plugging away on a particular frequency. Tuning it to a specific frequency at 0200 GMT provide one dominant jammer with 2 or 3 weaker ones in the background, but checking that same frequency at 0400 may reveal a totally different picture, with the formerly strong jammer "down in the mud," while yet another jammer is in charge. Actually, you may wonder what all the fuss is about since you are often perfectly able to copy the target broadcast right through the jamming noise. You, of course, are not located in the listening area which they are attempting to jam and their jamming efforts are absolutely indifferent to your being able to copy the programming.

Strangely, they have jammers going on the darndest things at times! Not long ago there were no less than two jammers going full blast on a frequency where the BBC was running an English language program about Laurel and Hardy films! Possibly they were just keeping the equipment warmed up to zap the Russian program which followed later in the evening.

Actually, international broadcasters have developed anti-jamming broadcast techniques which (they say) enables them to get 90% of their programming through to their potential audiences, yet the jamming continues. If it's true that it's only 10% effective, the Soviets and their allies obviously feel it's worth the effort and money. Sometimes the jamming is accidentally self-destructive, with Communist-bloc broadcast signals getting blasted by the sidewash of their own jammers, a fact which seems to be of little concern if such a move is necessary to jam the VOA, BBC, or other unwanted signal. There are also instances when broadcasters from nations which are scarcely involved in the East/West propaganda wars find their signals are being jammed by the Soviets solely because they happen to be located adjacent to a frequency which the Soviets find offensive. These unfortunate innocent bystanders have little they can do to avoid the problem—locating a clear frequency isn't easy!

Checking Them Out

Jammers aren't scarce, they dot the shortwave bands. Listeners casually tuning across the international broadcasting bands easily hear these stations with their unrelenting noise transmissions.

The World Radio TV Handbook, normally the authority on stations operating in the international broadcast bands, is strangely silent on jammers—ignoring them as if they didn't exist, same as pirate broadcasters. Yet, like pirate broadcasters, they do exist and do constitute viable listening fare for anybody with a communications receiver and a taste for the bizarre and unusual. Mostly, if one hopes to unravel any of the many secrets of the Soviets and their amazing network of 2,000 noise jammers, it's a matter of groping in the dark. There aren't the rewards of even a single QSL card or the ability to enter in the log the location of a specific jamming transmitter. It's a study done only for the pursuit of whatever knowledge one can hope to gain from unraveling a mystery.

As I've listened, I've taken loggings of those ID's I've unearthed. I then checked back in SPEEDX and the American Shortwave Listeners Club newsletters to see what jammer loggings other monitors have sent in. Those jamming ID's which were listed I have attempted to check out and verify to see if they were accurate and still valid; if they were, I logged them. What I finished up with is shown in Table 1.

Naturally, what with 2,000 jammers believed to be in operation, I don't have anything approaching a complete listing, but it does consist of those jammers most easily or often noted by North American monitors.

Table 2

5950 to 6200 kHz	49 Meter band
7100 to 7300 kHz	41 Meter band
9500 to 9900 kHz	31 Meter band
11650 to 11975 kHz	25 Meter band
13600 to 13800 kHz	21 Meter band
15100 to 15600 kHz	19 Meter band
17500 to 17900 kHz	16 Meter band
21450 to 21750 kHz	13 Meter band
25670 to 26100 kHz	11 Meter band

Want to discover some "new" jammers? Tune these frequency bands and you'll probably discover several each time you try! Even if you can't copy CW, the ID's are sent so slowly that the "dits" and "dahs" can easily be written down and "deciphered" at your leisure.

Remember that *some* jammers are (virtually) impossible to monitor in North America due to transmitter power, hours of operation, operating frequency, antenna design or orientation. There are, nevertheless, jammers to be found which don't show up in Table 1—plenty of them! If you'd like to discover additional broadcast jammers, take a couple of treks across the frequency bands shown in Table 2 and perhaps even a bit to the frequencies adjacent to those bands. If you would like to see a more comprehensive listing of jammers here in *POP'COMM*, jot down the ID's and frequencies of the ones you've monitored and pass them along to me in care of Popular Communications, 76 North Broadway, Hicksville, NY 11801. I'll combine all information received and supply a more complete listing.

You think the tree which bears unusual DX fruit has been picked clean? No way! Here's your chance to find out first-hand by exploring an almost totally ignored area of the shortwave bands.

SURVIVAL

ESTABLISHING SURVIVALIST COMMUNICATIONS SYSTEMS

BY R.L. SLATTERY

Photovoltaics And Communications

Everyone who watches television is familiar with the commercials that extol the virtues of a certain brand of alkaline batteries. While the scenario used in each commercial varies, the basic message remains the same—these batteries last and last. Most people will agree that these long-lasting batteries are ideal for powering flashlights, portable radios, or other devices that may be used only in an emergency. But what about communications equipment? When was the last time you tried to run your Bearcat 300 with a handful of "D" cells?

The question of how to power monitoring equipment such as scanners and communications receivers has, at times, been hotly debated. Some feel that one or two automotive batteries should be kept on hand for emergencies while others take more elaborate measures and install portable generators in their backyards. A final group simply relies on hand-held scanners and other equipment that uses flashlight or nicad batteries. While each of these solutions has its merits, they are all susceptible to Murphy's Law—anything that can go wrong will go wrong at the worst possible time. What, then, is the answer? Photovoltaics.

The shack of Paul DeNapoli. Equipment shown is Panasonic 2600, Regency 16 channel programmable scanner, Sonar-Scan 8 channel scanner, President Model 10 40-channel CB, Drake TR-33 two meter transceiver, and a Heathkit SB-101. All equipment can be run by the Amcon I system. (Photo courtesy ENCON Corporation)

The photovoltaic process, the process by which light is converted directly into electricity without the use of complicated equipment, was discovered over one hundred years ago by the French scientist Edmund Becquerel. However, the process was not explained until 1905 by Albert Einstein.

During early experiments it was found that the electrons in silicon—the main component of sand—were easily displaced when struck by particles of light (photons). This characteristic is particularly useful in constructing a photovoltaic (solar) cell. By treating silicon with certain chemicals, it is possible to enhance the material's natural interaction with light. This treatment produces two types of silicon, one of which will have a positive charge due to a deficiency of electrons while the other has a negative charge due to a surplus of electrons. These pieces are then assembled into a cell and the two layers are connected by a wire. When light strikes the negative layer (n-silicon), electrons are released which begin to flow through the wire and into the positive layer (p-silicon). This flow of electrons is an electrical current and can be used to power DC equipment.

A solar cell measuring one square inch will produce about 150 ma of current in full sunlight. Since this is not a useful current, it is necessary to use a larger solar area (more cells) to obtain practical voltages and currents. Enter the solar panel.

A typical panel such as the SX-100 available from ENCON Corporation (27584 Schoolcraft, Livonia, MI 48150) contains 40 series-connected cells in a package measuring 17.5 inches by 42 inches. This panel produces 17 VDC at 2 amps at peak power. While this is a considerable increase over the power produced by a single cell, it is still somewhat limited. This is where the photovoltaic system comes in.

A photovoltaic system is composed of all of the elements needed to produce electricity by the photovoltaic process. Included are the photovoltaic array—the electricity-producing unit—and the balance-of-system components, e.g., meters, controls, switches, power conditioning equipment, supporting structures, and storage components (batteries).

A typical system available from ENCON is the Amcon I. This is designed for amateur radio operators and contains two panels, two storage batteries, and a charge controller. The panels produce 64 watts of power (16 VDC at 4 amps) which is used to keep the two 6 volt, deep-cycle batteries charged. These batteries provide the user with 185 amp hours at 12 VDC.

Boosting the number of panels and batteries increases the capabilities of the system. For example, the Amcon IV system uses ten panels and four batteries to provide 320 watts (16 VDC at 20 amps) and 370 amp hours at 12 VDC.

What is so great about a photovoltaic system? Its simplicity. Electricity is available wherever there is sunlight. This allows independence from the utility company and provides reliable emergency power. Also there is no smoke, noise, radiation, or other pollution from one of these systems and they require very little maintenance.

At this point, the question of cost usually arises. How much is it going to cost for one of these systems? The Amcon I sells for $1300, but this figure is not too frightening when considered over an extended period of time. The cost per day of the Amcon I over one year is $3.50, but over twenty years it is only 17¢! Not a bad investment when considered with the tax credits available from most states and the federal government for installing a photovoltaic system.

How one of these systems can be used is limited only by the imagination of the user. Solar panels are providing power for remote communications facilities, satellites, and isolated homes. By using DC equipment and

inverters to convert the DC to AC, it is possible to use the photovoltaic system in any conceivable application.

A photovoltaic system is an ideal power source for communications equipment. The system can be used for normal operation as well as for emergencies. Any receiver or transmitter that can be powered by a DC source can be operated by a photovoltaic system. The shack of Paul DeNapoli, Communications Director at ENCON, shows how much equipment can be powered by a simple two panel system.

One important question concerns the length of time the system can be used without depleting the batteries. The answer depends on the amount of power required by the equipment. The user should determine this by multiplying the rated voltage of the device by the amps it draws. This figure is then multiplied by the number of hours per day the item will be used. See the following example.

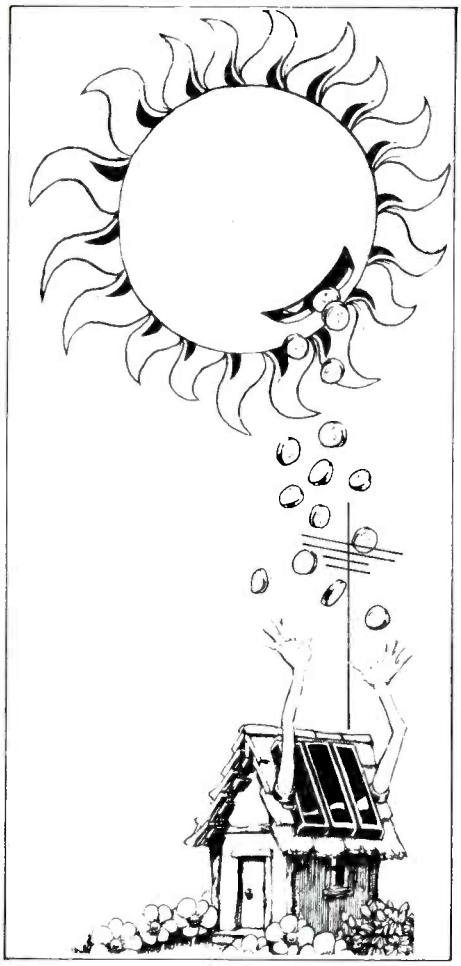
Example: A Bearcat 210 requires 13.8 VDC at 6W (0.5A). The scanner is to be used 4 hours per day, resulting in a total of 24 watt-hours. Adding a communications receiver with similar power requirements would result in a total of about 50 watt-hours per day. A system using two or three panels and batteries would work.

What about transmitting? The Amcon I system was recently tested in amateur applications and it was found that it could handle a 15 amp load for 10 hours without draining the system entirely. For more information on this, see the April 1983 issue of *CQ* magazine.

The key to using a photovoltaic system is common sense. By avoiding heavy demands during periods of darkness, the user could leave one or two receivers on stand-by all night and still have enough power for transmitting, if necessary.

Photovoltaic systems provide a simple, cost-effective means of powering communications equipment. The next time the lights go out be prepared so you can stay in touch with what is going on around you. Who knows, it might even save your life.

This month's guest columnist was Mark W. Johnson.



The Amcon I system with optional metering package and inverter. (Photo: ENCON Corp.)

LISTENING POST

BY GERRY L. DEXTER

WHAT'S HAPPENING: INTERNATIONAL SHORTWAVE BROADCASTING BANDS

The shack of James Morgan of Bangor, Maine showing his two Hallicrafters receivers.

Again this month there are a number of news items to report.

KNLS is now on the air from Anchor Point, Alaska. The schedule effective November through March shows an 0700 sign on 6.170 in Russian and Ukranian to 1200 GMT. From 1200 to 1500, the same frequency is in use to China in Mandarin. Still on 6.170, KNLS switches back to more Russian broadcasts from 1500 to 1730, then to 6.185 from 1730 to 2000 in Russian and Ukranian.

KNLS uses a 100 kilowatt transmitter which it says can reach at least one third of the world. Two antennas are employed, one centered on Beijing, China, the second aimed over the North Pole for broadcasts to European Russia. The station is operated by the World Christian Broadcasting Corporation, headquartered at 301 South Pioneer Drive, Suite 103, Abilene, Texas. In Alaska, the address is P.O. Box 473, Anchor Point, 99556. The station's slogan is "New Life Station" (NLS). FCC approval to begin regular programming was received in late July. Reception reports are welcome at the Anchor Point address. Reports on the summer test broadcasts were answered by letter from Francis M. Perry, Director of Engineering.

In the Middle East, still another chapter in the saga of the Voice of Peace is being written. The Voice of Peace is a radio station on a ship, run by Abie Nathan, an Israeli citizen who has dedicated close to 20 years promoting peace in that troubled area.

The Voice of Peace came on the air early in 1973 and most of the time has been anchored off Tel Aviv. Shortage of operating funds and hostility by various governments in the region has created a lot of starts and stops over the years. For the most part, broadcasts have been on medium wave with occasional shortwave transmissions and still more rumored shortwave broadcasts.

There had been no confirmed shortwave activity by The Voice of Peace for some years until this past summer, when a 400 watt station was placed in service on 6.240 MHz. This transmission has been well heard in Europe but so far, we know of no reports of reception in North America. Broadcasts are scheduled from 0600 to 2300 and best bets for reception should be right around sign on or sign off. If you're lucky enough to grab this one, your reception report can be sent to P.O. Box 4399, Tel Aviv, Israel.

Cameroon, one of the smaller African countries, is one of the more active on shortwave. The latest activity comes in the form of a new regional station at Douala, recently heard on 4.795 with very good signals. Douala joins Yaounde, Garoua, Buea, Bertoua, and Bafoussam on the shortwave bands from the Cameroon. If you log it, the address is B.P. 986, Douala, Cameroon. Try around 0430 or 0500 GMT.

In Cuba—CID and Clarin. We've mentioned the broadcasts by La Voz de Cuba Independiente y Democratica, some of which are carried over Radio Clarin in the Dominican Republic. The Cubans are not happy about these programs and have now complained to the government of the Dominican Republic about them. The authorities in Santo Domingo suspended the broadcasts in August and have promised an investigation, so it will be interesting to see whether the CID programs return to and remain on Radio Clarin. Radio Earth International, which also produces a program carried over Clarin, was quick to point out their innocence of any wrongdoing.

What is probably another move in the Caribbean/Central American radio wars is the appearance of a Russian-language "Mayak" transmission on 4.765. Based on the strength of the signal, most DXers who've heard this assume it's coming from Cuba, possibly in response to CID broadcasting or perhaps as a warning should the U.S. government eventually put "Radio Marti" on the air.

No verifications from the Armed Forces Radio and Television service. In a form letter sent to *POP'COMM* reporter David Scott of Newark, Ohio—Jack C. Giles, Chief of the Radio Division, says AFRTS no longer has adequate personnel to handle the "hundreds of reception reports we receive each month." Giles implies that the verie ban applies only to listeners in the United States. Well, you can always pay a visit to a friend or relative in some other country, log and report AFRTS from there, and have your host forward the reply! We predict the no verie policy won't last forever anyway.

Low Band Lists

If you enjoy tuning the tropical bands, here are a couple of publications you'll find useful.

The Danish Shortwave Clubs International publishes an annual *Tropical Bands Survey*, a listing of shortwave stations up through 5.900 MHz. You can order one for $4.00 from Gilfer Associates, P.O. Box 239, Park Ridge, NJ 07656.

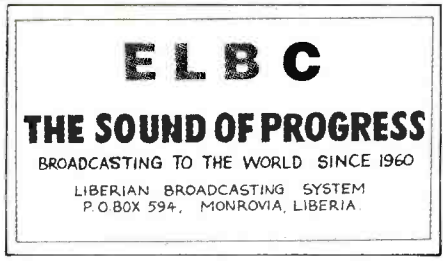
In the same vein, the *1983 NASWA Tropical Bands Guide* is a listing of all loggings which have appeared in the *Frendx* bulletin of the North American Shortwave Association between February of 1976 and January, 1983. The listing was privately compiled and is not an official NASWA publication. It can be ordered for $2.00 from George Sherman, Box 2284, Minneapolis, Minnesota 55402.

More Regional Clubs

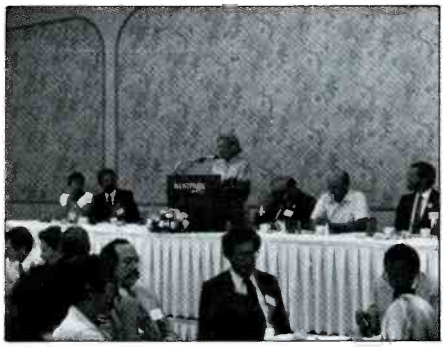
The Chicago Area DX Club publishes a monthly bulletin entitled *DX Chicago*. The title is a bit limiting in scope since the club accepts members from anywhere within a 150 mile radius of that toddlin' town. Columns cover shortwave broadcast, QSLs, medium wave, equipment and feature articles. The club holds a number of banquets, picnics, and other events each year. For membership info, send a self-addressed stamped envelope to Paul Kowalski at 7811 West Oklahoma Avenue, Apartment 5, Milwaukee, Wisconsin 53219.

The Central Maryland DX Association is a relatively new club catering to DXers in a four county area around Baltimore. Month-

David Munson, whose popular monologues were heard on the Belgian radio, is now featured on the broadcasts of Radio Earth International.



ELBC, Monrovia, Liberia sends out this QSL card.



ANARC's 1983 convention featured Pat Gates of the VOA Breakfast Show as its speaker. On her left is Joseph Costello, owner of WRNO, New Orleans. To his left is Phil Irwin of the VOA. Photo courtesy of Dr. S. David Klein.

ly meetings and DXpeditions plus a regular bulletin *The DX Gram* are offered by the club. Membership in the CMDXA is not restricted to listeners living within the central Maryland area, however. If you'd like a sample bulletin send a self-addressed, stamped envelope (business size, 37 cents in postage) to the Central Maryland DX Association, 6508 Eberle Drive, Apartment 101, Baltimore, Maryland 21215.

Still another opportunity for in-person get togethers is provided by the nearby Washington Area DX Association which publishes a monthly newsletter and holds regular meetings. If you live in the Washington, D.C. area and are interested, write WADXA, 606 Forest Glen, Silver Spring, Maryland. Enclose a self-addressed stamped envelope.

Incidentally, the WADXA were the hosts for the big Association of North American Radio Clubs convention in mid July which saw the largest attendance ever—some 300 people!

In The Mailbox

John Stephens of New Hope, Alabama checks in with two questions. John wants to know the address of Africa Number One in Gabon (It's B.P. 1, Libreville) and the address and 49 meter band frequency of AFRTS (Armed Forces Radio and Television Service Programming Center, 1016 North McCadden Place, Los Angeles, CA 90038). On 49 meters they should be found on 6.030 MHz. John would also like to correspond with DXers who have information on utility station addresses, medium wave stations which verify and shortwave broadcasters who send out pennants. John's address is 214 Curt Road, New Hope, Alabama 35760.

Robert Eddleman in Sebring, Florida has been active in the shortwave hobby for about three years and currently uses a Realistic DX-302 with a 75 foot longwire. He just began collecting QSLs this year and already has some 50 replies. Bob also notes that many of the replies he gets, especially from Eastern Europe, seem to have been opened and Bob wonders if the feds have their eye on him. Anything's possible, Bob, but we still doubt there's a mail intercept campaign going on. Maybe we're just too trusting.

Twenty-seven years. That's how long James E. Morgan of Bangor, Maine has been in the listening game. James includes monitoring of CW transmissions in his activities and uses a Hallicrafters SX-110 and a Halli SX28A with a 300 foot antenna. He promises logs in the future.

Ruth M. Hesch of White Plains, New York acts as something of an intermediary in reminding us to remind you that information on new stations or changes in existing stations is always being sought by the editors of the *World Radio TV Handbook*. Assistant Editor Andy Sennitt welcomes such information at P.O. Box 88, DK-2650 Hvidovire, Denmark.

An ICOM ICR-70 receiver is on the horizon for Navyman Dennis Rutowski of Groton, Connecticut. At the moment he's using a Panasonic RF4900, which has brought in some 80 countries.

Larry Rempala of Lisle, Illinois reminds us that patience is a virtue, and that replies from some stations can take quite a long time. Larry took an accounting of some of his report reply times and found they ranged all the way from 22 days for Radio New Zealand and Radio Canada International to 145 days for Radio Havana Cuba and 211 days for the Voice of Free China in Taiwan. The average reply time for Larrry's reports came to just over two months. Yes, the QSL freak has to have patience . . . and be nice to his mailman!

Trouble hearing All India Radio is Anil K. Kollipara's problem in West Lafayette, Indiana. Unfortunately, AIR does not direct any of its broadcasts to North America, so while reception of AIR certainly isn't anything unusual, it is difficult to get quality reception. You might try at 1330 GMT on 15.335 or 11.810, or at 2045 on 15.110, 11.755 or 11.620. Good luck!

If Peter Prichard of Krebs, Oklahoma had as long a wait for a reply from the Voice of Free China as Larry Rempala did, it was at least worth the wait. Peter reports receiving a QSL card, two VOFC pennant stickers, a VOFC newspaper, a magazine, and a VOFC tie! Yes, sometimes a station will really open up the goodie jar for a listener, yet the next reporter may get just the QSL!

David E. Salmi of Maynard, Massachusetts forwards a copy of the attractive QSL he received from ELBC in Liberia. Dave uses a Realistic DX-300 and he's been an SWL since the mid 1960's.

The Broadcaster's Forum at the ANARC Convention. Representatives from Radio Sweden, WRNO, the BBC, VOA, Radio Canada, HCJB, Radio Beijing, Radio Zambia, Radio Earth International, Radio Netherlands and Belgian Radio participated. Photo courtesy of Dr. S. David Klein.

Kenneth M. Maus of Wyomissing, Pennsylvania, along with Ruth Hesch, forwarded copies of QSLs now being issued by Radio Free Grenada. This station has been a nonverifier for some years but they're now replying with a pink and black card (showing only one of their two frequencies) and seem to be going through their pile of reports. If you haven't reported to them, now's the time to do so.

Listening Reports

Here's what's on—all times are GMT.

Australia Radio Australia excellent at 0000 to 0330 on 21.740, at 0330 on 21.680 until 0500 when they switch to French, and to 1600 fade out on 6.060. (Homuth, AZ) 15.160 at 0450 in English with concert hall, parallel to 15.320, 17.795, and 15.240. (Mackenzie, CA) At 0930 to 0940 on 15.115 in English to the Pacific, 0800 to 0820 on 15.410 with English to Asia and the Pacific, 0500 to 0525 on 15.320 in French to East Africa and Madagascar. (Pastrick, PA) VLW9 at Perth on 9.610 at 1455 with station IDs on the hour and half hour. (Stephens, AL) At 1000 with English news and a soccer game. (Rutowski, CT) Perth on 9.680 excellent to sign off at 1605. Time signal station VNG fair from 1300 to fade out at 1600 on 4.500 and 7.500 with IDs every 15 minutes. (Homuth, AZ).

Austria Austrian Radio heard in German at 0425 on 11.655 with commentary, into English with "Austria Calling" at 0430. (Mackenzie, CA)

Belgium Belgian Radio Television with "Brussels Calling" at 0037 on 9.880, which included the "DX Panorama Show" heard at good level. (Paszkiewicz, WI)

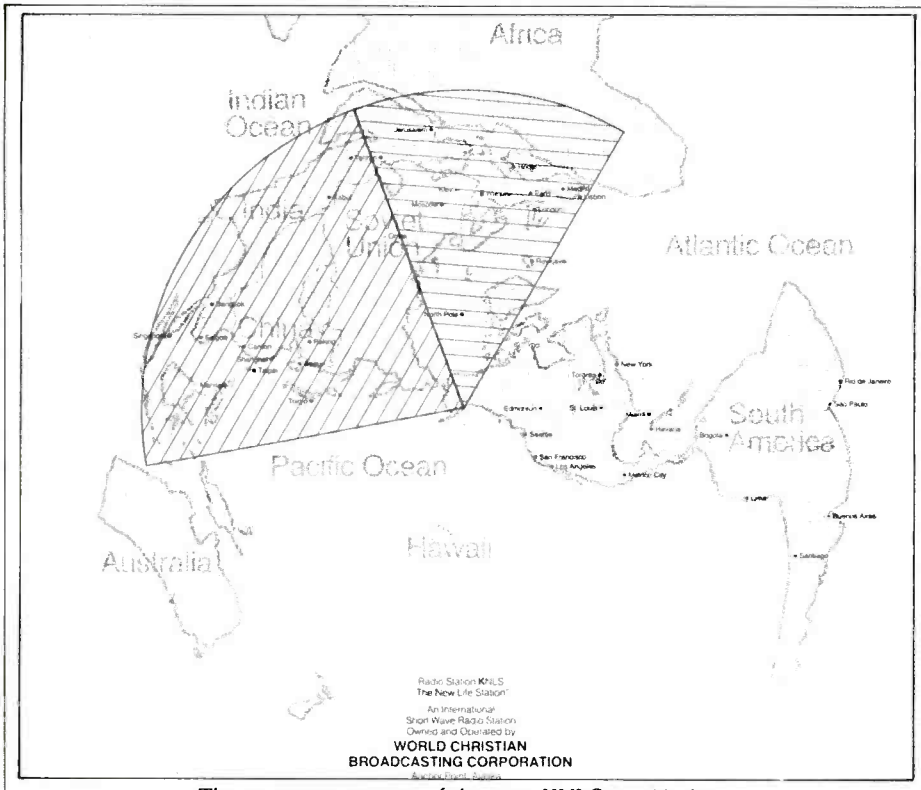
Bulgaria Radio Sofia transmits to North America from 0000 to 0100 on 9.700 and 15.110 and 0400 to 0500 on 11.750. Other English segments include 0730 to 0800 on 11.720 and 15.110; 1930 to 2000 on 11.720 and 15.110; 2130 to 2200 on 11.720, 11.750, and 15.135; and 2230 to 2330 on 9.700 and 15.110. The Radio Sofia DX Program is included in the broadcast on the second Friday of each month. (Scott, OH)

Canada Commercial outlet CFRX (relaying CFRB, Toronto) noted around 2300 with station identifications for the shortwave outlet at around 25 minutes past the hour. (unidentified reporter)

Costa Rica Radio Impacto on 6.150 at 0450 in Spanish with pop music and identifications. (Mackenzie, CA)

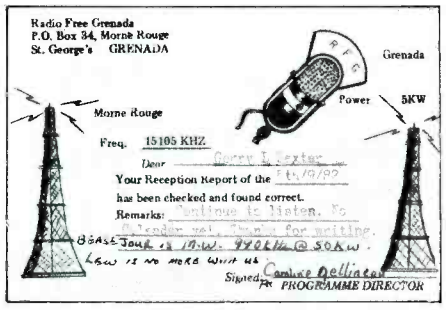
Cuba Radio Havana Cuba on 11.690 at 2230 with a program for stamp collectors. (Rutowski, CT) On 11.760 0445-0545 in English. (Pastrick, PA)

Dominican Republic Radio Clarin, 11.700 with a discussion program in English about coins of the Dominican Republic at 0427. (Rutowski, CT) Radio Earth International over Radio Clarin at 0350 with DX news, ID, and classical music, heard another time at 0330 sign on with news, Rudy Espinal from Santo Domingo, steel band music to 0430 close. (Mackenzie, CA) Noted at



The coverage pattern of the new KNLS in Alaska.

Ted Holman of the Minnesota DX Club, which we highlighted last month.



The new Radio Free Grenada QSL.

0330. (Rahn, IL) Radio Earth has now retimed their broadcat to 0200 to 0300. (Editor)

East Germany Radio Berlin International heard on 11.975 at 2335 with political commentary in English. (Mackenzie, CA)

Ecuador HCJB from 0746 to 0800 on 6.130 with English to Europe and the South Pacific. (Pastrick, PA)

Finland Radio Finland International noted with a strong signal at 1400 to 1425 on 17.800 but suffering from transpolar flutter. (Homuth, AZ)

Greece Voice of Greece with news and Greek music on 11.645 at 0338 in English to 0350 sign off. Also on 9.865 which was not as good. (Mackenzie, CA)

Grenada Radio Free Grenada on 15.045 from fade in at 2230 to 0030 sign off, with revolutionary speeches, political commentary, and ads. Strategic Air Command "Foxtrot" communications create strong interference on the hour and half hour. (Homuth, AZ) 15.045 at 2340 with English and pop music. (Mackenzie, CA)

Honduras La Voz Evangelica, HRVC, 4.820 heard at 0335 with the "Back to God Hour," English identification at 0337. (Stephens, AL)

Hungary Radio Budapest heard on 12.000 at 0220 and again at 0111. (Rosembaum, Maine)

Israel The Voice of Israel on 11.655 at 0100 in English with news, commentary, and sports to sign off at 0125. In parallel to 9.815 and 7.410. On 17.630 at 2000 in English to 2030 when into French, in parallel to 15.585. On 15.585 at 2230 in English with news, weather, and commentary to 2300. (Mackenzie, CA) From 0002 to 0030 on 11.655 in English. (Pastrick, PA)

Italy RAI heard on 9.575 in English from 0105 to 0120, then into Italian. (Mackenzie, CA)

Japan Radio Japan at 0100 in English on 17.755 and 17.810 with news and commentary. Also noted in Japanese at 0115 on 17.820, into English on this frequency at 0130. (Mackenzie, CA)

Kiribati Radio Kiribati heard on 16.433 (lower sideband) with English from 0600 to 0730 and in Kiribatese from 0730 to 0900. This "feeder" station links the government medium wave station on Tarawa with a sister station on Kiritimati Island. (Homuth, AZ) The station has, in the past, implied that the broadcasts on 16.433 is also intended for reception by the general public. Attractive postcard verifications are now being sent in response to reports. The address is Radio Kiribati, P.O. Box 78, Bairiki, Tarawa Atol, Kiribati.

Lebanon Radio Lebanon on 11.955 with English and "Lebanon Today" program at 0230. (Paszkiewicz, WI)

Liberia Liberian Broadcasting System, ELBC, heard on 3.255 at 0600 to 0640 in English with African songs, ads, identification, then local languages. (Salmi, ME)

Libya Radio Jamahiriyah heard on announced 11.816 at 2228 with the "Happy Music" program on a Saturday at good strength. (unidentified reporter)

Lithuanian SSR Radio Vilnius is scheduled in English at 2130 on 6.100 and at 2200 on 11.720, 11.960, 15.180, 17.860, and 17.900. (unidentified reporter) Most of these transmitters, likely all of them, are in the Soviet Union rather than Lithuania. (Editor)

Malta The Voice of Germany relay station noted on 17.720 at 2130 with an English identification and then into Portuguese. (Rutowski, CT)

Netherlands Antilles Radio Netherlands, via Bonaire, with a church service in Dutch on 15.560 at 2250, in parallel to 17.695. (Mackenzie, CA)

New Zealand Radio New Zealand on 17.700 at 0305 with folk music and on 17.705 at 0100 with news and commentary, in parallel to 17.810. (Mackenzie, CA) At 1000 on 11.960 with relay of medium wave service. (Rahn, IL)

Philippines FEBC heard on 15.300 at 0035 with English identification and newscast. (Mackenzie, CA)

Portugal Radio Portugal noted with news and a program on art and culture. Good level at 0303 on 11.925. (Paszkiewicz, WI)

Saipan KYOI on 15.405 at 0050 in Japanese with rock and roll. (Mackenzie, CA)

Seychelles FEBA, in Arabic on 11.865 at 0330. Preceded by their interval signal "What A Friend We Have in Jesus." Severe QRM on the frequency. (Stephens, AL)

South Africa Radio RSA is scheduled in English to North America at 0200 to 0257 on 5.980, 6.020, and 9.615. (Stephens, AL)

South Korea Radio Korea, heard in English with a mailbox program on 9.750 at 1437. (Pasckiewicz, WI) At 0535 in English on 11.810 with "Shortwave Feedback" program. On 15.575 at 0135 in Spanish. (Mackenzie, CA) Heard from 1300 to 1400 with General Service in English on 15.575, strong signals but heterodyne interference. (Homuth, AZ)

Spain Radio Espana Exterior from 0530 to 0545 on 9.630 with news and sports in English. From 2040 to 2100 on 15.375 with English to Africa and talk about jazz and flamenco music. (Pastrick, PA)

Sri Lanka Sri Lanka Broadcasting Corporation heard at 0105 on 15.425 with an English request program, birthday dedications, identification, and into a religious program at 0130 when it began to fade. (Paszkiewicz, WI)

Sweden Radio Sweden International noted at very strong level on 11.705 in English at 1215. (Bush, OH)

Switzerland Swiss Radio International at good level on 11.715 at 0145 with "Dateline" program. (Bush, OH)

Tahiti Radio Tahiti, 11.825 at 0530 in French, talk and church service. (Mackenzie, CA)

Turkey The Voice of Turkey on 15.220 at 0455 in Turkish with local music to 0500 identification and news read by a woman. Parallel to 15.435. (Mackenzie, CA)

Ukranian SSR Radio Kiev, heard at 2340 to 2359 on 11.710 in English, and is beamed to North America. (Pastrick, PA)

United Arab Emirates UAE Radio noted on 21.695 at 1048 in English with program called "This is Islam." (Rutowski, Ct)

United States WRNO, New Orleans, heard at 1702 to 1805 on 15.420 with rock music and religious programming. (Pastrick, PA) KGEI, the Voice of Friendship, noted in its broadcast to Asia at 0230 on 11.715. Language may have been Chinese. Identification at 0245. (Stephens, AL)

West Germany Deutsche Welle, the Voice of Germany, with English to North America 0514 to 0550 on 9.565. (Pastrick, PA)

Many thanks to: Stewart W. Mackenzie, Huntington Beach, California; John P. Stephens, New Hope, Alabama; Ruth Hesch, White Plains, New York; Dave Bush, Sebring, Ohio; Robert Pastrick, Baden, Pennsylvania; William Rosenbaum, Winthrop, Maine; Robert C. Homuth, Phoenix, Arizona; Sheryl Paszkiewicz, Manitowoc, Wisconsin; Dennis Rutowski, Groton, Connecticut; Steve Rahn, Bollingbrook, Illinois; David E. Salmi, Maynard, Massachusetts—and to all the rest of you who checked in this month.

Remember, no two days are ever alike on the shortwave dials and there's always something interesting to listen to or chase after. We look for your logs so others will know what's to be heard on the bands; also your questions, comments, shack photos, and good quality copies of your more interesting QSLs.

We'll be back with you again next month and we hope you'll join us. Thanks for stopping by. Good listening!

Viking International

10 HOUR CASSETTERECORDER

(5 hours each side) **ONLY $93**

TA210X*

(Why pay $199 or even $275?)

10 HOUR RECORDER WITH BUILT-IN VOICE ACTIVATION (nothing dangling outboard) – **$119**

*Our unique TA210X automatic telephone recording device turns the ENTIRE recorder on/off (not just the motor) thus saving recorder's batteries. The TA210X does not use batteries, relays or other primitive schemes, and is made in U.S.A. for professional use.

ONLY $25.95 *(Why pay up to $90!?)*

PORTABLE TELEPHONE SCRAMBLER

WHY PAY $990 a pair?

OUR price is **$840** a pair.

TAPE RECORDER AND TRANSMITTER DETECTOR

Dimensions: 2¼" x 7/8" x 3½"

COMPARE PRICES! **$635**

Same model but with tape recorder detection only **$428**

VIBRATING POCKET TRANSMITTER DETECTOR

Dimensions: 2¼" x 7/8" x 3½"

only $290! Why pay as much as $595?

THE ELECTRONIC *VOICE CHANGER*

FEATURES:

- No installation
- Can be used everywhere, even in payphones
- No annoying background whistle
- Renders voice totally unrecognizable
- Variable voice control
- Completely portable
- Negates voice stress analysis
- Powered by standard 9V battery
- Can be used to make disguised tapes

Only $471.00

Disappointed with cheap imported equipment that only generates a lot of distortion and is difficult to connect to your phone?

Not ready to pay from $1195 to $3750 for a desk model that does not work too well either?

Want a truly PROFESSIONAL, PORTABLE voice changer?

HERE IT IS! THE MODEL ECV VOICE CHANGER! AVAILABLE EXCLUSIVELY FROM VIKING INTERNATIONAL, THE LEADER IN REALISTIC PRICING FOR PROFESSIONAL EQUIPMENT!

Our new ECV voice changer uses proprietary LSI circuitry (equivalent to many thousands of transistors) to provide the utmost reliability and flexibility. Its coupler slips over the microphone of your telephone. A variable voice control lets you change your voice characteristics over a wide range.

VIKING INTERNATIONAL
P.O. Box 632, Newhall, CA 91322
Phone (805) 252-1820

BIG NEW (52 pg.) 1983-84 CATALOG
$5.00 (U.S. and Canada, first class mail)
$7.00 (all other countries, air mail)

CA residents add 6½% tax.

CIRCLE 56 ON READER SERVICE CARD

PRODUCT SPOTLIGHT

Hearing Those Out-Of-Band Signals On Your Scanner

Most scanner enthusiasts, sooner or later, realize that there are a lot of frequencies between the bands that their scanners cover. Is there some reason "they" don't want you to listen to those elusive bands? Does the government somehow pressure the scanner manufacturers not to include "secret" frequencies on the receivers the public buys?

No, there's no conspiracy to prevent you from listening to other bands! The scanners have been designed to cover the normal commercial two-way radio frequencies in use throughout the U.S. It is true that there are other bands and frequencies in use, but you may not be interested in hearing them on your scanner.

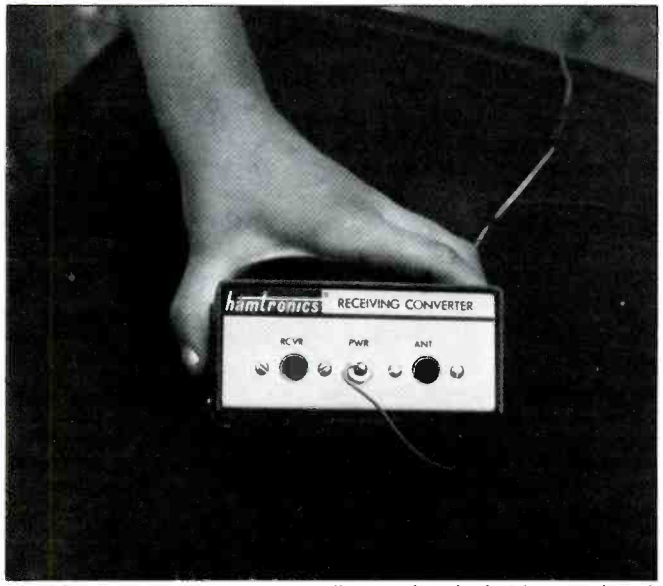
One category of signals you obviously do not need to copy on a scanner are the broadcast AM, FM, and TV bands. These together account for most of the spectrum space available. There are other bands, though, which have narrow-band FM signals you may wish to listen to in particular areas. The reason that scanners don't include them is that they are scattered throughout the spectrum; and, up until very recently, there were very few signals worth listening to. The cost of including these bands on a scanner would have been prohibitive. There are now some new, more expensive scanners to cover these frequencies, but there is a way you can adapt your present programmable scanner at very little cost to hear one or more of the bands if you have activity in your area. That's the key! You want to know what you would be able to listen to in your area before spending money to adapt your radio. Here's the scoop.

For years, hams have built or purchased converter units, which change the frequencies in a desired band to equivalent frequencies in a band on a receiver they already own. It is a very economical way to add VHF and UHF bands to a receiver's capabilities. It has a decided technical advantage in that the converter is generally designed for optimum performance on the new band, which results in better selectivity against unwanted interference. Since the converter is peaked for maximum response over a relatively narrow band of interest, it filters out some of the overload signals which can plague wide range receivers or converters which try to cover a wide spectrum of frequencies. So, quite often, the performance of a receiver with a converter attached is better than another receiver designed to cover all frequencies at once.

Well there's good news for scanner buffs, because one of the amateur radio manufacturers prominent in the field of low noise converters has turned its attention to providing out-of-band converters for scanners as well! Hamtronics, Inc. of Hilton, New York has been manufacturing high performance amateur and commercial radio equipment for over 20 years. They also offer a line of preamplifiers to boost the sensitivity of monitor receivers of all frequencies.

The CVR-series scanner receivers are attractive little units which install easily and set on the table next to the scanner, as shown in the illustration. Their 4 inch square, 2 inch high aluminum cabinets are covered with attractive wood grain vinyl to blend with the decor of the station. Figure 1 is a list of the models available.

All of the models in Figure 1 convert the out-of-band signals either to the 148-174 MHz VHF scanner band or the 424-512 MHz UHF band. The coverters change all of the signals in the band by a fixed amount. Therefore, you can select any frequency in



The Hamtronics converter is small enough to be held in one hand, and yet performs a big job.

Model	Freq Range (MHz)	Listen To
CVR-72	72-76	Radio Control & Low Power Industrial
CVR-135	135-144	Weather & Geophysical Research Satellites
CVR-240	240-270	Navy/Air Force Fleet Satellites
CVR-400	400-420	Federal Government & FBI Operations
CVR-806	806-894	New Metropolitan Land Mobile Band

Figure 1

Hamtronics converter connects between the antenna and scanner input. It requires 12 volts DC.

the new band you wish simply by punching up a frequency offset by the stated amount. For example, in the 806-894 band, all the signals are reduced in frequency by 382 MHz. To listen to 859.725 MHz, you merely select 859.725-382.00 or 477.725 MHz.

Some discussion of the type of activity on each of the bands may help you decide if you would benefit by being able to listen. Not all areas have activity in each band; and even if there is activity, you may not be entertained or informed by listening.

The 806-894 MHz band is, by far, the most popular of the new bands for monitors. Especially in the large metropolitan areas, the lo, hi, and UHF two-way FM bands are so crowded, it is no longer possible to get a license for new services to operate in those bands. Most new licensing of police and fire departments, community repeaters, mobile telephones, etc. is being done in this band. More and more cities are using this band for the more progressive agencies and users. There is an added advantage to police departments and telephone subscribers. Until now, it has been difficult to monitor this band; so communications of a confidential nature could be conducted knowing that few people, if any, would be eavesdropping. The disadvantage of this band to the listener is that the effective range is somewhat limited due to the propagation and cable loss characteristics of this near-microwave frequency range. A fairly good antenna is required to hear signals more than about 5 miles.

The next most popular band is the 400-420 MHz range. This is what some call "the forbidden band." The federal government and FBI use these frequencies for their own individual agency activities. Almost any large city has FBI activity, and many areas have other federal agencies as well. The majority of their conversations are in this band. Quite often, because of the resources of the government, these agencies have pretty good transmitters and sites; so you should be able to hear them for some distance, at least 15 or 20 miles with a scanner type outdoor antenna and somewhat less with an indoor antenna (but still a fairly good distance).

The 240-270 MHz band is used by fleet operations of the U.S. Navy and Air Force to communicate with other units in the fleet and with home bases. A lot of housekeeping chores are handled routinely on the satellites on FM, and some of it is RTTY. However, many enthusiasts like to be able to listen to this; it can be a challenge to hear anything coming through a satellite. Generally, a good antenna focused skyward toward the satellite is required.

The 135 MHz band, especially in the 135-138 MHz range, is extensively used by the U.S. Weather Service and similar foreign agencies to transmit FM facsimile weather map data. There is also some voice and much RTTY data transmission by academic and government institutions doing geophysical research on the ground and aboard vessels. Again, as with any satellite reception, a good outdoor directional antenna must be employed and aimed at the "bird."

Last, and probably least interesting, is the 72-76 MHz range. This band is a haven for low-power industrial paging, two-way, telemetry, and radio control link operations. Most of the activity is either unlicensed due to the exemption for low-power transmitters or easily licensed. You are likely to hear almost any kind of signal in this band, and some people find that aspect intriguing. Range is very limited due to the low power, but you may be able to hear things in your immediate neighborhood.

Installation of the converter is very simple. In most cases, programmable scanners have an external antenna jack and a blade-type terminal for external 13.6 volt DC power. The Hamtronics® Converters come with necessary cables. A short coaxial cable plugs into the external antenna jack of the scanner and the output jack of the converter. A second cable from the converter plugs into the blade terminal on the rear of the scanner. Most scanners actually have DC voltage available on this terminal when operating on AC power in the house. The converter has a voltage regulator which allows this power to be utilized for the converter. In the few cases of scanners which don't supply power on such a terminal, an inexpensive power supply is available for the converter as an accessory. The only other connection to the converter is the antenna input jack. For best results, an outdoor scanner antenna should be used. But for strong nearby transmitters, many monitor buffs merely use a short length of wire, about twelve inches plugged into the antenna jack on the converter.

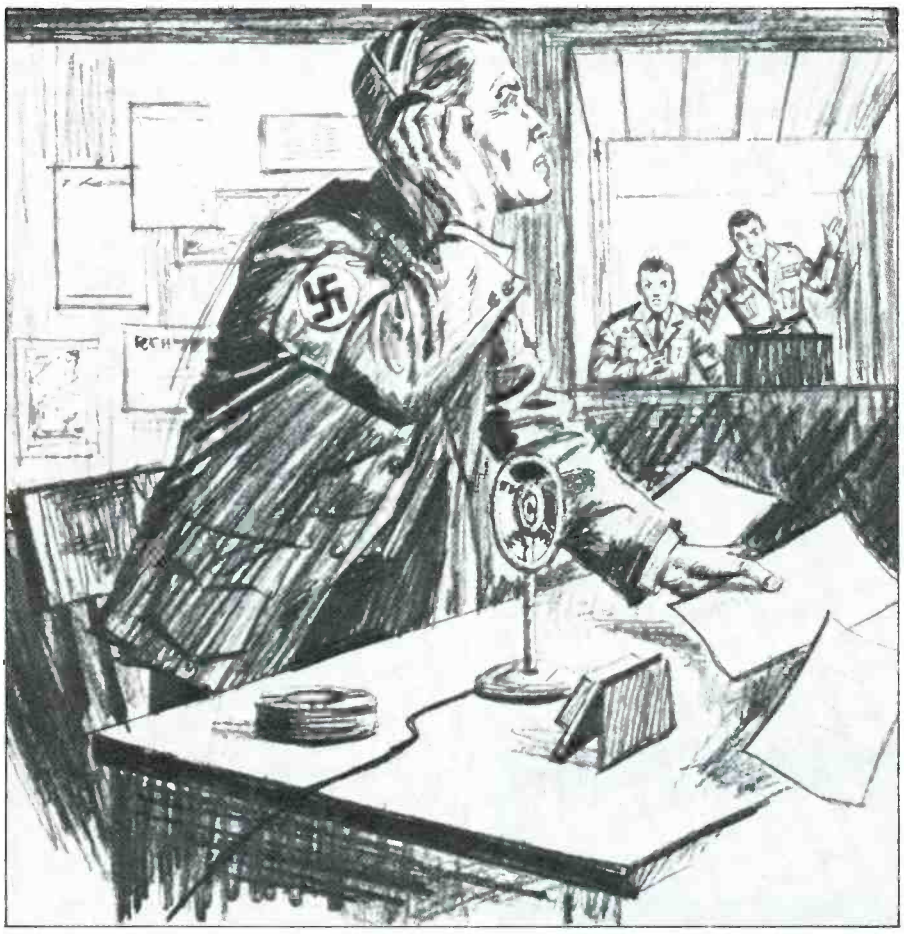
The built in telescoping whip on the scanner should be removed or folded in to prevent receiving signals on both bands at once. Since you are trying to receive signals converted from another band, you normally don't want interference from signals oiginal scanner hi-band or UHF-band. Some people do prefer to be able to scan the normal bands while also listening to the out-of-band frequency. This can be done with strong signals if you leave the whip antenna operational, but range is better if you set up to listen to one band or the other.

As you can see, the advantages of the converters are many! No special skills are required for installation. It is relatively easy to calculate and record the frequency conversions. Normally, no special antenna is needed except for satellite or long-distance reception. Since it isn't necessary to open your scanner, use of the converter does not affect the warranty for the scanner. Using a converter certainly is much less expensive than buying a special receiver to hear each new band. Best of all, the price is modest for a high-tech accessory such as this: less than $90 plus shipping and handling.

You can order by model number using a check or money order. You can even phone them and use credit card or UPS C.O.D. If you sent them $1, you can order a complete catalog. Their address is Hamtronics, Inc., 65-B Moul Rd., Hilton, NY 14468-9535. (Phone 716-392-9430).

This material extracted from manufacturer's literature.

Lord Haw Haw's Secret Nazi Stations



BY DON JENSEN

Outside Wandsworth, some 300 persons stood a quiet vigil, except for the occasional stamping of feet on the frosty pavement to keep warm.

It was January 3, 1946.

The group—newsmen, a handful of political oddballs, and the merely curious—had been there since before dawn, when the lights still shone yellow through the barred cell windows of the ugly, mid-Victorian prison in South London.

Just past 9 a.m., a jailer stepped out through a door set in a stone archway. He tacked a small notice on a bulletin board fixed to the dark green door.

The watchers crowded around, although they knew what it would say.

By order of the court, that morning, William Joyce had been hung for treason.

The 39-year-old Joyce—better known to history as Lord Haw Haw—was one of the most hated men in England at war's end. He had been Hitler's best-known broadcaster, a propagandist who nightly had mocked British audiences over Berlin's radio.

But few knew, or know today, that the American-born Joyce was more than just a despised voice. He was the behind-the-scenes brains of Nazi Germany's Buro Concordia and its secret clandestine broadcasting stations.

The Concordia Bureau was the British section of the German broadcasting organization, Reichsrundfunk, responsible for Berlin's English language programming. And it was on this regular foreign service to the United Kingdom where Joyce, the sarcastic Haw Haw, gained his infamy.

But secretly, Buro Concordia also ran four "black" clandestine operations aimed at England—Radio Caledonia, the Workers' Challenge and Christian Peace Movement stations, and, most vociferous of all, the New British Broadcasting Station.

A "black" clandestine, then as now, is a propaganda broadcaster in sheep's clothing, a station pretending to be what and where it is not.

Naturally there was no mystery about the regular Berlin broadcasts. Listeners knew where they originated and who was behind them. But the "blacks" were different. They pretended to operate from within Great Britain, under the very noses of the authorities who would silence them if they could.

The Nazis hoped they would be accepted by listeners genuine, if illegal, British dissident stations, run by daring and patriotic homefolks, unhappy with their own government's policies. Theoretically, at least, their messages of disinformation and discouragement for the war effort would be more credible to listeners in Great Britain.

The New British Broadcasting Station (NBBS) claimed to be operated by and for the British middle class worker. Workers' Challenge was to appeal to the socialist left wing. The Christian Peace Movement supposedly spoke for the pacifist element in Great Britain, while Radio Caledonia preached Scottish nationalism to the shipworkers of the Clydeside.

Transmitters, of course, were in Germany, not 100 miles from Berlin, but the clandestines maintained the fiction of broadcasting secretly from within the United Kingdom.

"You'll probably 'ear us tomorrow night at the same hour," observed another turncoat announcer, Leonard Banning, affecting a Cockney accent on one of the NBBS programs, "but it's getting 'ard; the police are always on our 'eels, nowadyes!"

Joyce, whose voice was well known on Berlin radio, could hardly also broadcast over the secret stations claiming to be on British soil. But he worked long and hard behind the scenes for Buro Concordia.

He wrote nine-tenths of the scripts used in the clandestine broadcasts. He was responsible for planning and directing the elaborate hoaxes. Joyce also recruited other Englishmen and British Commonwealth citizens for on-the-air duty.

Joyce had been born in New York City in 1906, the son of a Britisher who had become a naturalized U.S. citizen. Most of Joyce's life was spent in England and Ireland, however. In the 1930's, he was active in British Fascist circles. He made what would prove to be his fatal mistake in 1938, when he obtained a British passport. (After the war, he would be condemned on the legal grounds that as the holder of the passport he was a subject of the Crown who had committed treason.)

Not long afterward, Joyce moved to the Germany he so admired. He took up residence in a wide-windowed flat on Kastanien Allee in Charlottenburg, a comfortable, modern Berlin suburb.

Nearby, in Charlottenburg, was the Reichsrundfunk headquarters. There, on September 18, 1939, just after the outbreak of hostilities, Joyce joined the German radio as a news reader in the English service.

In Buro Concordia, Joyce's immediate boss was the section head, Dr. Erich Hetzler, described in post-war courtroom testimony as "a brute . . . for all intents and purposes, a maniac," and "the prototype of the Nazi."

With great understatement, an ex-SS

NRD-515
COMMUNICATIONS RECEIVER
GENERAL COVERAGE 100 KHz. to 30.0 MHz.

NOW THE ULTIMATE IS AFFORDABLE

PRICE BREAKTHROUGH !!!

NRD-515 Receiver .1-30 mHz.
$995.00

NRH-518 96 Channel Memory
$224.00

NCM-515 Keypad Controller
$149.00

NVA-515 External Speaker
$ 39.95

The NRD-515 offers more features and performance than any other receiver in its class. Exceptional selectivity and stability make this an excellent radio for RTTY and FAX reception. Designed for the serious DXer who demands the best!

For more information on this or other SWL products write to:

Universal Amateur Radio
F. Osterman - SWL Dept.
1280 Aida Drive
Reynoldsburg, OH 43068
Phone: 614 866-4267

Improve
your Scanner/Shortwave Listening
With These Unique Products!

Converters
Antennas
Books
Preamps
Tuners
Receivers
Readers
Filters
Couplers

MINI TUNER FOR SHORTWAVE

Remove images and intermod from your general coverage receiver, 150 kHz-30 MHz. Minituner preselector provides top performance with all popular shortwave receivers. Connects between antenna and receiver; no power required. Size 4" x 2" x 3". Only $56.00 includes UPS shipping.
Guaranteed for one year; 15 day return policy.

CALL TODAY to place your order on Mastercard or Visa or send check or money order. No COD.

J. Arendt of Illinois says: "You folks are to be commended for the prompt response to orders (8 days total using the mails, money order and UPS shipment.)"

MONITORING TIMES, the most informative accurate periodical written exclusively for the serious listener to the spectrum. Equipment reports, frequency information and schedules for military, government, broadcasters, public safety, satellites, smugglers, pirates...everyone on the airwaves! 28-page tabloid newspaper. Only $10.50 per year. Write for free sample.

FAST and DEPENDABLE
Your order processed within 24 hours from receipt.

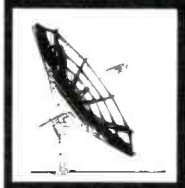
GROVE ENTERPRISES, INC.
140 Dog Branch Road, Dept. P , Brasstown, NC 28902
Business Hours: 9-5 EST weekdays

CALL NOW
for your free catalog.
1-800-438-8155 (cont.US)
1-704-837-2216 (NC,HI,AK)

CIRCLE 52 ON READER SERVICE CARD

Paraclipse Midwest

Your Picture Window to the World



High Performance Satellite Antenna

STOCKING DISTRIBUTORS FOR

Paraclipse	Luxor	Bowmen
Amplica	MTI	Drake
Chaparral	DX	General Instrument

Guaranteed Lowest Prices
SYSTEM PRICES STARTING AT
$1795.00

VIDEO ELECTRONICS INC.
4416 Outer Loop
Louisville, Kentucky 40219
(502) 964-DISH
Outside Kentucky 1-800-55-VIDEO

CIRCLE 68 ON READER SERVICE CARD

radio technician named Krumpiegel testified that Hetzler's "relations with his employees were never a source of gratification!"

Concordia was part of Dr. Joseph Goebbels' propaganda office. Between the excitable Goebbels and the "frantic bully" Hetzler, Joyce had his problems.

His first job was to recruit other English-speaking announcers. His first targets were interned Britishers who were sympathetic to Germany.

He gathered an odd lot. There was Banning, a British Fascist who had been teaching at a Berlitz language school in the German capital. The group also included the ample and elderly Miss Margaret Frances Bothamley, an eccentric Salvation Army missionary from the Channel Islands, who thought Hitler would redeem a sinful world; and a beautiful young woman who had fallen in love with a German officer.

There was also a certain British colonel's daughter who volunteered to broadcast, but did little at Concordia but sit around and sullenly knit. She later had a change of heart and sold everything she owned to pay back the salary she had accepted from the Nazis. The Gestapo promptly sent her to a concentration camp. She survived the war and was tried in London for aiding the enemy. But having partially paid her "bill," she drew only a 12 month prison term.

Early in 1940, in a heavily guarded villa on Masurenalle, adjoining Rundfunkhaus, Hetzler laid plans for the "black" stations.

Programming, except in emergencies, was to be carefully scripted and recorded in advance. The exception would be the newscasts, which for reasons of immediacy would be done live from the Charlottenburg studios. Programs would be sent by post office telephone lines to one of Germany's transmitter sites, at Hamburg, Bremen, Cologne, or Zeesen, according to availability.

To produce these programs, Joyce had some major staffing problems. The first announcer-recruits, like Joyce himself, already were being used on the official Berlin radio. New, fresh voices, announcers who could speak in colloquial English and make local references, were needed.

Joyce looked to the prisoner-of-war camp at Thorn in Germany's Wartegau district. Initially there were few volunteers, but after some screening, he came up with eight likely candidates.

They were moved to comfortable quarters in Berlin, with relative freedom and easy access to good food, drink, and female companionship. For the most part they were weaklings, rogues or madmen, plus a handful of right-wing ideologues.

Young Francis Dale was a New Zealander who had been captured by the German Army on Crete; Reginald Arthur Humphries, a sailor in his 20s, would play the role of a Roman Catholic priest on the clandestine radio; and Walter Purdy was a mentally disturbed junior naval engineer who had been taken prisoner in a commando raid on Narvik, Norway.

One who slipped through Joyce's careful screening was a Welsh quartermaster sergeant, John Henry Owen Brown. The British, realizing that the Nazis would probably try to recruit propagandists from among the POWs, briefed a small number of non-commissioned officers, including Brown, on what to do if the situation should present itself.

So when Brown was captured, he readily volunteered to broadcast for Joyce. But as a spy on the inside, he reportedly managed to slip information useful to the British military into his broadcasts. After the war, he was cited for his courage and cunning.

The first "black" broadcast from NBBS was aired late in February 1940. It was a nightly half hour in English, actually transmitted on shortwave from a station at Gumbinnen in East Prussia.

At first the programs were recorded in the Rundfunkhaus studios, but later, for security reasons, the clandestine operations were separated from the rest of Buro Concordia. A makeshift studio was set up in the press boxes of Berlin's Olympia Stadium.

Presenting credible newscasts always was a problem for Concordia's clandestine stations. At best, the major British newspapers were received a day late, smuggled into Germany via neutral countries such as Sweden and Portugal.

Monitoring of British broadcasts was carried out by four agencies, none of which was particularly helpful to Buro Concordia.

The Reichsrundfunk's own monitors generally gathered off-the-air information favorable to Germany; The Forschungsamt (Research Office), headed by Air Marshall Hermann Goering, was mainly interested in military affairs. The propaganda ministry duplicated the work of the Reichsrundfunk, while the German foreign office's monitoring efforts were largely second rate, even though that agency maintained a superior attitude to the others.

Eventually, Concordia did its own monitoring of English newscasts to stay on top of events there.

German "black" clandestines also were handicapped by restrictive "ground rules" which never permitted them to actually criticize the Fuhrer as actual British stations might be expected to do. As a result, the secret Nazi stations never were completely convincing.

The second station, Workers' Challenge, went on the air July 8, 1940. It was heard in the British Isles on a medium wave frequency with a 20-minute daily program. It also claimed to be coming from somewhere in England. In fact, the programs came from a portable transmitter located in the Rhineland, but later moved to occupied Holland.

Its announcers purported to be tough factory workers with strong socialist views. They frequently used unprintable language never before heard on the radio in Britain.

Only ten days later, on July 18, to the strains of "Loch Lomond," a third clandestine voice began. The announcer, in a rough Scott's burr, said: "You are listening to Radio Caledonia, the Voice of Scotland."

The Nazi regime was still convinced that the tyrannical English were holding down the other nationalities by force and that those minorities were awaiting their chance to overthrow the London government. This thought was sufficiently widespread in official Germany to support a secret radio voice that advocated a separate peace between Scotland and the Reich.

And not long afterward, in August, the fourth Concordia English language clandestine went on the air. Introduced by the music of a harmonium, and operating for a quarter hour a day on shortwave, the new station was pacifist in sentiment and spoke for a fictitious organization called the Christian Peace Movement.

It never drew much of an audience, but it was still operating weakly on the higher shortwave frequencies in April 1941.

Successes were few, and generally hard to measure. Only occasionally did Buro Concordia get feedback on the results of its broadcasts. Now and again there would be a hint in one of the British papers. Mimeographed excerpts from a Radio Caledonia broadcast, apparently distributed by a scattering of Scott sympathizers, would be found in a cinema. One man was charged with sticking a label bearing the NBBS frequency in a telephone booth.

The biggest reaction came shortly after an August 14, 1940 NBBS broadcast which reported that Nazi parachutists, wearing British military uniforms or civilian clothes, had landed near Birmingham, Manchester, and Glasgow. The Nazi paratroopers were being hidden by Fifth Column sympathizers, the radio claimed.

To support the story, the Luftwaffe dropped empty parachutes during the night. When they were found in meadows and cornfields the next morning there was immediate public consternation!

The British public firmly believed that the earlier invasion of Holland had been preceded by parachute drops by Germans disguised as nuns or Dutch soldiers. Joyce was not wrong in thinking the British were susceptible to parachutist scares.

Soon, though, the press pointed out that there were no traces of footprints near the apparently abandoned chutes. When no invasion—or even sabotage attempts—followed, the hoax collapsed.

The New British Broadcasting Station, the best of the clandestine lot, continued its propaganda activities throughout the war.

Late in March 1945, with Berlin's defenses crumbling, Buro Concordia moved out of the city and set up at Helmstadt. The engineers assembled their equipment and the editorial staff got to work on new scripts. That evening, Good Friday, the Oebisfelde transmitter broadcast the NBBS program.

So things continued until the advancing American troops reached nearby Brunswick. It seemed Buro Concordia would be overrun within hours. Hetzler burned the station's records, research files, and scripts in the courtyard of a Helmstadt hotel. The final broadcast was aired, but ironically it was a Pole named Kowalski, not an Englishman, who was the last to be heard over one of Concordia's "black" stations.

Joyce and the others were given false identity cards and were advised to try to lose themselves in the local German population. Most, though, were quickly caught by the Allies. Banning turned himself in at the British embassy in Brussels, where he claimed to have been engaged in anti-Nazi spy work.

William "Lord Haw Haw" Joyce was arrested some weeks later by two British officers who found him hiding in some woods near the Danish frontier.

Trials followed in Great Britain. Banning was sentenced to ten years in prison, as was New Zealand commando Francis Dale. Purdy was sentenced to death, but that was later commuted to life imprisonment. Most of the participants in the Buro Concordia operations went to jail for various periods.

Joyce was a different case. He was the prime symbol of willing collaboration with the enemy. He was the most familiar voice on Nazi radio and the brains behind the traitorous broadcasts.

That was what Britain could not forget, or forgive, and it brought Haw Haw to the gallows in Wansworth prison that cold January morning.

PIRATES DEN

FOCUS ON FREE RADIO BROADCASTING

BY DARREN LENO, WDØEWJ

The letters WRAM comprise the self-proclaimed callsign of a shortwave pirate broadcaster whose activity we have been following over the last couple of months in this column. "RAM Radio" was famous in SWL circles for their marathon transmissions, and were widely heard on their frequency of 7430 kHz.

Perhaps WRAM was on once too often, and heard by one SWL too many. The station was closed recently by Enice C. Coleman from the Federal Communications Commission's office in Oxford Valley, PA. I had the chance to talk to the operator, Ron, about the closer. He admits that WRAM's twenty hour broadcasts may have had something to do with Mr. Coleman's ability to track down the station.

"I just had it on too long," says Ron, referring to his transmitter. "I just left it on—it was in my room. I kept on switching tapes and had announcements."

Another underlying cause was the television interference (TVI) that Ron's neighbors were receiving from WRAM. Evidentally, complaints were received by the FCC regarding this interference, and most of you amateur radio and CB operators can attest to the fact that the FCC takes any form of radio interference very seriously, and will work to have it eliminated, as WRAM was.

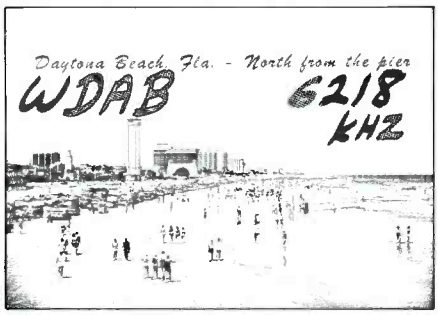
When Coleman knocked on Ron's door and identified himself as an agent from the FCC, Ron knew the game was over and invited him inside. "I figured . . . that if I gave them any trouble, they'd be back in five minutes with a warrant anyway" he says.

One of Ron's first thoughts when he saw the agents was one of disappointment. "I was having a lot of fun with my broadcasts, and they ruined it!" he says with a chuckle. His thoughts then became a bit more serious as he realized there was a possibility that the vintage radio equipment he owned might be confiscated. "I thought they were gonna take my stuff!" he said.

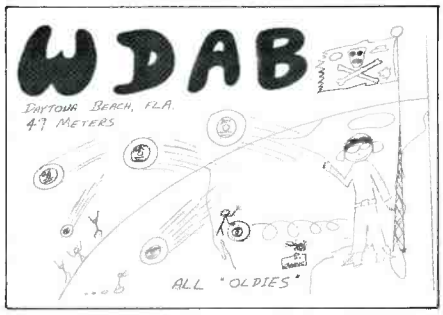
WRAM was still on the air when Coleman arrived, and Ron was told to inform his listeners that the station had been closed down by the FCC.

Ron is not exactly sure what penalties will be levied against him for broadcasting without a license, but Mr. Coleman has hinted that a fine somewhere in the range of $750.00 could be expected. As of this writing, nothing definite had been decided.

Ron has since sold the Hallicrafters transmitter that sent WRAM's signal all around the United States, over to Europe, and even down to Venezuela. A friend of his purchased the radio, so maybe we have not heard the last of it. Further developments concerning WRAM can be seen here.



Here is one of WDAB's first QSLs. On the reverse side is the verification information.



Later, WDAB followed up their postcard QSLs with printed cards.

New Stations

Several new pirate stations have been logged by listeners since the last column of The Pirates Den was written.

KTGR was heard by Terry Provance of Ohio during a transmission on 7410 kHz, from 06:45 to 07:45 GMT. The DJ at this station calls himself "The Innkeeper," and the musical format takes on a rock 'n' roll sound.

New Wave Radio Int'l was heard on 7430 kHz. Kirk Baxter of Kansas heard this station from 04:45 to 06:45 GMT. The musical format, as the name implies, features such "new wave" groups as Duran Duran, Devo, Thomas Dolby, and the Go-Gos. Benn Kobb of Colorado heard this new station give a computer program for its listeners who owned a Timex Sinclair ZX-81 computer, while Kirk Allen noted a female DJ proclaim that you were listening to "pirate radio technology in action." The amount of power this station claimed was 100 watts, and listeners were told to send reception reports to the Association of Clandestine radio Enthusiasts, who are not sure what they should do with them.

Radio Angeline was noted on 7390 kHz from 04:30 to 04:40 GMT. Artie Bigley of Texas noted this station identifying itself in a variety of languages, including English, Spanish, and German, while Terry Provance, Ohio heard identification as "Radio Angeline, a multiple vacation from the Isle of Write" or something similar to that effect. Older music from groups such as ABBA was heard.

Radio Highlander is one of the more unique pirate stations to have appeared recently. They put on a Scottish atmosphere, complete with a properly accented DJ, Scottish folk and bagpipe music. Bill Martin of Delaware heard the station identify itself as, "This is Radio Highlander, aye, for free Scotsmen everywhere!"

The Voice of Democracy was noted near 7430 kHz by *POP'COMM* Editor Tom Kneitel and myself recently, as they "relayed" a lampooned version of Radio Moscow's world service sometime after 03:00 GMT on a recent Sunday evening. This has got to be one of the more playful pirates I've heard, and definitely among the most creative. The VOD's programming consisted of classical music, humorous spoof pro-communist commentary, and listener phone calls.

I was surprised at the large number of listeners who called the station, and decided to jump on the bandwagon myself. After I dialed up the VOD at the 212 area loop number they were anouncing over the radio, a man answered, put me on the air, and began asking me if I was "a communist," why I wasn't a communist, and if I'd like to talk to the communists in Moscow. "Sure!" I said to the last question. "Put them on."

After several beeps, clicks, and other odd noises on the phone line, the VOD's "direct satellite link to Moscow" was complete. I talked to a man and woman announcer with very good Russian accents, and was even invited to visit Moscow.

I was impressed with the quality of the broadcast, and with the organized way the station presented itself. In fact, they sounded so good, Tom Kneitel heard one gentleman on the air who called in and was apparently unaware that this was only a pirate poking fun at Radio Moscow. He was indignant and completely serious when he began arguing for free enterprise. As you can prob-

An historic QSL from New York City's notorious pirate, WFAT, compliments of Konstantine Rychalsky, CT.

ably guess, the announcers had a good time putting him on with silly questions. The station announced a Battle Creek, Michigan address, but as of this writing (many weeks after a reception report was sent), VOD has unfortunately not bothered to respond.

Our last new station for this month is WTNT, which was noted by Paul Walkendorf of Michigan. They were operating on 7430 kHz from 03:00 to 03:30 GMT. Programming consisted mainly of music, which ranged from Disney's "It's A Small World" to Peter Gabriel.

A station that was mentioned last month, the Voice of Tomorrow, has an address to which you can send reception reports and comments. Write to: The Voice of Tomorrow, PO Box 786, Bristol, VA 24203.

The VOT created quite a loud, negative reaction from their listeners after they broadcast "white supremacist" commentaries. The announcers stated that the VOT's remaining on the air was dependent upon listener response. Whether they wanted positive or negative listener response wasn't made clear. One would assume a positive reaction would be desirable, but it's a sad fact that some stations take to the air just for the purpose of making a group of people, or even just one person, angry. However, no one has heard the VOT since their first transmissions.

A reader in Florida called to tell us that "RADIO X" is operating on 103.5 MHz FM in Daytona Beach. Some of you may remember that Daytona Beach was the home of WDAB, a shortwave pirate that was heard around America circa 1979. Radio X's transmitter was previously owned by WDAB, who used it for cable TV FM simulcasting operations, apparently after they decided to expand their coverage locally.

While these nifty black/white/gold embroidered patches were originally designed for military use in Vietnam, they certainly have a lot of possibilities these days for those interested in pirate broadcasting! They are shown in the catalog of U.S. Cavalry Store Inc., 1375 N. Wilson Rd., Radcliff, KY 40160. (Their 100 page color catalog is $3.)

The Voice of the Voyager was a very popular shortwave pirate that was closed in suburban Minneapolis on May 9, 1982 by FCC agents from St. Paul, Minnesota. Since this was the second time the station had been "busted," heavy fines were levied against the operators; $3000 worth in all. To make matters worse, both the "Voyager Boys," Mike Martin and Scott Blixt, were enrolled in school at the time of the bust, and the money for the fines was not readily available. Just in the past few months, well over a year since the closer, a reasonable method of payment of the fines has been reached with the Justice Department. Both Scott and Mike wil pay $25 a month until the balance is reached.

I don't suppose I have to remind you that Christmas is upon us. I would, however, like to remind you that along with the strange relatives and strange gifts you'll be receiving, Christmas also brings strange stations to the airwaves. Actually, most of these stations are not that strange at all, and many of them are quite good. Some of the pirate activity last year on or near Christmas Eve included appearances from stations like Radio Clandestine, Voice of the Pyramids, Radio Indiana, WOIS, WTDT, something called "Music 5," and "the king of the pirates," Radio Free Wave. Now, I won't tell anyone to spend their Christmas vacation glued to a shortwave receiver trying to hear pirate stations that may or may not show up, but if you can find the time to occasionally take a sweep through the bands (especially 7 MHz), perhaps you'll have a chance to hear some of the unlicensed broadcasters that take to the air at this time of the year. And if you think the Christmas pirates are something, wait'll New Years! We'll talk about that next month. Have a Merry Christmas!

WASHINGTON PULSE

FCC ACTIONS AFFECTING COMMUNICATIONS

Experimental Actions

The FCC took the following actions:

KM2XMI, KM2XMK, Westinghouse Communication Services, Inc., Anne Arundel County, MD. Experimental research stations to operate on 1030 MHz and 2891.2-3108.8 MHz to be used to test radar equipment prior to shipment to the Government of Switzerland.

KE2XKI, KE2XKF, Southern Regional Medical Consortium, Lafayette, LA and Gulf of Mexico and Hattiesburg, MS, and the southern counties of Mississippi. Experimental research stations to operate on 149.195, 149.220, and 149.245 MHz to provide communications essential to research project using ATS-3 to link ambulances and paramedic teams with hospital emergency physicians.

Experimental research stations to operate on 401.7895 MHz for collection of data using GOES Satellite: KE2XMP, Crabtree Meadows, CA; KE2XMQ, Lee Vining, CA; and KE2XMR, Lee Vining, CA.

KM2XLD, Stone And Webster Engineering Corp., Various Counties in the State of Texas. Experimental research station to operate on various discrete frequencies between 216.2 and 219.6 MHz to conduct seismic studies in Permian Basin Area off Texas panhandle under U.S. Government contract.

KM2XLP, Eyring Research Institute, Inc., Provo, UT. Experimental research station to operate on discrete frequencies within 1600-2490, 2510-4990, 5100-9990, 10100-14990, 15100-24990, 25100-35000 kHz, and 1600 kHz-101.6 MHz bands for antenna test range research on broadband antenna concept.

KM2XMM, Texas A&M University, W. Boothbay Harbor, ME. Experimental research station to operate on 148.300 and 148.900 MHz to study currents in the Gulf of Maine sponsored by NSF Grant.

KM2XMN, Rockwell International Corp., Richardson, TX. Experimental developmental station to operate on various discrete frequencies between 2851 and 21931 kHz for experimentation, development, and evaluation of new products and techniques of transmitters, receivers, and antennas for aeronautical and aircraft use.

KM2XMO, Westinghouse Communication Services, Inc., Anne Arundel, MD. Experimental research station scheduled to operate on 1250-1350 MHz for development and production testing as required by the U.S. Government.

KM2XMP, Westinghouse Communication Services, Inc., Anne Arundel, MD. Experimental developmental station to operate on 1030 MHz for development testing and demonstration of radar for the purpose of sales.

KM2XMS, Joseph H. Reisert, Jr., Chelmsford, MA. Developmental station to operate on 902-908 MHz band to develop equipment for use by amateurs in new frequencies indicated in WARC 1979.

KM2XMU, Jack C. Parker, Bismarck, ND. Experimental research station to operate on 902-928 MHz to develop designs for equipment suitable for narrowband weak signal communications as indicated in WARC 1979.

KM2XMV, KM2XMW, KM2XMY, Atlantic Research Corporation, St. Petersburg, FL. Experimental research stations on 45.8 MHz for development of a radio receiver to be installed in automobiles for an automatic highway advisory radio system under U.S. Government contract.

KM2XMZ, Gary S. Rasmussen, Within State of Massachusetts. Experimental research station to operate on 10,525 and 24,150 MHz to develop a device that alerts auto drivers of hazardous conditions which could involve head-on collision.

KM2XNA, General Electric Radio Services Corporation, Lynchburg, VA. Experimental research station to operate on various discrete frequencies in 150, 450, and 860 MHz bands for evaluation of signaling schemes and propagation systems in actual field conditions of new equipment.

KM2XNB, Litton Systems, Inc., Van Nuys, CA. Experimental research station to operate in 2905-3080 MHz band to test and evaluate system under U.S. Government contract.

KM2XNC, James R. Blair, Norcross, GA. Experimental research station to operate on 18.068-18.168 MHz and 24.890-24.990 MHz bands to research RF interference caused by transients, looking toward elimination of such interference.

KM2XNE, Union Pacific Railroad Company, Omaha, NE. Experimental developmental station to operate on 400 kHz and 45 kHz to obtain operational and engineering data in actual railroad environment of railcar identification system.

KM2XNF, Westinghouse Communication Services, Inc., Anne Arundel, MD. Experimental developmental station to operate on 35.0, 257.5, 268.1, 272.5, 277.5, 335.7, and 371.5 MHz for development testing and demonstration of radar for sale purposes.

KM2XNG, Westinghouse Communication Services, Inc., Sunnyvale, CA. Developmental experimental station to operate on 10585 MHz to field test a SYNAPZ Business Local Distribution System.

KM2XNL, Norden Systems, Inc., Melville, N.Y. Experimental research station to operate on 5450-5825 MHz band for testing radar under U.S. Govt. Contract.

KM2XNM, Coded Communications Corp., San Marcos, CA. Experimental developmental station to operate on 866.0125; 867.0125; 868.0125 and mobile on 821.0125; 822.0125 and 823.0125 MHz for development and technical enhancement of mobile trunking communication system primarily dealing with trunking control protocols and development of mobile data communication equipment for trunked systems.

KM2XNO, Stanton Rust Prentiss, Edgewater, MD. Experimental research station to operate on 3700-4200 MHz band and 500-506 MHz band to conduct TV receiver only examinations, beginning at C-band and eventually extending to K-band when B/C Satellite services commence in future.

KM2XNP, RCA Corp., Island of Guam. Experimental research station to operate on 3.7-4.2 GHz; 5.925-6.425 GHz; 11.7-12.2 GHz; and 14.0-14.5 GHz bands to establish low-power transmitting facility at satellite tracking station to permit the accurate calibration of earth station.

KM2XNQ, Texas Instruments, Inc., Dallas, TX. Experimental research station to operate on 420-450 MHz band for feasibility research of spread-spectrum techniques.

KM2XNR, University of Alaska, Fairbanks, AK. Experimental research station to operate on 462.25 MHz to transmit data related to a research project.

KM2XNT, General Electric Radio Services, Corp. Dewitt, NY. Experimental developmental station to operate on 808.6125 and 853.6125 MHz to develop hardware for a personal radio communications service to be in position to comment on Gen Docket #18262.

KM2XNU, Motorola, Inc., Schaumburg, IL. Experimental developmental station to operate on 1610 kHz to test, evaluate and demonstrate AM stereo receivers. Here's one to listen for!

Industrial Long Distance Communications Announced

The FCC recently adopted new rules which govern the licensing and operation of HF (2-25 MHz) radio systems in the Industrial Radio Services. The new rules allow these frequencies to be used in support of activities involving safety of life or property or other activities incident to the national interest. In conjunction with the new rules, a separate Public Notice will be issued which lists frequencies between 2 and 25 MHz which will be available initially for certain long distance communications in the Special Industrial, Petroleum, Power and Telephone Maintenance Radio Services. The new rules contain special eligibility requirements which limit authorizations to operate in these bands to uses in connection with ex-

ploration for energy and mineral resources, restoration of electric power distribution systems, and provision of backup communications circuits when other communications circuits are not available or feasible.

Current licensees in these services may continue to operate on frequencies previously granted, subject to the new rules. The new rules state that all licensees operating on frequencies below 25 MHz (except in the Radiolocation Service or as otherwise provided) must vacate a frequency upon notification by the Commission in the event that a complaint of interference is received from a foreign source.

The rules also require the submission of a communications plan when applying for or renewing authorizations. The requirements for the plan are as follows:

(1) A description of the communication requirement sufficient to demonstrate that no alternative to the link is appropriate and that there is no reasonable way to abbreviate the link;

(2) The frequency bands and the number of frequencies necessary for the link;

(3) The name and phone number of the person responsible for ceasing operations of the licensee's stations in the event of interference; and,

(4) Where the link provides a standby backup circuit for another communications circuit, a brief description of the supported circuit and its vulnerability to disruption.

Plans need not be resubmitted in subsequent renewals if they continue to represent the communication system. The Commission must be notified immediately of any change in plan, including a change of telephone number.

Pre-authorization frequency coordination is not necessary on these frequencies. The Commission authorizations will specify frequency bands of operation rather than specific frequencies. Licensees are encouraged to cooperate with other licensees in selecting the frequencies of operation to minimize the incidence of interference.

In order to help identify stations during a disaster or emergency, it is necessary to distinguish the various types of stations in use, i.e., mobile, fixed/base, or temporary fixed/base stations. To this end we will be issuing separate callsigns for each of these types of stations. We will require a separate application for each permanently located base/fixed station, as well as one for all temporary base/fixed stations, and one for all mobiles. This departure from our usual system licensing concept will assist in identifying any station in a system to resolve interference problems quickly. Above 3400 kHz only fixed operations are permitted.

Applications may be filed with the Commission beginning August 15. Please see the new rules (48 Fed. Reg. 46339) for additional technical, licensing, and operational requirements. For any questions concerning these procedures, contact Keith Plourd, Federal Communications Commission, Washington, D.C. 20554; (202) 634-2443.

Marine Radio Operators Fined For Causing Radio Interference To Safety Radio Services

Oliver K. Long, Engineer in Charge of the Federal Communications Commission Kingsville, Texas Monitoring Station, notified the following vessel owners/operators of apparent liabilities ranging from $100 to $1,00 for causing interference to safety Radio Services:

Southern Trawlers, Inc., Bayou La Batre, Alabama
Fisherman Marine, Bayou La Batre, Alabama
Wilbur-Gene Seaman, Jr., Bayou La Batre, Alabama
Ron-Jon, Inc., Bayou La Batre, Alabama
James Danial Seaman, Grand Bay, Alabama
Eddie Barbour, Sr., Irvington, Alabama
Linda D. Trawlers, Inc., Irvington, Alabama
Laddie Portier, Houma, Louisiana
Glenn Pellegrin, Houma, Louisiana
Joe Barbaree, Lockport, Louisiana
Anthony Hutchinson, Montegut, Louisiana

The Commission recently received numerous complaints of interference to Public Safety Services (fire, police, and ambulance), as well as business and military communications around the Corpus Christi, Texas area. The interference was caused by improper usage of Marine Radio frequencies by shrimp boat operators.

These activities are a continuing effort by the Federal Communications Commission to alleviate interference to various radio frequencies by vessels engaged in shrimping activities in U.S. Gulf Coast waters. The issuance of these eleven Notices of Apparent Liability to owners/operators of shrimp fishing boats, brings to fifteen the total number of notices issued during the months of June and July 1983.

VHF Marine channels available for commercial ship-to-ship radio communications are:

Channel	Frequency (MHz)
01	156.050
07	156.350
08	156.400
09	156.450
10	156.500
11	156.550
18	156.900
19	156.950
63	156.175
67	156.375
79	156.975
80	157.025
88	157.425

Misuse Of Aircraft Radio Stations

The Field Operations Bureau of the Federal Communications Commission announced that FCC Field Monitoring Units have issued Notices of Violation to several air cargo carrier licensees for unauthorized use of aeronautical frequencies. Superfluous communications and unauthorized air to air communications were noted on multicom, flight test, instructional, airdrome control, and other channels. Such activity has been reported by FCC Monitoring Personnel at Douglas, Arizona; Grand Island, Nebraska; Livermore, California; Powder Springs, Georgia; Fort Lauderdale, Florida; Belfast, Maine; Ferndale, Washington; and Sabana Seca, Puerto Rico. One particular licensee, upon notification of the violation, disciplined the First Officer of an aircraft involved by the imposition of a suspension without pay for an unspecified period.

"The misuse of Aeronautical Radio frequencies for illegal chit-chat among pilots and airlines is a nationwide problem even extending into Canada," Smith said. He also added, "Since aircraft fly at high altitudes, this type of operation can cause interference to other operations over an area of several hundred miles."

According to Smith, "Radio is vital to the operation and safety of aircraft, and must be used in a business like manner." Smith added, "that FCC Field Units are making a concerted effort to heighten the awareness of aircraft pilots to the seriousness of this widespread problem."

Frequencies such as 122.8, 122.85, 122.9, and 123.45 are often noted by monitors as being used for chit-chat.

Deletion Of Restrictions On Mobile Relays In Bands Below 470 MHz Proposed

The Commission proposed to delete restrictions on the use of mobile relays in the bands below 470 MHz in the Private Land Mobile Radio Services (PLMRS).

A mobile relay station receives signals transmitted by mobile units and automatically retransmits them, significantly expanding the effective range of a land mobile system.

Currently, licensees are permitted to use mobile relays below 450 MHz in the contiguous 48 states in all PLMRS except Land Transportation, Business, Special Industrial, Relay Press, Radiolocation, Manufacturers, and Motion Picture Radio Service licensees. In the PLMRS bands above 470 MHz, where frequencies are paired, mobile relay operations are permitted in all radio services.

Noting that it receives requests for waivers of its restrictions on mobile relays in the Land Transportation Radio Services below 450 MHz as well as in the 450-470 MHz band, which are usually granted on a demonstrated showing of need, the FCC proposed to allow mobile relays in all PLMRS, except Radio location, below 470 MHz.

Denial Of Alien Use Of Additional Amateur Frequencies Above 144 MHz

The Commission upheld the Private Radio Bureau's dismissal of Joseph P. Spe-

roni's petition to amend Part 97 of the rules to grant alien amateur radio operators from countries in International Telecommunication Union (I.T.U.) Regions 1 and 3, operating their stations under the authority of reciprocal permits issued by the FCC, the authority to transmit on all amateur radio service frequencies above 144 MHz, regardless of frequency privileges authorized by their own government.

Speroni claimed that, as a result of international frequency allocations, restrictions are placed on these amateurs that are not placed on U.S. amateur operators. He added that there is nothing in the agreements signed by the United States and other countries that compels the U.S. to accept only the frequency privileges of the other country.

The FCC said that an alien amateur radio operator has the same privileges in the U.S., under the authority of a reciprocal permit, as his/her country authorizes, but never more than those the Commission's rules authorize to the highest operator class. It added that International frequency allocations are not the only reason for restrictions, pointing out that licensing requirements and privileges vary considerably among the 65 countries representing all three ITU Regions with whom the U.S. has reciprocal agreements, with many administrations limiting amateur operator privileges depending upon the qualifications of the operator.

The FCC added that, in lieu of requesting a reciprocal permit, an alien could obtain a Commission-issued amateur radio license by taking the same FCC examinations as a U.S. citizen.

Rule Changes Affecting Assignment Of Marine VHF Public Correspondence Frequencies In Puget Sound Area Allow More Channel Utilization

The Commission amended Subpart S of Part 81 of the rules to increase spectrum utilization and reduce potential interference on marine VHF public correspondence frequencies in the Puget Sound area of Washington and Canada.

The changes reduce the effective radiated power of the primary and supplementary channels from 125 watts to 60 watts. Antenna height is limited to 500 feet for inland waters primary and secondary channels, 50 feet for inland waters local channels, and 250 feet for coastal waters local channels.

Each public correspondence sector is assigned one primary and one supplementary channel, with the exception of the three sectors where a supplementary channel is unavailable. Any channel among those included in the arrangement can be used as a local channel in a particular sector, except those designated as primary and secondary channels in that sector. Whereas the current arrangement assigns up to two primary and supplementary channels per sector and Channels 24 and 25 as local channels, the new channeling arrangement provides more flexibility to local channels without degrading service on other channels.

The Commission pointed out that coast stations still may be licensed by either the United States or Canada without prior coordination if they accord with the arrangement. Preliminary U.S./Canada coordination will be required for all applications in variance with the channeling arrangement.

FCC Field Operations Bureau Reorganized

The FCC reorganized its Field Operations Bureau to improve its management and reflect current programs better. The Commission said staffing levels will remain the same, although the changes reflect staff reductions which have already occurred. Most of the staff will not be affected, it said, and most of those who are will be affected by organizational rather than duty changes.

Under the reorganization the Violations Division will be incorporated into the Enforcement Division as a Branch. The Investigation Branch and Inspection Branch of the Enforcement Division will be combined into a single Investigations and Inspections Branch. The Regional Services Division will be renamed the Public Service Division, and the names of certain other units will change. A Support Staff will be established in the Enforcement Division and an Administrative Accounting Staff in the Engineering Division, in general to relieve operational units of administrative duties.

Bureau functions listed in FCC rules (Part 0) will be amended to reflect current programs and delegations of authority. Functional listings for units within the Bureau will be deleted, in keeping with current FCC policy. Listing of field installations and their administrative areas also will be eliminated, since that information is subject to relatively frequent change.

Four Frequencies In 40-50 MHz Band Allocated For Meteor Burst Communications

The FCC allocated four frequencies in the 40-50 MHz band and established new rules for using meteor burst communications in the State of Alaska.

Amendment of Parts 2, 22, and 90 of the rules, the Commission said, would permit private radio stations to use 44.20 and 45.90 MHz and common carrier radio stations to use 42.40 and 44.10 MHz on a primary basis for meteor burst communications in Alaska. Also, common carrier and private radio stations are permitted to share each other's frequencies on a secondary, non-interference basis.

(Meteor burst communications use the phenomenon of meteor trails in the earth's atmosphere to reflect radio waves in the VHF frequency range for communicating over distances of up to 2,000 km. Since meteor trails last only a few milliseconds, resulting communications are intermittent, necessitating data transmission at a very high rate.)

Because of possible interference to television receivers, the Commission said it would go forward with the licensing of meteor burst stations under a developmental grant policy to insure that the expanded use of this new technology does not cause harmful interference to other users.

Also, the FCC said the maximum transmitter output power would be 2,000 watts for base or central office stations and 500 watts for remote or subscriber stations. A 150 mile separation would be required between co-channel base or central office stations and between co-channel remote stations and the base station of another licensee.

If mutual interference occurs, the Commission pointed out, stations must take all available measures to eliminate or minimize it and to promote compatible use of the limited frequencies. In addition, if co-channel users cannot meet the 150 mile limit, but can agree to a cooperative sharing arrangement, a waiver of the separation requirement may be requested.

HOLIDAY GIFT VALUES From SPECTRONICS!

MAKE WAY FOR THE NEW LEADER IN SW!

The new Sony 2002 is here!

Reg. $249.95
INTRODUCTORY SPECIAL
$224.95
Plus $3.00 UPS

AVAILABLE NOW!

We didn't think that Sony could top the 2001, but they did!

FEATURES

Ten memory channels • 12/24 hour quartz clock • PLL tuning for drift-free performance • Dual conversion Superheterodyne for high sensitivity • SSB/CW

SPECIFICATIONS

150 kHz-30 MHz AM, 76-108 MHz FM • 1 uV sensitivity @ 6 dB S/N @ 10 MHz • 72 dB @ 10 MHz image ratio • 3 kHz @ −6 dB

9 Band Sony ICF-7600A

Reg.$144.95
$109.95
Plus $2.00 UPS

"An obvious choice for travelling shortwave listeners" . . . WRTH

FEATURES & SPECIFICATIONS

7 SW bands, MW & FM • Dual conversion, superheterodyne on SW • High stability • Sensitivity: 0.8 uV @ 6dB S/N @ 11.8 MHz. • Selectivity: Less than ± 8 kHz @ −50 dB

SONY 6-BAND Pocket World Receiver

ICR-4800

Reg. $89.95
$69.95
plus $2.00 UPS

- 6-band pocket world receiver—SW 1-5, plus MW • Extremely compact and lightweight—palm sized! • SW band spread dial-easy tuning • Tuning indicator • FET RT amplifier for clean, low-noise reception along with high sensitivity and selectivity • Soft-touch band selectors also turn on the unit • Locking power-off switch • Only 2 15/16" x 5¼" x ⅞"

SUPER CLOSEOUT!

Reg. $179.95
Now only **$96.50**
plus $3.00 UPS

SONY ICF-6500W

"The 6500W performs on a par with models in the $200-300 price range" (World Radio TV Handbook)

- Digital LCD display for accuracy
- Dual Conversion Superheterodyne
- BFO for SSB/CW • 1 uV Sensitivity
- AFC for FM • AC/DC power

KEN-TECH® 24-HOUR SWL ALARM CLOCK

$19.95
Plus $1.50 UPS

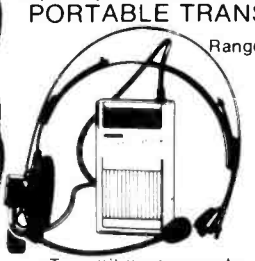
- 1 Yr. Warrantee
- Electronic digital alarm clock
- .7 inch red LED numerals
- 24-hour memory alarm
- Drowse control
- Dark brown walnut grain
- 2¼"H x 6¼"W x 3¼"D

TALKMAN

Lightweight, portable, hands-free operation.

PORTABLE TRANSCEIVER

Range up to 1/2 mile.



$39.95 ea.
plus $2.00 shipping
for Business

- Warehousing
- Construction
- Loading
- Surveying
- Hospitals for Sports & Recreation
- Coaching
- Skating
- Racing
- Hiking
- Boating
- Fishing
- Camping

• Transmit messages automatically - just speak into the mike on headset • Adjustable headset -comfort -fitting earpiece with volume control and moveable mike • Portable and convenient - Rugged, yet lightweight. Weighs less than 9 oz. Secures to belt or pocket • No license required to operate • Great for sports, recreation, and business.

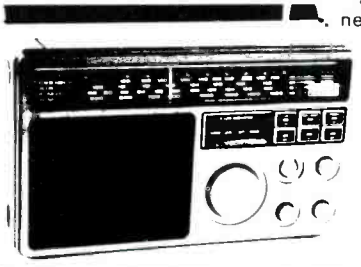
AM/FM/AIR PUBLIC SAFETY

SAVE $$$

ONLY **$69.95** plus $2.00 UPS

THE NEW PANASONIC RF-1405 HAS IT ALL!

Portability and practicality are built right in to this newest Panasonic receiver, not to mention LOW PRICE!



- AC/DC power
- AM 525-1610 KHz.
- FM 88-108 MHz.
- AIR 108-136 MHz.
- PSB 136-174 MHz.

FAMOUS "EAVESDROPPER" SW RECEIVING ANTENNA

$59.95 POSTPAID

- AUTOMATIC BANDSWITCHING!
- COMPLETELY WEATHERPROOF!
- 60, 49, 41, 31, 25, 19, 16, 13 & 11M BANDS!
- COMPLETE, NO ASSEMBLY NEEDED!

All the world's shortwave broadcast bands are yours with the Eavesdropper All-Band antenna. Individually tuned traps make the Eavesdropper work like seven separate antennas, each tuned to a different international broadcast band. Also covers 11, and 50M bands as well. Its 100 foot, 72 ohm balanced feedline provides an exact match to the antenna on every band. Comes completely assembled, and ready to install with 50 ft. of 450 lb. test nylon rope. Overall length: 42' 10" Wire: #14 copper clad steel. Bandswitching: Automatic. Impedance to rcvr: 50-75 ohms balanced. **Only $59.95**

SPECTRONICS, INC

1009 GARFIELD ST. OAK PARK, IL. 60304

PHONE
(312)848-6777

MasterCard VISA

CIRCLE 21 ON READER SERVICE CARD

SCANNER SCENE

BY CHUCK GYSI, N2DUP

MONITORING THE 30 TO 512 MHz "ACTION" BANDS

The busiest channels to monitor on your scanner aren't police and emergency services frequencies—the business band is more active, particularly in metropolitan areas.

Business band channels are alive 24 hours a day. While office workers are asleep, overnight air couriers are rushing packages to their destinations and dairies are dispatching milk tanker trucks from distribution centers—all by two-way radio. No matter when you tune in, you're likely to hear interesting activity on the business band.

First of all, who can you expect to hear on business band? Technically, any business is eligible to use business band frequencies. Federal Communications Commission rules also allow educational and philanthropic institutions, clergymen and churches, and hospitals, clinics, and medical associations to use business radio.

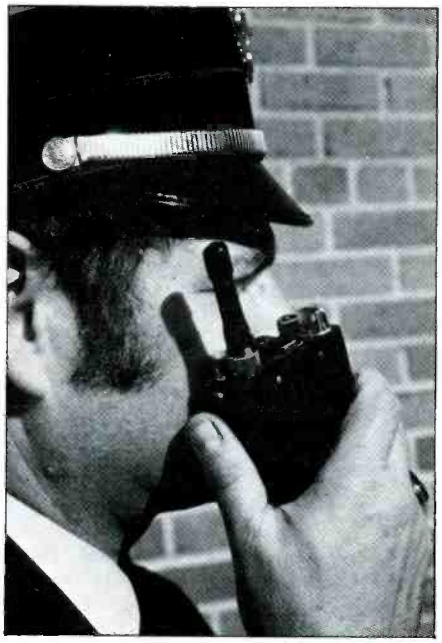
Because anyone engaged in any type of commercial activity can use business band frequencies, all types of interesting communications can show up on any given channel. You'll be able to hear everything from garbage trucks to delivery trucks, race car drivers to taxi drivers, wrecking crews to construction crews, and casinos to pizza shops. Any business with a legitimate need for two-way radio can obtain a license in the business radio service.

Business communications on low band (30-50 MHz) and VHF high band (151 and 154 MHz) are simplex; the base and mobiles operate on the same frequency. However, on UHF (460-465 MHz), business band communications usually are through repeater stations. In fact, most business communications on UHF you will hear will occur on "community repeater" systems.

In a community repeater system, usually a dealer in two-way radios will maintain a repeater system at a high elevation and rent time on the repeater to those who need two-way radios. The dealer also may rent the user the two-way radios and provide a service contract for their maintenance.

To maximize the two-way dealer's profit, community repeaters usually are host to several users—all on the same channel. Thus, most community repeaters usually have an average of 10 to 12 users in smaller metropolitan areas and perhaps as many as three dozen users in major cities.

But how do the users keep from going bonkers listening to everyone else's communications all on the same repeater? It's easy; each user has his own sub-audible tone (also known as Private Line, Channel Guard, and Quiet Channel by manufacturers) that each unit transmits. Unless the mobile or base units hear the same sub-audible tone transmitted by units in its own fleet, the radio's receiver remains silent—even if the other companies are transmitting on the same channel. Usually a light on the radio indicates to the user, however, that the channel already is in use. This prevents one company from transmitting on top of another user at the same time.



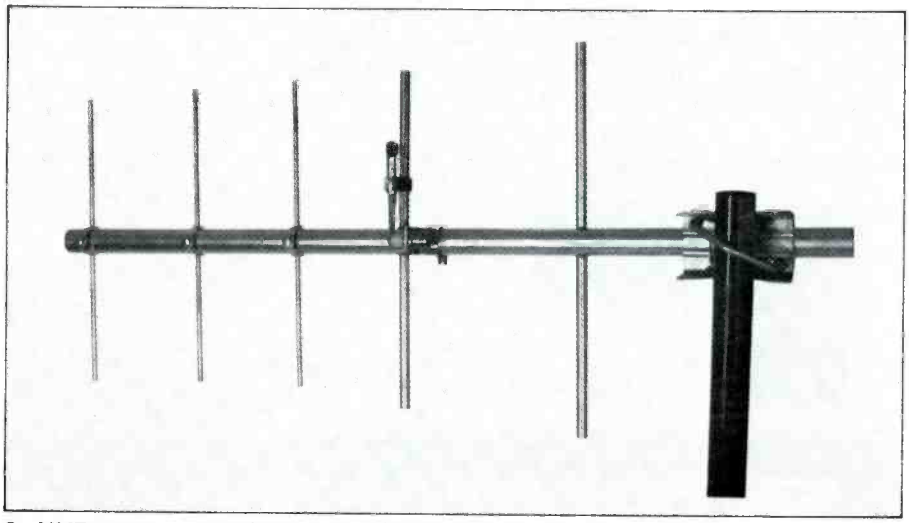
A security guard uses a UHF business band walkie-talkie check in with his dispatcher.

The repeater, meanwhile, has a special board installed that allows it to retransmit signals only on sub-audible tones assigned to its users. This prevents unauthorized users from bootlegging on the repeater—a problem in some urban areas.

Although some repeaters will give their users citywide coverage, others may be installed to cover only a given area or building. Many large office buildings, stadiums, manufacturers, and shopping malls operate their own repeater systems to enable better coverage over their property. Usually these types of short-range communications occur on "local control" frequencies on UHF (see accompanying chart). Local control stations, which also may operate simplex on the channels, usually operate with low power. Community repeaters, which use much higher power, are not allowed to operate on the same channels. Thus, the local control channels can be used over and over again from one town to the next.

It also should be noted that there are some special VHF channels as well. For instance, power output on 154.570 and 154.600 MHz is limited to 2 watts—the power of a walkie-talkie. Most activity you'll hear on these channels will be short range, such as museum security, stadium supervisors, and plant operations.

Another frequency to keep an eye on is 151.625 MHz. This frequency is reserved for itinerant purposes; in other words, if a business radio user moves around a lot from one area to another and does not have a specific base of operations, they may use this frequency. Some of the thousands of users of 151.625 MHz include: United Parcel Service, Kenny Rogers Productions, Los Angeles Dodgers, Dottie West, The Associated Press, Ringling Bros. and Barnum & Bailey Circus, Boy Scouts of America, National Fire Protection Association, U.S. Auto Club, and the Marshall Tucker Band—quite a wide variety. Two pairs of UHF channels deserve a similar look: 464.500/



On UHF repeaters, most businesses will have a Yagi beam antenna like this mounted on the side of their building and pointed directly at the repeater. The base, or control, station operates on the same frequency as the mobiles and is repeated by the repeater.

Chart of Business Radio Frequencies

Frequency	Use	Channel Spacing	Frequency	Use	Channel Spacing
27.43-27.47	General	20 kHz	461.025-462.175	General	25 kHz
27.49	Itinerant	—	462.750-462.925	Paging	25 kHz
27.51-27.53	Low-power (2w)	20 kHz	462.200-464.300	General	25 kHz
30.76-30.80	General	40 kHz	464.325	Local control	—
30.84	Low-power (2w)	—	464.350	General	—
30.88-31.24	General	40 kHz	464.375	Local control	—
33.14	Low-power (2w)	—	464.400	General	—
33.16	General	—	464.425	Local control	—
33.40	Low-power (.5w)	—	464.450	General	—
35.02	Low-power (2w)	—	464.475	Local control	—
35.04	Itinerant	—	464.500	Itinerant	—
35.06-35.14	General	20 kHz	464.525	Local control	—
35.18	General	—	464.550	Itinerant	—
35.70-35.72	General	20 kHz	464.600-464.650	General	25 kHz
35.88-35.98	General	20 kHz	464.675	Local control	—
42.96	General	—	464.700-464.750	General	25 kHz
42.98	Low-power (2w)	—	464.775	Local control	—
43.00	General	—	464.800-464.850	General	25 kHz
151.625	Itinerant	—	464.875	Local control	—
151.655-151.955	General	30 kHz	464.900	General	—
152.480	Paging	—	464.925	Local control	—
154.515-154.540	General	15 kHz	464.950	General	—
154.570-154.600	Low-power (2w)	30 kHz	464.975	Local control	—
154.625	Paging	—	465.000	Paging	—
157.740	Paging	—	467.750-467.925	Low-power (2w)	25 kHz
158.460	Paging	—			
457.525-457.600	Low-power (2w)	25 kHz			
460.650-460.875	Airlines (20w)	25 kHz			
460.900-461.000	Alarm companies	25 kHz			

*__Note:__ On systems using repeaters from 460.650 to 465.000, mobiles and portables operate exactly 5 MHz higher and are retransmitted on the above listed frequency.

469.500 and 464.550/469.550 MHz also are used for itinerant purposes on a nationwide basis, except in the Detroit, Michigan area, where those two channels are used for repeaters.

It also should be noted that if you live in an area where the UHF T-band (470-512 MHz) is in use, check usually the upper two MegaHertz of the bands assigned for your area for business communications. Also, the 851-856 MHz band is rapidly becoming crowded with business users in many areas.

Extra Ears

Have you ever wished you could listen to your scanner while you are at work? Imagine being able to listen to all the fire calls in your town while you are away on vacation. There is a way to do this. With an add-on device to your tape recorder, it's all possible.

There are several devices available that will connect your scanner to your tape recorder. The device uses a voice-actuated relay so that the tape recorder is switched on only when it "hears" something from your scanner. And because there is no "dead air" between transmissions, all the listening is compressed on the tape. Thus, you come home and turn on the tape recorder and can hear everything that happened during the day in a matter of minutes.

Although you can adapt some units such as the Craig 9106 Voice-Actuated Microphone for this use, other units are commercially available exclusively for use in connection with scanners. J.C. Labs (P.O. Box 183, Wales, Wisconsin 53183) manufactures what it calls "Action Monitor," and Capri Electronics (Route 1, Box 91-1J, Canon, GA 30520) sells a "Scan Record." If you don't want to miss any of the action, you might want to consider recording.

Mailbag

Wayne Drexler of St. Petersburg, Florida, writes to say he is hearing strange tones on the frequencies of 154.45625, 154.46375, 154.47125, and 154.47875 MHz. These frequencies are assigned to the business, local government, power, petroleum, forest products, special industrial and manufacturers radio services for remote control and telemetry operations. For instance, a water company may use the frequencies to remotely open up a gate to release water; an electric company can use the frequencies to remotely adjust the temperatures of hot-water heaters in customers' homes. The frequencies also might be used to relay information from a remote site by telemetry. There's a good chance you'll hear strange tones on these frequencies almost anywhere in the country. Similar activity might be heard on these frequencies as well:

173.20375	173.3125
173.210	173.3375
173.2375	173.3625
173.2625	173.390
173.2875	173.39625

SATELLITE VIEW

INSIDE THE WORLD OF TVRO EARTH STATIONS

BY MARK LONG, WA4LXC

Dish Antenna Geometry

Satellite earth station antennas must be manufactured to conform to a precise set of design parameters if maximum performance is to be achieved. Our task in this month's column is to acquaint the reader with the basics of antenna geometry, explaining the choices faced by design engineers and how their decisions affect the overall performance of their antennas.

Computing Antenna Gain

One of the most bandied about technical terms associated with satellite antennas is the gain of the dish. Generally speaking, the higher the gain the better the video quality coming out of your TV set. Gain is expressed in decibels dBi referenced to an isotropic reference antenna—an imaginary antenna conceived by engineers which would theoretically receive signal equally well from all directions at once. It has a gain of 0 dB. The gain figure for real-life antennas is determined by calculating how much more signal can be captured from the desired direction over that which could conceptually be achieved by the isotropic reference. The following formula will allow you to determine the gain for a given antenna size:

GAIN in dB = 10 log ($d^2 * f^2 * E$)

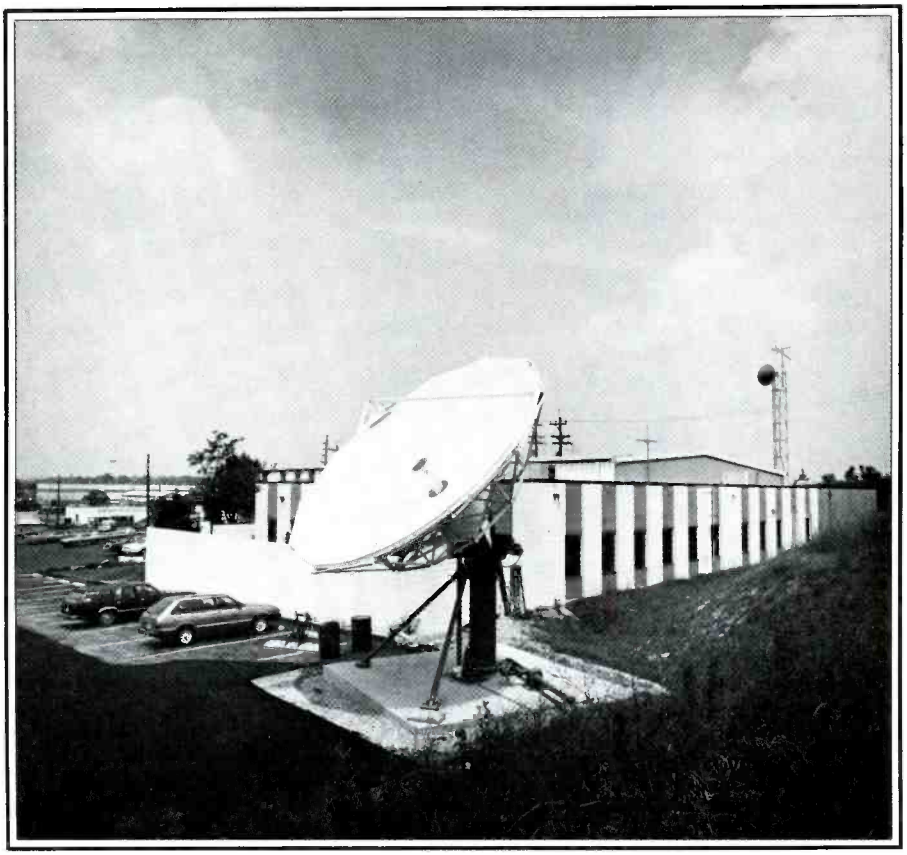
D is the diameter of the dish in meters (to convert feet to meters divide size in feet by 3.2808);

F is the operating frequency in GHz (between 3.7 and 4.2 GHz for C band satellite antennas);

E is the efficiency of the antenna as a %.

The chart in Figure 1 shows the range of variance that can be expected given differing values of antenna efficiency and operating frequencies.

From this chart we can see that both the frequency being received as well as the overall efficiency of the dish can have a significant effect on the gain of the antenna. Sometimes a manufacturer will state their antenna gain at the higher frequency level to make the antenna appear hotter than it actually is. A 55% efficiency is typically achieved by the prime focus type of antenna which places the feedhorn and LNA to the front and center of the dish. Some manufacturers can attain as high as a 65% efficiency for their antennas by combining super precise manufacturing techniques, which minimize the surface deviation from the true parabolic curvature of the original design, and a shallow parabolic design.



A 7 Meter antenna with Cassegrain feed. (Photo courtesy of Harris Communications)

Deep vs Shallow Dish Design

Depending on the parabolic curvature selected by the antenna designer, the depth of any dish can vary between extremely shallow to very deep. A shallow dish will have a very long focal distance, so the feedhorn and LNA will sit out quite a ways from the center of the antenna. The shallow dish design maximizes the potential gain of the antenna, since the feedhorn has an excellent view of the entire surface area from its lofty perch. Shallow dishes have the ability to receive more than one satellite at the same time. With the addition of a multi-feed and several LNA's, it is possible to simultaneously receive multiple satellites (see photo). Many cable TV operators are retrofitting their antennas so that they can simultane-

Dish Size vs Gain Chart

Size In Feet (Meters)	Gain At 55%		Gain At 65%	
	@3.7 GHz	@4.2 GHz	@3.7 GHz	@4.2 GHz
6 feet (1.8 meters)	34 dBi	35.1 dBi	34.7 dBi	35.8 dBi
7 feet (2.1 meters)	35.4 dBi	36.4 dBi	36.0 dBi	37.1 dBi
8 feet (2.4 meters)	36.5 dBi	37.6 dBi	37.2 dBi	38.3 dBi
9 feet (2.7 meters)	37.5 dBi	38.6 dBi	38.3 dBi	39.4 dBi
10 feet (3.0 meters)	38.4 dBi	39.5 dBi	39.2 dBi	40.3 dBi
11 feet (3.4 meters)	39.3 dBi	40.4 dBi	40.0 dBi	41.1 dBi
12 feet (3.7 meters)	40.0 dBi	41.1 dBi	40.8 dBi	41.9 dBi
13 feet (4.0 meters)	40.7 dBi	41.8 dBi	41.5 dBi	42.6 dBi
14 feet (4.3 meters)	41.3 dBi	42.4 dBi	42.1 dBi	43.2 dBi
15 feet (4.6 meters)	42.0 dBi	43.1 dBi	42.7 dBi	43.8 dBi
16 feet (4.9 meters)	42.5 dBi	43.6 dBi	43.3 dBi	44.4 dBi
20 feet (6.1 meters)	44.5 dBi	45.6 dBi	45.2 dBi	46.3 dBi

Figure 1

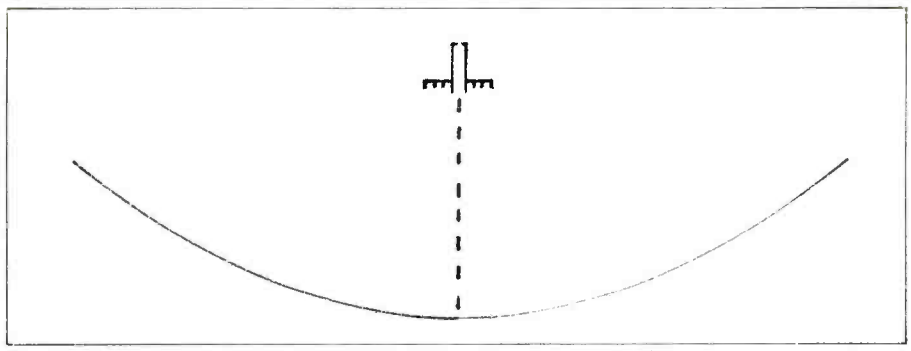


Figure 2: *Deep dish parabola with .3 F/D*

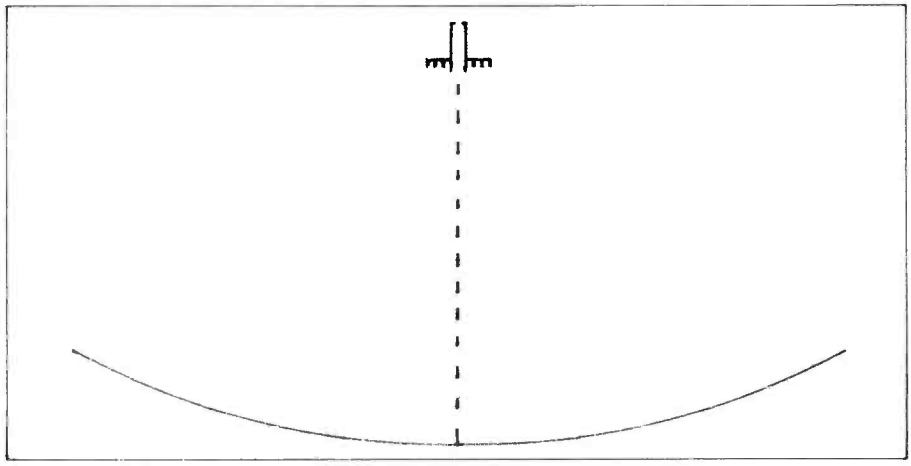
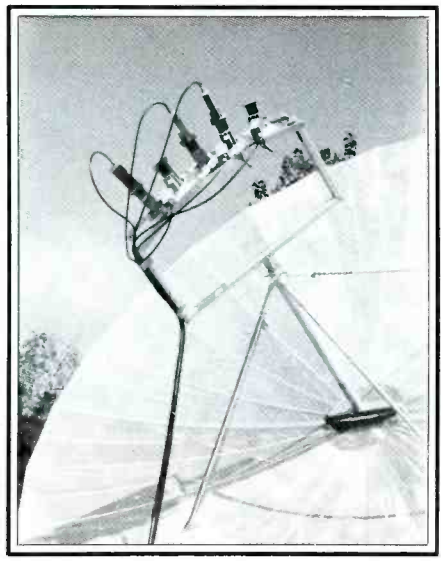


Figure 3: *Shallow dish parabola with .5 F/D*

ously pick up services from both Satcom IIIR and the new Galaxy I bird.

There are certain disadvantages to shallow dish design, however. Molecular motion within the earth itself generates a 4 GHz signal many times stronger than those produced by the satellites. At lower elevation angles, some of this earth noise is picked up at the feedhorn and mixes with the satellite signal, thereby degrading performance. However, the feedhorn selected for use with a shallow dish will have certain characteristics which will compensate somewhat for this inability to reject earth noise. We will examine how this is done in just a moment. Because of their broad view of the antenna surface, shallow dishes are also more susceptible to microwave interference as well as side lobe interference from adjacent satellites, a primary concern now that the FCC has made eventual 2 degree satellite spacing mandatory.

With a deep dish design, the LNA and feedhorn are positioned at a level almost parallel with the rim of the antenna. The deep dish offers additional shielding for the feed over that of a shallow dish, giving increased noise rejection at low elevation angles. But because of the feed's close proximity to the surface of the antenna, it does not view the total surface area of the reflector as well as the shallow dish design. This results in a slightly reduced gain figure for a given aperture. But in the overall tradeoff between gain vs. noise temperature, the deep dish design is not really inferior. The deep dish has the additional advantages of greater



Multiple satellite reception is possible with shallow dishes. (Photo by Jeffrey Keating)

shielding from microwave interference in crowded urban environments and a reduced susceptibility interference from adjacent satellite which may be brought about by reduced satellite spacing.

The F/D Ratio

Another term commonly encountered in antenna specifications listings is the focal length to diameter (F/D) ratio of the dish. The F/D ratio will give you an indication whether a given antenna is deep or shallow in design. Deep dishes have an F/D of be-

tween .25 and .35, while shallow dishes have an F/D of between .4 and .5. The F/D ratio of any antenna can be calculated from the following formula:

F/D = sqr. root of R/ 4 × d

where R = the radius of the antenna (or the diameter divided by 2)

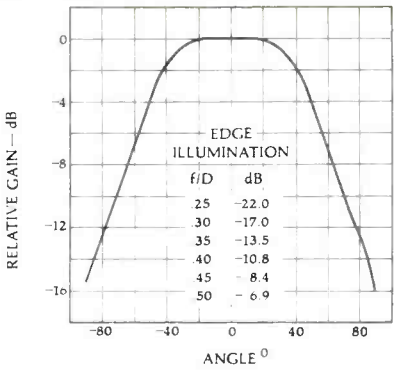
d = the depth of the dish from the center of the reflector to a point directly above center which is parallel to the rim of the dish.

The focal distance, which is the distance between the center of the surface of the reflector and the mouth of the feedhorn, can be found by multiplying the antenna diameter by the F/D. A 10 foot dish with an F/D of .4 would have a focal length of four feet or 48 inches.

Antenna Feed Designs

The dish itself is merely the reflector portion of the antenna. Once concentrated by the lens-like parabolic aperture, the incoming signal is reflected upwards to the focal point. At the focal point, a feedhorn intercepts the signal and funnels it into the LNA, the first stage of microwave electronics. The most common feed used today is the scalar feed, which consists of a 2½ inch wide open tube surrounded by a series of concentric rings.

Most of the signal picked up by the standard scalar feed is reflected by the inner 70% of the dish's surface. The scalar type of



TYPICAL SUPER FEED™ PATTERN (at 3.9 GHz)

Courtesy of Chaparral Communications.

feedhorn manufactured by Chaparral and others is designed to maximize this view of the reflector, while attenuating the signal contribution from the outer edges of the dish. As shown by the accompanying graph, the amount of attenuation provided by the Chaparral feed varies depending on the F/D ratio of the antenna. The peripheral vision of the feed is tapered in order to minimize the noise contribution from the earth which lies just beyond the rim of the antenna, an important addition for shallow dish designs. The standard Chaparral "Super Feed" is designed to give optimum performance on parabolic antennas with F/D ratios of .33 to .45.

Seavey Engineering manufactures a unique feedhorn which is specifically designed for use with deep dish antennas. The Seavey ESR-40X provides extra gain when used with deep reflectors having F/D's ranging from .25 to .35. Pattern tests using 3.7 to 5.0 meter reflectors have verified that this feed gain is attained by the use of a feed-probe which sits out in front of the corrugated surface of the feedhorn. This probe is a dipole antenna and it is covered by a plastic bubble to protect it from the weather. From its position in front of the feedhorn, the probe has a superior view of the outermost portion of the reflector, providing the extra smidge of gain. This dipole probe is excited by the satellite signal and directs it downward inside the feed and into the LNA.

The Cassegrain Feed

Some satellite antenna manufacturers can achieve even higher gain figures by the use of alternate feed techniques. The Harris Corporation produces their 3 meter "Delta Gain" antenna which incorporates the use of a subreflector at the focal point of the dish; this cassegrain subreflector directs the received signal down into the center of the dish where the feedhorn and LNA are mounted. In order to maximize the efficiency of the cassegrain feed, the curvature of the antenna surface is purposefully deviated from that of a pure parabola. The specifications for the Harris "Delta Gain" antenna state that an efficiency of 78% is reached with their dish with a gain of 41.0 dBi at a frequency of 4 GHz.

The Cassegrain feed can offer a slight gain (.5 to 1 dB) in overall efficiency when compared to conventional prime focus feed techniques. This should not be confused with the small subreflectors or splashplates used in the home TVRO marketplace, however. These subreflectors are too small and too flat to produce any greater efficiency over prime focus methods. The use of a splashplate is merely a different way to feed the LNA, but without any advantage in antenna gain.

The Cassegrain type of feed system allows equal reception of incoming signal off of the reflector right on out to the edge of the dish. Unlike conventional prime focus feeds which must taper their "view" to attenuate earth noise beyond the rim, the cassegrain feed can be designed to cut off reception at the rim of the antenna. The Cassegrain feed is most effective when used on larger aperture antennas and is commonly employed on commercial cable TV installations. Because of its more complicated geometry, the cassegrain antenna is more difficult to manufacture and install, which raises the overall cost of the system.

If you would like to learn more about satellite communications, *The World of Satellite Television* by Mark Long and Jeffrey Keating is available from: Solar Electronics International, 156 Drakes Lane, Summertown, Tennessee 38483. Price is $10.00 plus $1.00 shipping and handling. Also available: International Satellite Coordinates Computer Printout: (please supply site latitude and longitude). Price is $6.00.

ON THE LINE

BY GORDON WEST, WB6NOA

NEW AND EXCITING TELEPHONE TECHNOLOGY

Cordless Capers

As predicted, cordless telephone prices are still dropping, and there are many sets available for under $100 that are fantastic bargains. This month let's take a look at the popular cordless telephone, explore what it takes to choose the right one for holiday gift-giving, and take a peek as to what will be happening to cordless telephones in the future.

FCC Is Mum

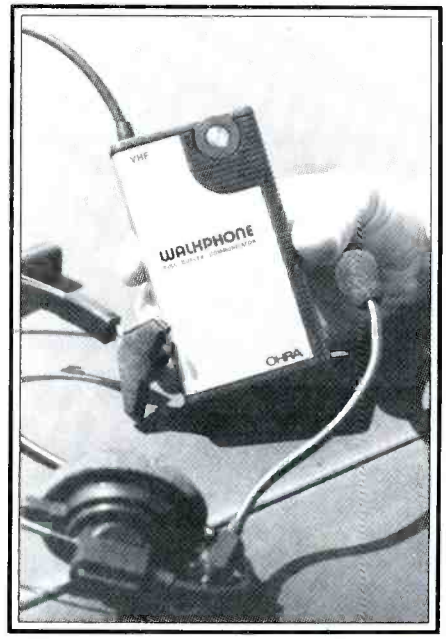
The present five cordless telephone channels are bulging at the seams with cordless telephone users. Last year, two million cordless phones were sold on these five channels. By the end of this year, it is estimated that over four million more units will be on the air and squeezed into the same five channels. This means that there are over five million users of cordless telephones in the United States, with everyone sharing the five channels as best they can.

What are some of the problems with overcrowded cordless channels? How about a phone that rings in the middle of the night, and it's not for you—but rather for your neighbor who's on the same frequency.

Channel congestion is also a problem when you bring home your new phone, only to find out that it's on the same frequency as the fellow across the street; and when he receives a call, you receive a call. When he dials out, your set squeaks and squawks. When you turn your set on to make a call, you can hear his conversation loud and clear.

The Federal Communications Commission has received numerous applications and petitions from manufacturers requesting additional frequencies at 46 MHz and 49 MHz. Although ten additional channels won't completely solve all of the problems of channel congestion, it will definitely help. Those new channels at 46 MHz and 49 MHz (full duplex) might also eliminate some of the noise found on using full duplex sets at 1.7 MHz and 49 MHz. There is still no word when the FCC may announce the availability of these new channels to manufacturers.

Pending that announcement, cordless telephones on the present five channels are still going like hotcakes, and users are learning to live with co-channel interference. If they buy a set on their neighbor's frequency, it's usually a simple matter of taking the set back and having it exchanged for a new channel. That's a good point. If you're planning on buying cordless telephones as a gift this holiday season, make sure that the dealer will exchange a unit to another channel if the recipient of the gift encounters co-channel interference.



Communicators can hear cordless calls.

Some dealers may send the set in for modification—a lengthy proposition, and sometimes expensive. The better cordless telephone dealers will simply exchange the unit for another one on a different frequency. Just like the original unit you returned, the replacement unit may also be out of the box because it was tried by someone else on a different frequency. Just be sure and set up an agreement with the dealer prior to plunking down the dollars in case of interference.

The present channels are at 1.7 MHz for the base unit, and 49 MHz for the handset. Your handset listens on 1.7 MHz, and talks back at 49 MHz. The 1.7 MHz link always seems to be the weak one when it comes to maximum range. The transponder normally dumps the signal into the AC power line, and it's off of these power lines that you do the receiving on your handset. If you get too far away from the power lines, reception gets noisy.

Several cordless telephone manufacturers have petitioned the Federal Communications Commission to allow higher power levels from the base transponder into the AC power line on frequencies between 1.625 MHz and 1.8 MHz. The Commission found that cordless phones on the market right now actually exceeded the established field strength limit, but that there were no reported instances of interference from units operating below 1.8 MHz. The FCC indicated it would take no further action in changing power levels.

One reason for their decision was the fact that today's cordless telephone may not really be expected to last beyond 1988. Beginning 1988, frequencies between 1605 kHz to 1705 kHz may contain AM broadcasting stations if or when the FCC expands the present AM broadcast radio band. Won't that be exciting—turn on your cordless telephone and hear music stations on it by 1988. That doesn't bother me—chances are they'll have cordless telephones the size of a wristwatch by then.

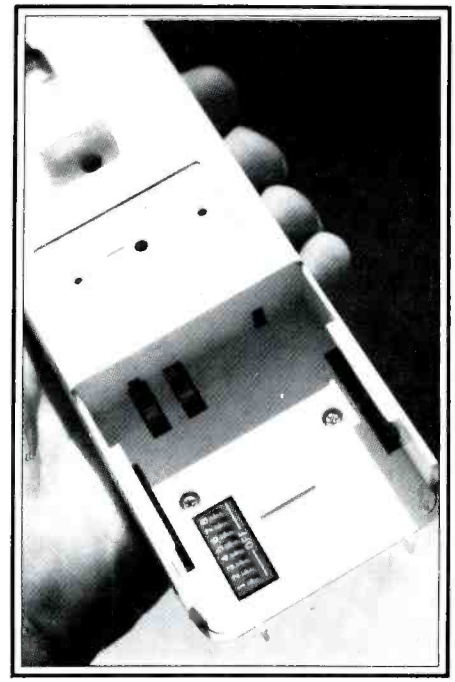
The FCC's next move is for more channels for cordless telephone systems. This will probably be announced shortly.

Security In Numbers

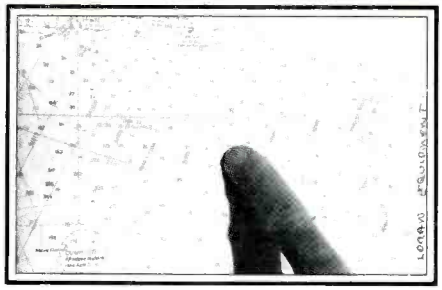
Most manufacturers have developed ingenious ways to keep your neighbor from making long distance calls (or any calls) from your cordless telephone system. Some systems are simple for those sets under $100, and some systems are more elaborate.

About six months ago I rode my bicycle around my neighborhood and found that I could bring up a dial tone on three different cordless systems within a 10-block area! The chances of that occurring now, with the latest in technology, is remote.

Cordless telephones that sell for under $100 have a very simple system to keep unauthorized users from making calls over your cordless setup; when your cordless telephone handset is on the hook and charg-



Here is a digital security phone system.



Loran positions within 50 feet from sophisticated Loran equipment.

ing, it automatically disables your transponder signal to send out or receive signals. Just as long as you have your set in the cradle, no one with a similar piece of equipment can make a phone call.

The inexpensive cordless phones also have single tones that must correspond with the handset before the dial tone is brought up and put on the air. Even if someone were on the same frequency as your set, if their signal tone did not match the signal tone in your transponder, no phone call. The chances of someone having the same channel *and* the same tone as your set to make an unauthorized call might be one out of fifty.

The more elaborate cordless telephones use digital tones between the handset and base to tell each other that they're part of the same family to make a phone call. The digital tones have several different frequencies, and the tone duration in milliseconds allows for an intricate number of variables to be used as a lock-out to other phone sets. The chances of someone else being able to make a phone call on the more sophisticated cordless telephone systems might be one out of five thousand.

The $200 and up cordless telephones have several different security systems that will lock out unauthorized users. The chances of cracking this code might be as little as one out of one hundred thousand! Dip switches in both the base as well as the cordless handset can be changed at random by the user to insure that no one on the same frequency can ever come up and make outgoing phone calls or receive your calls.

Easy Eavesdropping

Although these new digital lock-outs will keep others from making and receiving phone calls on your system, they in no way will camouflage your signal from being eavesdropped by a scanner listener or someone with a shortwave set. Your signal will still be there, loud and clear, up to a block away. Even though the brochure talks about the security in your new cordless phone system, this security blanket only applies to unauthorized people making phone calls over your set, and in no way guarantees any privacy. Any shortwave receiver can easily tune in both sides of the phone conversation near 1700 kHz using AM slope detection. Most scanners will go as low as 49 MHz, and it's simply a case of searching frequencies at 49 MHz for crystal clear cordless telephone calls.

Bizarre Reception

Those little hip-pocket communicators also share cordless phone frequencies. It's quite possible, on your communicator, to eavesdrop on cordless telephone conversations. If you have one of these little sets, take a walk around the block and you'll probably tune into some juicy conversations.

It's also possible for the base unit of cordless telephone setups to hear the communicators. Sometimes cordless phone calls are interrupted by kids talking back and forth on their VOX communicators. I have one confirmed report of a local cordless telephone user being able to hear the stage crew talking on their communicators at a local ampitheater one block away. Although the communicators are extremely low-powered transceivers, they can give you up to one-quarter mile range under the right conditions over a cordless telephone setup.

Adding Amplifiers

Every week I receive letters from readers wanting to know what kind of a linear amplifier can strengthen and lengthen the distance between a cordless phone and the base transponder. Technically, it's just not going to happen. First of all, it's illegal. Second, you would need to build actually two amplifiers—one to amplify signals down near 1.7 MHz and then a special buffer section to put the amplified signal into the AC power line. Chances are you would short out the whole works and ruin everything.

Then you would need an amplifier for the actual cordless handset. You would need to amplify the 49 MHz signal back to the base transponder antenna. This would require a larger battery pack and a little shoe box to stick the amplifier in. I suppose you could wear the whole thing on your belt, but it would look highly ridiculous. Also, you would probably desensitize the receiver at 1.7 MHz, and that won't work.

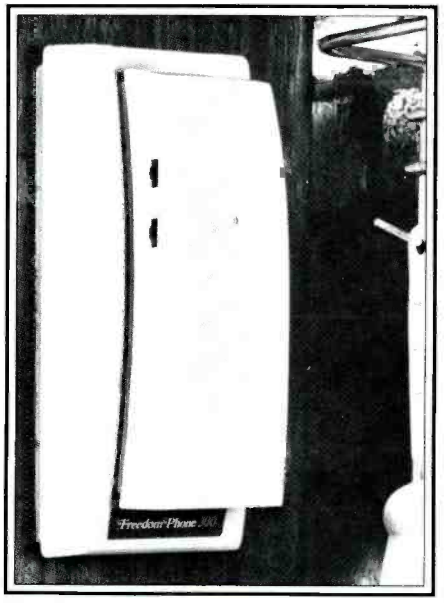
The best bet for longer range is to try a new position for your base transponder unit. Add a long, stretched-out extension cord for some possible range increase. It's usually the transponder output range that needs the boost, and this sometimes will help.

Extension antennas for the telescopic antenna on the base transponder will certainly increase the reception capability from the handset to the base unit. Unfortunately, this is not where range suffers; normally, it's the other way around, and that's why the extension cord and better placement of the transponder is always the best bet.

Finally, we may have some new records as to whose cordless telephone transmits the furthest using legal amounts of power. A scanner listener recently wrote in the following letter:

"I use a JIL scanner with an outside ground plane antenna. I like to scan the cordless channels for local conversations. Last summer, on June 27, I picked up some exciting telephone calls you won't believe.

"Several times I could hear people on cordless telephones saying the name of Miami, Dade County, Florida, Disney World,



The Freedome Phone 300 cordless extension telephone. No calls may be made when this unit is in the charger.

and places like that. I noticed on my television that two distant Florida stations were coming in, loud and clear, on Channels 3 and 6. All of the stations I was listening to were not local because they would fade in and out. I know for a fact I was listening in to cordless telephone calls from Florida."

The letter was signed Tim Barrett, a scanner listener from El Paso, Texas!

Sound impossible? Not really. Summer month sporadic E skip (Es) is very common. It doesn't take much of a signal to bounce off of the E layer, up to 1000 miles away. Short skip signals from low-power transmitters are quite common on ham frequencies at 50 MHz. Signals of 100 mW from cordless telephones propagate nicely off of the E layer for some exciting listening.

If you're giving a cordless gift this Christmas, choose it carefully. Make sure the dealer will exchange it for a new channel. Have a good Holiday Season to one and everyone!

PRODUCTS

REVIEW OF NEW AND INTERESTING PRODUCTS

Action Monitor

J.C. Labs introduces the "Action Monitor"—an adapter that connects any cassette recording device to a communication system, such as: scanner radio units, monitors, CB radios, handi-talkies, mobile radios, repeaters, ham radios, aircraft radios, remotes, dispatch centers, and more. The Action Monitor has been tested by a variety of communication system users with some exciting results. The Action Monitor is ideal for recording transmissions for later reference. It universally connects to any communication system or monitoring device and a cassette recording device.

An on/off switch controls the selected use of the monitor. Three feet of connecting cord and two universal plugs make it easy to adapt to any cassette recording device. Detailed, easy-to-read instructions are included with each unit. While a 9-volt battery is standard, an optional AC adapter is available to frequent users.

The Action Monitor can be used anywhere communication systems are located. The sturdy black case with attractive white letters is compact ($2\frac{3}{4}$" × 4" × $1\frac{1}{2}$") enough to meet the smallest space demands. Being adaptable to standard cassette tape recorders, it eliminates the need for special tape recorders and standardizes the use of tapes. The Action Monitor is voice-activated, permitting you to condense long tape recordings into short cassette tapes.

The price of the Action Monitor is $39.95 plus $2.00 or shipping and handling in the United States and $3.00 in Canada. Some other features of the Action Monitor are:

- Automatic starting and stopping of your tape recorder
- Quick start-up of the recorder at normal volume level
- Equally spaced messages
- Has a built-in four to six second delay—to listen for the answer
- Fully electronic with integrated circuits; no relays or microphones used
- A 30-day money back guarantee
- J.C. Labs accepts MasterCard and Visa credit cards for all orders
- J.C. Labs entertains dealer inquiries

Police and Fire departments, rescue services, hospitals, ambulance services, paramedics, aviation services, construction companies, shipping departments maritime operators, utility companies, newsrooms of radio and T.V. and newspapers, Government offices, public works departments, and transportation facilities are only a few industries which are potential users for the Action Monitor. Great for radio hobbyists, too!

The need to retain information varies with the user. In some areas, it can free valuable personnel to perform more important tasks. Monitoring of the radio traffic can be made at a more convenient time. For others, it assures that valuable transmissions are not missed or misunderstood. Also, the Action Monitor has recorded actual transmissions to be used when the actual transmission is necessary to ascertain what actually was said and when it was said, especially in emergency situations. If there is any question or need to retain transmitted messages for future use, the Action Monitor performs a valuable service.

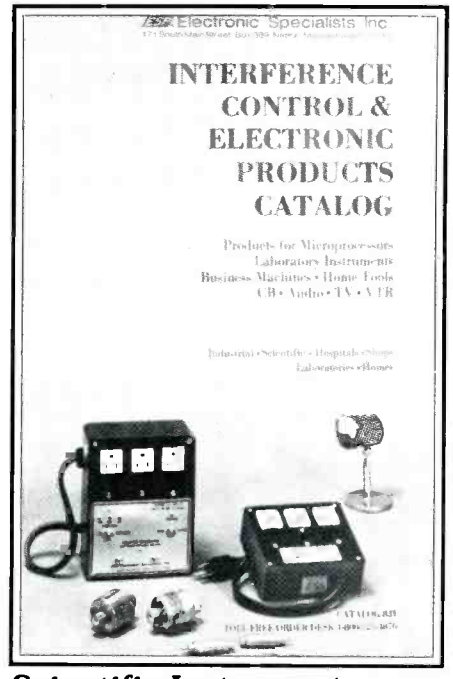
Additional information may be received by contacting James Casamassa, J.C. Labs, P.O. Box 183, Wales, Wisconsin 53183; or call 414-547-7987.

Window ID Cards

One of these cards is 4 by 5 inches in size, printed on cherry-red card stock. It specifies "EMERGENCY RADIO UNIT," and is designed closely along the lines of similar vehicle sun-visor official-ID cards issued by many municipal, county, and state agencies. The card contains spaces for vehicle and operator data, and is suitable for plastic laminating after the data has been entered.

The other vehicle sun-visor card is 3 by 5 inches in size with stark white stencil-style lettering on a bold, solid black background. This specifies "U.S. GOVERNMENT OFFICIALLY LICENSED RADIO COMMUNICATIONS UNIT." This card is also made up on card stock.

These cards are available, in a limited quantity, as a 2-card set for $5, postpaid. They are available from CRB Research, P.O. Box 56, Commack, NY 11725. While supplies last, they will be included (upon request at time of ordering) at no additional cost on all orders totaling $20 or more. A complete CRB catalog is available upon request by writing directly to that company or by circling number 102 on the reader service card in this issue. CRB offers a wide selection of interesting and unusual publications relating to scanners, shortwave radio, espionage, cryptology, electronics surveillance, and other topics. They recently added more than 40 exciting new titles to their catalog.



Scientific Instrument Interference Control

A new 40 page catalog from Electronic Specialists presents their line of instrument and computer interference control products. Protective devices for smooth instrumentation operation include Equipment Isolators, AC power line filter/Suppressors, Line Voltage Regulators, and AC Power Interrupters.

Descriptive sections are included, outlining particular scientific and computer problems, together with suggested solutions. Typical applications and uses are highlighted. Request catalog 831.

For more information, contact Electronic Specialists, Inc., 171 South Main Street Natick, MA 01760, or circle number 109 on the reader's service card.

RTTY

THE EXCITING WORLD OF RADIOTELETYPE MONITORING

BY JOSEPH JESSON

Last month, we described a low cost way of building a starter RTTY demodulator. A demodulator simply converts the two audio tones into binary ones zeros. The proper string of binary ones and zeros will represent Baudot or some agreed-on code. Of course, now we have to make sense of the output logic levels (represented by 0 to 5 V assuming you selected 5 V as V +) and display the intended characters.

By the way, for those of you who are not interested in building your own RTTY demodulator, there is a recent addition to the MFJ line (MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762) which includes a very low cost demodulator using the Exar phase locked loop.

While the MFJ-1225 uses the phase locked loop as the heart of the unit, there are many useful additions—such as a sharp 8 pole active filter, push button selectable shifts, and a two LED positive tuning indicator system—all for a price of $69.95 for a receive only unit and $99.95 for a transmit/receive RTTY interface.

When a shift of 850 Hz or 425 Hz is selected, the 8 pole active filter is bypassed and the receiver's audio output is directly coupled into the phase locked loop (pin number 2 on the XR2211 PPL) after being attenuated by 10K potentiometer. The audio input level should be adjusted to the point where the phase lock LED stops flickering when no RTTY signal is present. See Figure 1 for the addition of a phase lock LED and input level control potentiometer to the home-brew demodulator design shown last month in Figure 2.

The MFJ-1225 provides various input and output jacks to allow interfacing to nearly any possible combination of computer and receiver. As in the home-brew design, the demodulator output provides a TTL level signal which corresponds to the income RTTY signal. This output is high on RTTY mark and low on RTTY space.

Each design will allow a certain amount of receiver drift without problems, while an RTTY demodulator with sharp filters will not copy RTTY reliably when used with a receiver with drift. The liability, however, is that a strong adjacent signal will cause the low cost PLL demodulator to "pull" the voltage controlled oscillator toward the adjacent RTTY carrier.

This problem is only noted on very crowded ham frequencies and can be readily cured by adding an external audio filter (built in on the MFJ demodulator). Now back to our need to do something useful with our binary TTL demodulator output. As we mentioned earlier, these binary signals have to be reconstructed into the correct alphanumeric characters to be displayed. This is where a personal computer will be required to translate and then display the demodulator's output.

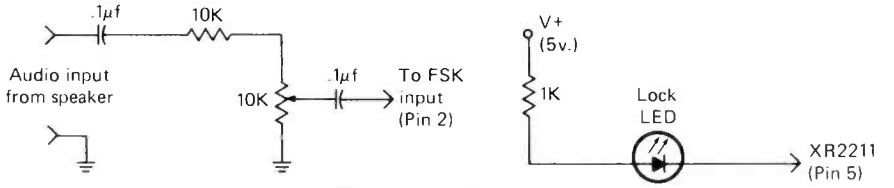


Figure 1: *Additions*

Deciding which computer to use depends on many factors—cost, flexibility, character density, and available software. The Apple is certainly not the lowest in cost, however it has the most RTTY software (last count listed five).

RTTY software is available for the VC-20, TRS 80C, Atari, TI-99, Commodore 64, and the more expensive CPM systems with the valuable built-in disk drives. Kantronics software is available for many of the above machines and it incorporates RTTY send/receive at 60, 67, 75, and 100 WPM, ASCII send/receive 110,300 band and CW at 5-99 WPM. RAK software is quite popular for the low cost VIC-20 computer. Let's look at what is necessary to write your own RTTY program in order to use the low cost demodulator.

Personal computers first should be divided into two areas with a built in Universal Asynchronous Receiver Transmitter (UART) which is usually the case if a "serial port" is included or without any serial I/O.

In the first case, the UART is a full duplex receiver/transmitter which accepts asynchronous serial binary characters and converts them to a parallel format. All characters contain a start bit; 5, 6, 7, or 8 data bits; one, one and a half, or two stop bits; and either odd or even parity or no parity.

Don't panic after looking at all these variations since most RTTY is simply one start bit, five data bits, and stop bits. In fact, if more than one stop bits are sent, the UART will interpret additional stop bits as basic idle time. The UART functions can be programmed by the computer and the baud rate, bits per character, parity mode, odd or even parity, and the number of stop bits can all be programmed. The UART will internally synchronize the start bit with the clock input to assure a full 16 element (clock periods) start bit. What this means is that once the start bit is detected, each data bit and stop bit will be sampled in the exact center of the bit element.

Usually, the UART will strobe the input bit within +8% of the theoretical center of the bit. The UART receiver will also reject start bits that are not in the spacing mode at the half bit sample time (error condition). After the first mark to space transition on the serial input line, the receiver samples the serial input line at the 8 + 16n clock edges. If the first sample is a mark (high condition), the receiver returns to the idle state ready to detect another mark to space transition.

If the first sample is a space (low condition), the receiver enters the data entry state and stores the state (either high or low—binary 1 or 0) of the serial line internally until each of the five data bits are reconstructed. After each data bit is latched (saved) and shifted internally, the five bit Baudot character is then presented in parallel (all five at once) to the internal microcomputer. Now, the software "looks up" or converts Baudot to ASCII for display purposes since most microcomputers use the ASCII code for display purposes.

If a UART is not available on the microcomputer, software has to be provided or written to perform the above UART functions. Specifically, the precise steps in displaying serial data from the simple demodulator are as follows:

1). Set up a timed sample rate as a function of baud rate—usually 16 × band rate.

2). Watch for input transition from mark to space using an available input port line.

3). Wait eight time samples and verify that this is indeed a start bit (low).

4). If a high was detected, this means that only noise had been detected, and then one should ignore noise and start over.

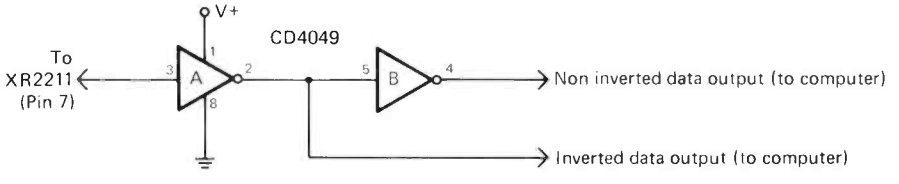


Figure 2: *Addition of inverted/noninverted data*

```
QRA DE 3DZ5/19325  KHZ  RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG BACK 134567390
QRA DE 3DZ5/19325 HKHZ  RYRYRYRYRYRYRYRYRYRYRYRYRZRYRYRY
THE QUICK BROWN FOX JUMPS OVR THE LAZY DOG BACK 1234567390
QRA DE 3DZ5/19325  KHZ  RYRYRYRYRYRYRYRYRYRYRYRYRYRYRZRY
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG BACK 1234567390
QRA DE 3DZ5/19325  KHZ  RYRYRYRYRYRYRYRYRYRYRY
KANWIL

X''''''''''''''''''

ATTENTION TO ALL POINTS ''''''''

NOTICE TO ALL RECEIVERS OF ANTARA NEWS CAST THROUGH HF
RADIO TRANSMITTER.
------------------

TO ALL RECEIVERS OF ANTARAS DAILY NEWS CAST THROUGH
 ITS HF
TRANSMITTER 3DZ5 OPERATING ON 19325 KHZ.
ANTARAMANAGEMENT VERY MUCH REGRETS TO ANOUNCE THAT AS FROM
AUGUST 1, 1983, ANTARA WILL CEASE ITS NEWS CAST IN ENGLISH
BY MEANS OF HF RADIO TRANSMITTER.

ANTARA WOULD VERY MUCH APPRECIATE YOUR KIND UNDERSTANDING AS
TO THE NECESSITY OF THIS STEP
TAKEN BY THE MANAGEMENT TO
ADAPT ITS COMMUNICATIONS SYSTEM TO SATELLITE COMMUNICATIONS.

ANTARA 07280350/T-1
NNNNN
```

7-27-83

```
QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10950 KHE
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY

QRA DE 3MA22/26/35/23 13563/7695/16224/10960 KHZ
CNA CEP TAIPEI R.O.C. RYRYRYRYRYRYRYRYRYRYRYRYRY
```

5). Assuming a start bit was verified, wait 16 samples.
6). Read status of input line (from demodulator) and save status.
7). Do the above five times and reconstruct Baudot data by shifting each of the saved status to concantinate a complete Baudot character.
8). A final "frame" will verify that a mark condition exists and this represents a stop bit.

Again, noise of a "hit" would prevent a valid stop bit to be detected and the entire five bit character should be thrown out and the entire sequence should be done again.

This should give an idea for the internal operation of a display for received RTTY data. Available software basically does this sequence each and every time the demodulator sends it a Baudot serial character.

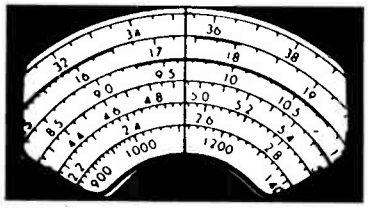
Next month, we will implement actual assembly language routine to accomplish these convert and display tasks. This month we have enclosed a test slip (RY) from China News Agency or CNA logged recently on 10960.0 kHz. Thanks to Erich Kern who enclosed an important RTTY bulletin from ANTARA, the Indonesian News Agency. This catch indicates ANTARA will be switching its English newscast from a 19825.0 kHz HF transmission to satellite. This only means that the ideal RTTY DX setup will include both a satellite dish/receiver and HF equipment.

See you next month.

RTTY Software:
Kantronics
1202 E. 23rd Street
Lawrence, KA 66044
(913) 842-7745

W.H. Nail Company
275 Lodgeview Drive
Oroville, CA 95965
(916) 589-2043

Universal Software Systems Inc.
9 Shields Lane
Ridgefield, CT 06877
(203) 438-3117



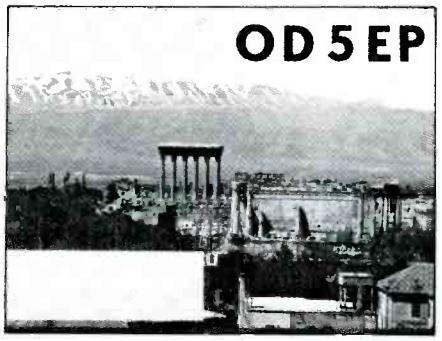
COMMUNICATIONS CONFIDENTIAL

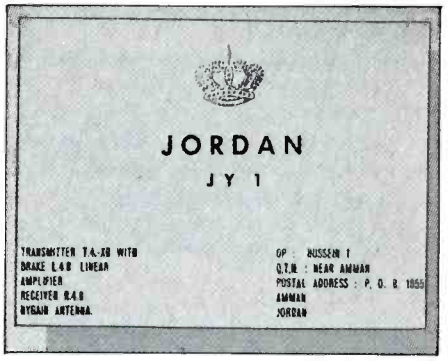
BY HARRY HELMS, KR2H

YOUR GUIDE TO SHORTWAVE "UTILITY" STATIONS

It seems that QSLing time signal stations has become very popular with several of you! This month, two readers have shared their prized verifications with us. Robert Homuth of Arizona sends along a copy of the letter he received from ZUO, Olifantsfontein, South Africa, which operates continuously on 5000 kHz. Readers along the East Coast should try for this station around local sunset; listeners further west should try during periods of disturbed reception conditions when WWV/WWVH are weakened.

George Osier of New York sends along a copy of the card he received from YVTO, Venezuela, on 6100 kHz. This station also operates continuously and is best heard after 0500 GMT when the interference from international broadcasters lessens. Our thanks to both Robert and George!





These three QSLs from the troubled Middle East are courtesy of Tom Kneitel. The card from station JY1 is the one sent out by King Hussein of Jordan.

More On The Numbers Stations Mystery

As this column is being written, we are coming off a period of very heavy numbers stations activity. On a personal level, your editor (an SWL since 1963) cannot recall any period where so many numbers stations have been active on so many different frequencies and at so many different periods. One of the readers of this column, Kim Clark of Massachusetts, writes that he is studying for his Novice ham radio license and has had difficulty in finding a station sending code at eight words per minute. He has, however, had no trouble running across several numbers stations while trying to find a station sending code at the desired speed!

A recent issue of *The Ace* (published by the Association of Clandestine Enthusiasts) contained an interesting article by Lani Pettit summarizing much of what is known about the numbers stations. For example, the FCC has in the past stated that the numbers stations on 3060 and 3090 kHz were transmitting from Cuba. In 1978, your editor tried to verify that with the FCC. The FCC response appeared in my book, *How to Tune the Secret Shortwave Spectrum*. I specifically mentioned the earlier FCC claim that 3060 and 3090 kHz transmitted from Cuba; the FCC ignored this and blandly stated that the frequencies were allocated to the aeronautical mobile service and that they could be coming from any Latin American country!

While Cuba has been the "culprit" in most theories of where the numbers stations transmit from, there is ample evidence that at least some of the stations transmit from the United States and its territories. In 1978, your editor wrote a monthly feature on SWLing/DXing for a now-defunct electronics magazine. In August, 1978, your editor did a feature article dealing with numbers stations. A couple of weeks after the issue hit the newsstands, your editor received a letter from a listener in southern Florida claiming that he had positive evidence that various numbers stations transmitted from sites in southern Florida. He would drive around with a portable shortwave receiver tuned to numbers stations and found several areas where his receiver would "overload"—which meant that the transmitter was likely only a few hundred yards away from him. Not coincidentally, each location where overloading happened was adjacent to either a military base or government property!

Your editor wrote this reader back but received no answer, nor has your editor heard from him since. But anyone who has listened to numbers stations from southern Florida can readily testify that several are of enormous strength. However, numbers stations can be heard at powerful levels elsewhere in the United States. Some of the most powerful signals have been reported by listeners in Ohio (site of Voice of America facilities and other government transmitting stations). Certain numbers stations are very loud in New York, as your editor has discovered to his surprise.

Listeners who have conducted rough direction-finding measurements of various numbers stations have told your author in confidence that they feel the evidence points to transmitter sites on the Florida Gulf coast, in Puerto Rico, near Guatanamo Naval Base in Cuba, and near Portland, OR/Vancouver, WA.

Direction-finding should be a relatively simple task these days. In the pages of *POP'COMM*, you can find advertisers offering directional loop antennas manufactured by such firms as McKay-Dymek and Palomar Engineers. These loops have a figure-8 receiving pattern which allow you to establish whether or not a station is located at a right angle to you. To get a fairly accurate indication of where a station is located, two listeners equipped with directional loop antennas, located in different parts of the country, both listen simultaneously to the same station and take direction bearings with the aid of a compass. The direction bearings are extended until they intersect. The intersection will be location of the transmitting station.

We'll be discussing direction finding techniques at length in a future column. For now, your editor would like to hear from any listeners equipped with directional loop antennas who would be willing to participate in a coordinated effort to track the locations of some of these numbers stations.

Keeping In Touch

It's essential that anyone seriously interested in the activity covered in this column join a club. Two clubs your editor can heartily endorse are The American Shortwave Listeners Club (ASWLC) and the Association of Clandestine radio Enthusiasts (ACE). ASWLC will be familiar to regular readers of this column; their monthly bulletin *SWL* covers the topics we do in this column along with shortwave broadcast DX. For a sample bulletin and ASWLC member-

ship details, send $1.00 to ASWLC, 16182 Ballad Lane, Huntington Beach, CA 92649.

ACE restricts its coverage to pirate radio and numbers stations. Their monthly bulletin, *The ACE*, is one of the most fascinating your editor has ever read. For a sample bulletin and membership information, send $1.00 to ACE, P.O. Box 452, Moorhead, MN 56560. Be sure to tell both ASWLC and ACE that *POP'COMM* and Communications Confidential sent you!

Featured Frequencies

The 1600-1800 kHz range is loaded with fascinating listening, and the current cold winter nights are the best time of year to explore it! You can hear navigation beacons, cordless phones, news remotes, and numerous pirate broadcasters. Give this a tune, and report what you hear! (However, send any pirate loggings to The Pirates Den, not Communications Confidential please.)

The winter is also the best time to tune the longwave frequencies below 540 kHz. Many of you have receivers capable of tuning that low in frequency, so why not drop "down that way" and see what you can hear? And reshare the results of your tuning with fellow *POP'COMM* readers!

Listening Reports

Here are this month's listening reports. We'd like to see your reports here too. Submit them in the form you see used in this column; be sure to include enough information to make your reports useful to others. For example, if you hear a numbers station, tell us whether the announcer was male or female, the language used, and whether the digits were in four or five digit groups, etc. Also include callsigns and locations for the stations you hear.

Remember to submit your reports to the proper column. Reports on RTTY, pirate radio, or shortwave broadcast reception should be sent to the appropriate column editor. Send your reports for this column to: Harry Helms, P.O. Box 157, Rockefeller Center Station, New York, NY 10185.

And now to this month's receptions . . .

530: NB, North Bay, ON, CW beacon 0700. (Jerry Rappel, IA)

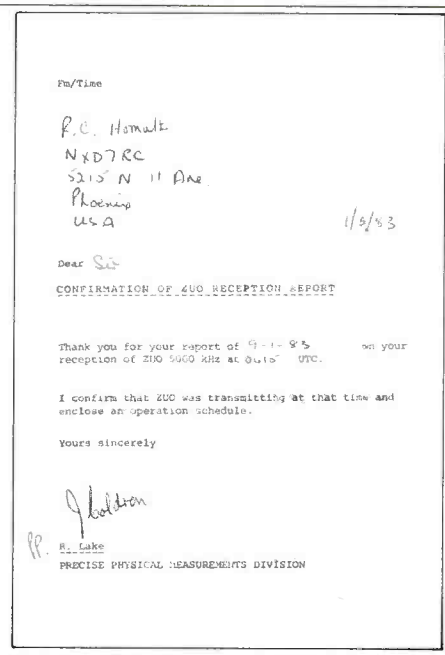
1610: WXK790, Phoenix Sky Harbor Airport, Phoenix, AZ, parking information repeated continuously 2330. (Robert Homuth, AZ)

4311: "UMA7 UMA7 UMA7 DE AME3 AME3 AME3 13 RG 13 RG 13 RG" repeated in CW 0015. (Don Schimmel, VA) UMA7 is a call from those assigned to the Soviet Union while AME3 would be Spain; however, it is likely that they are located somewhere else. (Editor)

4430: NMN, U.S. Coast Guard, Portsmouth, VA, transmitting a marine weather forecast in SSB 0408. (George Osier, NY)

4500: VNG, Lyndhurst, Australia, 1214 with male announcer followed by more time signals. (Robert Homuth, AZ)

4640: Spanish-speaking male announcer slowly reading numbers for 20 seconds, then 20 seconds of RTTY, followed by numbers for 30 seconds, and then 10 seconds of RTTY. This was followed by numbers for 50 seconds, then two seconds of RTTY, etc. This pattern was first observed at 0058. At 0106 there was a long period of RTTY, then more numbers beginning with "atencion," followed by more RTTY, etc. (Thad Adamaszek, OH) An extraordinary logging, Thad! The first one I've ever seen of this type. Readers, have any of you found similar activity? (Editor)



Fm/Time

R.C. Homuth
NXD7RC
5215 N 11 Ave
Phoenix
USA

11/5/83

Dear Sir

CONFIRMATION OF ZUO RECEPTION REPORT

Thank you for your report of 9-15-83 on your reception of ZUO 5000 kHz at 0415 UTC.

I confirm that ZUO was transmitting at that time and enclose an operation schedule.

Yours sincerely

pp. R. Lake
PRECISE PHYSICAL MEASUREMENTS DIVISION

Here's a QSL letter from ZUO, a standard frequency station on 5.000 MHz.

Man in Spanish reading groups of numbers, pausing to catch breath between groups, off at 0300. (Thad Adamaszek, OH) OK, gang, something very interesting is obviously going on here so keep an ear on the frequency! (Editor)

4670: Four-digit Spanish numbers station with female announcer 0200; was parallel to 5810 kHz. The message opened with hum on carrier, ten beeps, then "Grupo 198" repeated twice; message ended with pulse. (Thad Adamaszek, OH)

4684: Unidentified CW station transmitting five-figure groups. Station sends message, pause of 40 seconds, and then message was repeated. A second message followed and was repeated in same manner. Noted from 0240-0245. (Don Schimmel, VA)

4723: MVU, Royal Air Force, West Drayton, England, aviation weather for British Isles followed by identification and off air at 0248; was in SSB. (George Osier, NY)

4996: RWN, Moscow, USSR, female announcer in Russian, CW identification 1219, followed by time signals. (Robert Homuth, AZ)

5115: Five-digit Spanish numbers station with female announcer 0109. (Thad Adamaszek, OH)

5812: Four-digit Spanish numbers station with female announcer 0225. (Tom Lewandowski, NY) This is the most commonly used channel for four-digit Spanish numbers stations; your editor has never failed to hear one on this channel in the evening hours within a half-hour of tuning in! (Editor)

6220-6225: This is a very active frequency for barge traffic on midwestern rivers such as the Missouri, Ohio, and Mississippi; all traffic is in SSB. (Dan Nicholson, MO)

6697: Skyking broadcast in SSB 0715; this is a new frequency. (Dennis Eckert, WA)

6714: Both Air Force One and Air Force Two have been heard on this channel in SSB working Andrews AFB. (Tom Lewandowski, NY)

6993: CKN, Canadian Military, Vancouver, BC, V marker in CW 0150, then into weather for the Yukon and Washington coast. (Dan Nicholson, MO)

6996: WAR, U.S. Army, Washington, DC working 1KE in SSB 2028. (George Osier, NY)

7405: Six-digit (!!) Spanish numbers station with female announcer 0600; used SSB. Good signal. (Jonathan Scherf, WI) This is the first report I can recall ever seeing about a six-digit numbers station. Note that this channel is well within range of ham radio gear and has been used actively in the past by various insurgent groups in Latin America. (Editor)

7612: "00 DE 28," "45 DE 28," "22 DE 28," "83 DE 28," and "36 DE 28" all among the stations passing cipher traffic in CW around 2330. (Don Schimmel, VA) Don notes these stations, as well as the stations he reports on 13555 kHz, all use the characters AA, IM, OE, and OT, which are sent together as a single character. These characters are also used in traffic between Soviet ship and shore stations. Thus, Don feels these stations could be Soviet in origin. Good point, Don! I'd add that Soviet clients, such as Cuba and—yes, Nicaragua—would likely follow similar radio procedures, since the resulting cipher groups should be fairly "language independent" if properly encoded. (Editor)

7675: "Cape Radio" (AFE71, Patrick AFB, FL) working "Baker One Charlie" and "Bravo Hotel Three Eight" in support of launch of the Space Shuttle "Challenger." Seemed to be part of rescue team in case launch was aborted and a sea rescue was necessary since "Bravo Hotel Three Eight" indicated they were returning to Patrick AFB about three minutes after lift-off. (Paul D. Sweeney, MA) Excellent report, Paul! (Editor)

8917: "Charlie India Oscar Two" read by female announcer repeated continuously 0147 until off 0150. (Thad Adamaszek, OH)

9074: Four-digit Spanish numbers station with female announcer 0102; was parallel to 11533 kHz. (George Osier, NY) Question of the month: why do some numbers stations operate in parallel? The strength and lack of interference would seem to make it unnecessary. Any ideas, readers? (Editor)

9075: Four-digit Spanish numbers station with female announcer 0205; was parallel to 10615 kHz. (Thad Adamaszek, OH)

9265: Five-digit English numbers station with heavily-accented speaking female announcer at 0005. (Thad Adamaszek, OH)

9451: Five-digit German numbers station with female announcer in SSB 0205. Opened with musical tones, then "Bravo Kilo" repeated followed by more musical tones. Most powerful German numbers station I've ever heard. (George Osier, NY)

9975: Five-digit German numbers station with female announcer 0200; transmission opened with series of double beeps. (Thad Adamaszek, OH)

10138: Five-digit Spanish numbers station with female announcer 0304. (Thad Adamaszek, OH)

10175: Five-digit German numbers station with female announcer 0120; was in SSB and transmission ended with a beep. (Thad Adamaszek, OH)

10460: Five-digit German numbers station with female announcer 0208; was in SSB and transmission opened with flute music. (Thad Adamaszek, OH)

10500: Five-digit German numbers station with female announcer 0239; used SSB and sent RTTY-like signals for ten seconds prior to transmission end. (Thad Adamaszek, OH)

10570: Three-digit Spanish numbers station with female announcer 0125; opened with pips and a long pip at 0130. Message was "110 287 130 211" repeated. (Thad Adamaszek, OH)

11243: "Skyking" broadcast in SSB 0700. (Dennis Eckert, WA)

11580: Five-digit Spanish numbers station with female announcer 0232; opened with "atencion 448 45" and then into number groups. (Thad Adamaszek, OH)

11545: Five-digit German numbers station with female announcer 0417. (Tom Lewandowski, NY)

11610: "4VUEVN4NUEN6VVV DABTEBNBETVNN DVBTAEUANEDT4" repeated continuously in CW 0615. (Jerry Rappel, IA) My first guess would be that this was a marker transmission with some sort of defect in the keying; however, this is a range often used by various numbers stations. (Editor)

11617.5: Five-digit German numbers station with female anouncer 0218; very rich accent with music at beginning and end of transmission; was in AM and usually SSB numbers stations are heard on this frequency. (John Demmitt, PA)

11620: Five-digit German numbers station with female announcer ending transmission 0249; transmission ended with a single tone. (John Demmitt, PA)

11179: This is an active frequency for U.S. Air Force traffic in SSB. Among the ground stations heard working planes aloft are AFL, Loring AFB in Maine and AFE, MacDill AFB in Florida. (Henry Ponder, NC)

11182: AFG, Scott AFB, IL is often heard on this channel in SSB. Was heard once working "Edgy" (an AWACS craft) and phone patching it through to "Raymond 24" (the TAC command post at Tinker AFB in Oklahoma). (Henry Ponder, NC) Welcome Henry! (Editor)

12135: Five-digit German numbers station with female announcer 0010; was in SSB. (Thad Adamaszek, OH)

13808: Three-digit Spanish numbers station with female announcer; began with pips, long pip at 0130, message was simply "252 774 063 312." (Thad Adamaszek, OH)

13171: "Skyking" broadcast in SSB 1945; new fre-

YVTO on 6.100 MHz is the Venezuelan Naval Observatory station that sends out this QSL.

quency? (Dennis Eckert, WA) None of my lists have this listed as a "Skyking" channel, so a new one or a goof—we had a report in this column recently of a "Skyking" broadcast on 7080 kHz! (Editor)

13181: "Skyking" broadcast with female announcer in SSB 2014. This is also apparently a new frequency. (Dennis Eckert, WA)

13201: Air Force One calling Andrews AFB in SSB 0015; perhaps President Reagan on trip back to California? (Dennis Eckert, WA)

13214: "SAM682" working Andrews AFB in SSB 1515. (Tom Lewandowski, NY) "SAM" is short for "special air mission," meaning VIPs and similar government bigwigs are aboard. (Editor)

13211: "Lameduck" working "Juliet" in SSB 2028. (Dennis Eckert, WA)

13346: Five-letter groups in CW with Spanish character MW (nyeh) 2157; this station was found working station on 7428 kHz. (Don Schimmel, VA)

13405: "406 406 406 1" repeated 2101, into five figure CW groups 2106. (Don Schimmel, VA)

13431.5: Two, three, and four letter cipher groups in CW 2137. (Don Schimmel, VA)

13459: Five figure CW groups 1953; numbers 3, 4, 5, 6, and 7 sent normally; 1, 2, 8, 9, and 0 sent "cut" as A, U, D, N, and T. (Don Schimmel, VA)

13488: "QY QY QY" in CW followed by four groups of six figures per group 0049. (Don Schimmel, VA)

13492: CW station working another station apparently changing frequencies often, sent "QSY 33," "QSY 73," "QSY 91," etc. Signal was very strong; station changing frequency was not found. (Don Schimmel, VA)

13504: Five-character groups in CW, mixed letters and numbers (but only numbers observed were 2, 3, and 8). Spanish letter "nyeh" (sent as MW) noted. Caught at 2055. (Don Schimmel, VA)

13510.4: Five-letter groups in CW 2325, probably Soviet since letters IM, OE, OT, and AD noted. (Don Schimmel, VA)

13555: Cipher groups passed in CW, no calls noted, around 1217 and 2128. (Don Schimmel, VA)

13629: Transmitter being tuned 1134, then two-three seconds of sending CW at very high speed. Then two five-figure groups were sent manually, repeated them, off the air at 1137. (Don Schimmel, VA)

13698: Five-letter groups in CW 1116, similar to station noted on 13510.4 kHz. (Don Schimmel, VA)

13816: "BT 18888 BT 18888" repeated in CW 1647. (Don Schimmel, VA)

14408: "835 835 835 1" repeated in CW 2043, into five-figure groups at 2045. (Don Schimmel, VA)

14439: Two men whistle blowing to each other in SSB 2106, into coded voice messages. Possible smuggling traffic? (Dennis Eckert, WA) Very likely. (Editor)

14450: Five-letter CW groups 2110-2245; powerful 40 over S9 signal. FCC monitoring station in Blaine, WA called but they weren't interested other than taking a quick bearing. (Dennis Eckert, WA) Probably because the station is operated by an agency of the U.S. government. (Editor)

14555: Five-letter groups in CW 0226, similar to 13510.4 and 13698 kHz items. (Don Schimmel, VA)

14580: Five-letter groups in CW 1629, similar to above item. (Don Schimmel, VA) Don, I think I speak for all *POP'COMM* readers when I say "thanks!" for the great loggings this month. (Editor)

14686: Drug Enforcement Agency (DEA) traffic on this channel using tactical calls "Atlas" and "Panther" around 2230-2315. Mention of keeping various boats under surveillance. (Dennis Eckert, WA)

15000: JJY, Tokyo, Japan, CW identification 2040 followed by announcement by woman in Japanese, then time signals. Signal was almost equal to WWV and much stronger than WWVH. (George Osier, NY)

15004: RID, Irkutsk, USSR, CW identification and then female announcer 1359. (Robert Homuth, AZ)

15036: VXA, Edmonton, AB, VOLMET in SSB 1224. (George Osier, NY) This station is operated by the Canadian military and identifies as such. (Editor)

15540: KKN50, U.S. State Department Intelligence Service, Washington, DC, QRA marker 1840. (Dan Nicholson, MO)

17552: KWL90, U.S. Embassy, Tokyo, Japan, QRA marker in CW 1248. (Dan Nicholson, MO)

18020: "Format" working "Alpha Bravo Alpha" in SSB 1818, "Alpha Bravo Alpha" said they had "gyro problems." Phone patch was made to "maintenance" and asked how far they are from "Howard." (George Osier, NY) Probably military traffic of some sort, George. (Editor)

18196: Five-digit German numbers station with female announcer in SSB 2115. (George Osier, NY)

18210: Five-digit Spanish numbers station with male announcer 1525; five-digit groups were followed by three-digit groups and "zero" repeated five times. Very strong signal. (Tom Lewandowski, NY) Excellent catch, Tom; male announcers are rare but can be heard. (Editor)

20191: "Houston Control" giving progress reports during flight of the Space Shuttle. Gave reports of altitude in nautical miles and nautical miles downrange. Was in SSB. (Paul D. Sweeney, MA) Also noted carrying conversations between the Challenger crew and Mission Control for most of the day and night. Seemed to be a rebroadcast of the UHF communications from the Shuttle to Earth. (Tom Lewandowski, NY) Keep an ear on this channel during future Shuttle missions. (Editor)

22606: General Pacheco Radio, Buenos Aires, Argentina, voice marker in Spanish read by male 2010; was in SSB mode. (George Osier, NY) Call for this one should be LPL with a numerical suffix. (Editor)

Beaming In (from page 4)

der for one to offer an acceptable account of one's self in such confrontations. For one thing, some of these trinkets go in and out of vogue so rapidly that before anybody can figure out what they are about, the devices are obsolescent, like the *Nuvisor* and the *Compactron*. The key was that the only people who really try to drag others into such conversations are show-offs, know-it-alls, and various other wiseacres who don't know that much about what any of these things are themselves. In fact, some of these devices are so complicated and confusing, the less you know about them the better off you may be all around. When I figured this out I took quick action and devised a couple of safe stock phrases which I memorized to respond to almost any high-tech inquiry.

For instance, any mention of transistors would trigger me to state, with an air of authority, that "transistors are OK, but they sure are prone to noise pickup." That would seem to satisfy most people that there was little point in trying to make me look foolish since I obviously knew as much as they did.

If modulation was the topic, I would toss out information about how the "carrier envelope shows up nice on the scope," plus a couple of comments incorporating terms relating to "downward modulation," or "overdriving the final."

If I accidentally got dragged into one of these conversations over the air (hams are great for trying to put you down with this stuff), I found that by telling the guy that he either had "carrier shift" or "some carrier in his signal," I could usually silence him rather quickly and would probably not hear him on the band again for a week or so while he pulled apart his rig. That failing, I'd say that the phone was ringing and I had to sign-off.

All of this worked, at least for a while. But the press of technology eventually made this approach far too simplistic to be effective. Computers, IC's, PROM's, spread-spectrum, and all of the current technology started crying out for a whole new approach with far more impact, especially since this new technology seems to have spawned a whole new inlux of obnoxious creeps who take extreme delight in seeing you squirm when pressed about a subject upon which you appear even slightly foggy. There is now one great and ultimate way in putting the whole rotten bunch of the people in their places. I warn you, it's potent dynamite, cleverly engineered to wither even the most knowledgeable soul. I once had the head designer for a major communications equipment manufacturer alternately begging for mercy and offering me an engineer's position at almost any price I could name.

Y'see, there's this evil little chart that's the heart of the system. It makes it possible for you to generate about 1,000 different supercolossal high-tech sounding terms. The formula is to pick a 3-digit number, even at random, and then select those words on the chart which correspond to the numbers. Then you bounce that 3-word simulated high-tech expression off the sap who's trying to run you through the grinder.

High Tech Phrase Generator

Column A	Column B	Column C
0. Attenuated	0. Sinosidal	0. Resonance
1. Pulsed	1. Envelope	1. Flexibility
2. High-level	2. Integrated	2. Option
3. Coherent	3. Reciprocating	3. Capability
4. Phased	4. Steady-state	4. Transmission
5. Programmable	5. Logic	5. Mode
6. Random	6. Transitional	6. Memory
7. Silicone	7. Incremental	7. Parameter
8. Coherent	8. Decay	8. Phase-lock
9. Balanced	9. Digital	9. Frequency

Instructions: Select any 3-digit number at random then match it up with the words above for a snob squelching high-tech phrase. Difficult cases may require using two such phrases in one sentence. Guaranteed to work if instructions in text are followed.

Here's a typical example. You're on the job or at a radio club meeting, or a radio convention, or standing at the counter in a communications shop. Some fink in a tweed jacket and button down shirt with a striped tie is standing there puffing on his pipe and giving you the beady eye. He's got an ultramini calculator in his hand and from time to time he punches numbers into it and nods as the answers appear. You just know that this guy is waiting for the right moment to trap you. Don't be afraid. Walk right over to the most sophisticated gadget you can locate and begin examining it— maybe pick it up and study it. The guy moves in on you. "Bet you didn't know that this device has a CMOS hex inverter performing amplifier pulse-shaping operations," says the nerd. Without batting an eyelash you toss him an 807—not an 807 transmitting tube—but an 807 from the chart, "Yeah, I was aware of that. What do you think about its *coherent sinosidal parameters?*" End of conversation.

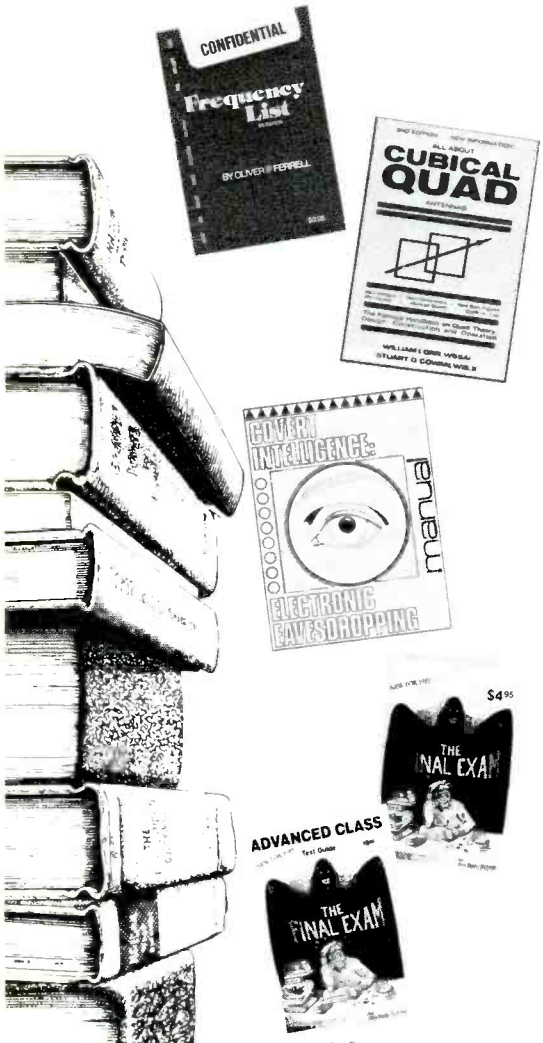
If you get an especially tough customer who attempts to bluff some sort of response to that jibberish, polish him off with a double, like a 583 coupled with an 095. "Fascinating, but doesn't the *programmable decay capability* negatively affect the *attenuated digital mode?*" End of conversation.

The possibilities are fantastic. I've used this in conversations with (and letters to) manufacturers, readers, authors, and all sorts of folks; in fact, I use it with everybody who tries to bash me over the head with esoteric technological terminology just to see me squirm. Sweet revenge.

In the meantime, if (like me), you're one of the many communications enthusiasts whom the march of electronics technology caused to begin stumbling somewhere between the demise of the 6AK7 tube and the advent of the CK-722 transistor, this could very well offer you new hope for the present and for the future!

And have a happy holiday!

POPULAR COMMUNICATIONS BOOK SHOP



Guide To RTTY Frequencies 2nd ed.
Details on 5500 RTTY stations/frequencies in two lists. "Real" press schedules, inside information on new RTTY techniques, etc. 192 pages, paperback, $9.95. Order #G205.

Radio Handbook, 22nd ed.
by Bill Orr, W6SAI
A state-of-the-art, single-source reference on radio communications and theory for hams, professional ops, techs, and engineers. New coverage includes solid-state devices, Yagis and quads, and H.F. amplifier designs. A hands-on instruction manual, as well. 1168 pages, hardcover, $39.95. Order #S197.

The Radio Publications Group—The "Bill Orr Series"
These easy reading classics belong in the library of any active ham. Loaded with practical how-to information, with tables, charts, and formulas arranged for handy reference.
Beam Antenna Handbook, 200 pages, paperback, $7.95. Order #R143.
Wire Antennas, 192 pages, paperback, $7.95. Order #R144.
Antenna Handbook, 192 pages, paperback, $7.95. Order #R145.
Cubical Quad Antennas, 112 pages, paperback, $6.95. Order #R146.
VHF Handbook, 336 pages, paperback, $11.95. Order #R147.
Interference Handbook, by W.R. Nelson, 247 pages, paperback, $9.95. Order #R172.

The Final Exam
by Dick Bash, KL7IHP
Amateur radio license exam manuals proven highly successful in helping hams pass the FCC tests. Material for the books was obtained by interviewing actual applicants for the exams and collecting and researching the questions they had on the exams.
General Class, 123 pages, paperback, $9.95. Order #B153.
Advanced Class, 108 pages, paperback, $9.95. Order #B154.
Extra Class, 108 pages, paperback, $9.95. Order #B155.
Novice Class, 104 pages, paperback, $4.95. Order #B163.

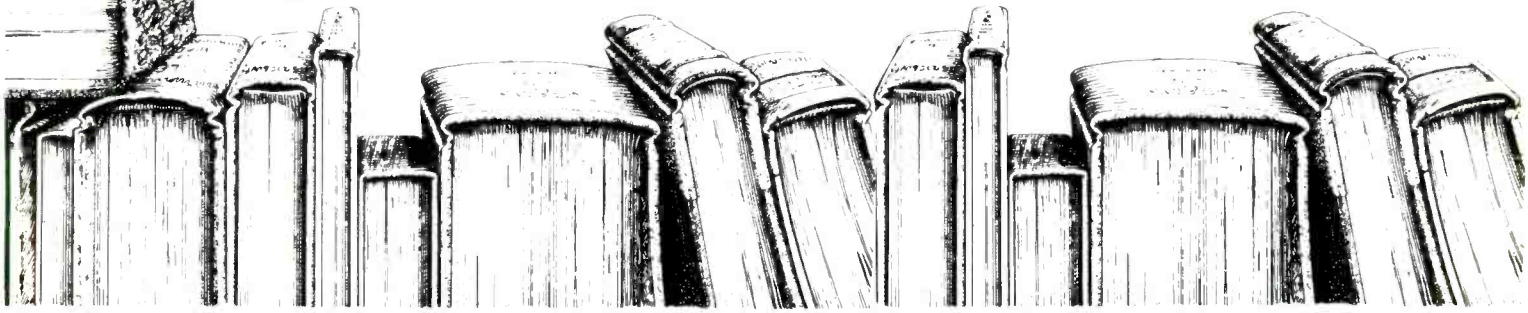
Confidential Frequency List 5th ed.
by Perry Ferrell
Bigger than the 4th edition, this new book has 30% more stations listed, more than 7500 operating between 4-28 MHz. Listings by frequency and callsign. Complete list of Coastal CW stations plus Embassy, Aeronautical, Military, Time Sigs, Feeders, VOLMET, FAX, INTERPOL, etc. Details on schedules, emergency channels, alternates, and never-before-published IDs. Paperback, $9.95. Order #G196.

Air-Scan, Directory of VHF Aero Band (108 to 136 MHz) Stations, 3rd ed.
by Tom Kneitel, K2AES
More than 30,000 listings in U.S., Canada, and Mexico—Control Towers, Unicoms, Multicoms, Approach/Departure frequencies, Flight Service Stations, Air Route Traffic Control Centers, airline frequencies, search/rescue, etc. 80 pages, paperback, $7.95. Order #C152B.

Covert Intelligence:
Electronic Eavesdropping Manual
Illustrated guide to using hidden transmitters and telephone taps for intelligence gathering, covering both theory and application. Detailed text enhanced by many graphs, charts, schematics, illustrations, field tests of equipment. Paperback, $8.95. Order #C191.

Covert Techniques
For Intercepting Communications
A revealing inside look at how many federal agencies (some you never heard of) regularly "screen" phone, telex, and other "private communications." Here's the how, why, and "who" of it all. Most likely your own private communications have been checked by an intelligence computer or agent. Find out about it in this book. Paperback, $8.95. Order #C192.

World Press Services Frequencies
by Thomas Harrington
A comprehensive manual covering the field of radioteletype news monitoring—antennas, receivers, terminal units, monitors, and more. Contains 3 master lists of times of transmission, frequencies, plus ITU list of over 50 news services worldwide. 84 pages, paperback, $8.95. Order #U173.



POPULAR COMMUNICATIONS

76 N. Broadway, Hicksville, NY 11801 Order Date:_____

Name _____

Address _____

City _____

State_____ Zip_____

☐ Check ☐ MasterCard ☐ VISA

Card No._____ Expires_____

X _____

Signature required on all charge orders:

QTY.	ORDER #	TITLE	PRICE	TOTAL

Shipping charges $2.00 per order. Shipping charges waived on orders of $50.00 or more. Books shipped best way. All orders are processed the day they are received, but please allow 30 days for delivery within North America.

Book Total	
Shipping Charge	
Grand Total	

COMMUNICATIONS SHOP

Advertising Rates: Non-commercial ads are 30 cents per word including abbreviations and addresses; minimum charge $6.00 per issue. Ads from firms offering commercial products or services are $1.00 per word; minimum charge $20.00 per issue. Leading key words set in all caps at no additional charge. All classified ads must be prepaid in full at time of insertion; a 5% discount is offered for prepaid 6 time insertions. All ads must be typewritten double spaced.

Approval: All ad copy is subject to Publisher's approval and may be modified to eliminate references to equipment and practices which are either illegal or otherwise not within the spirit or coverage scope of the magazine.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Communications Shop have not been investigated, the Publisher of Popular Communications cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: PC Communications Shop, 76 N. Broadway, Hicksville, NY 11801.

POLICE CODE UNSCRAMBLERS, lets you hear the coded messages of Police, Fire, and Medical channels; other scanner accessories. Satisfaction guaranteed: DNE, Inc. Rt. 7, Box 257B, Hot Springs, AR 71901 (501-623-6027).

ARE YOU A VICTIM OF ELECTRONIC RAPE? Has your phone or premises been compromised by someone else's listening devices? If so, give this EX-FED a call from a secure phone and I can provide expert countermeasures. My staff are trained by DEKTOR and armed by ISA with the most modern equipment; will travel anywhere in the USA to guarantee your privacy! (518) 383-2064 or in NY 800-422-2525.

RTTY FDM DEMODULATORS. Frederick 1202R, four models available; used, new, $50-$350. Call/write for full specifications. Electrovalue Industrial Inc., Box 376-PC, Morris Plains, NJ 07950. 201/267-1117.

MILITARY RADIO SET TYPE AN/PRC-47, 2 to 12 MHz, 10,000 channels. 20 or 100 watts output, operates on 24 VDC portable, base, or vehicular. Complete in original military shipping container with all accessories, checked, ready to use $400.00. For more details on this and other current military equipment, S.A.S.E. and $1 to Michael P. Murphy, 11621 Valle Vista Rd., Lakeside, CA 92040 (619) 561-2726.

GIANT SCREEN OSCILLOSCOPE converted from ANY size TV technicians, hams, broadcasters, hobbyists: Minor inexpensive changes convert TV to Super-Sensitive Testing Device. No experience needed. Follow clear- cut plans. Fully illustrated. Perfect for Workshop, Lab, School, Etc. ANY size screen . . . ANY size TV complete plans . . . $5 (plus $1 postage & handling). MicroTech, Dept. op-15, Box 8561, Waco, Texas 76714.

POLICE ★ FIRE PATCHES, BADGES—all 50 states, discount scanners, crystals $2.94. Two stamps for free catalog. Dever Communications, P.O. Box 277, Hot Springs, AR 71901

ARE YOU INTERESTED in English transmissions on shortwave? If yes, then the International Listening Guide is for you!! For information send 50¢ to I.L.G., P.O. BOX 3434, Littleton, CO 80161, USA

DO YOU WANT INFORMATION on shortwave listening, shortwave clubs, shortwave DXing? For information send 50¢ to Shortwave, P.O. Box 3434, Littleton, CO 80161, USA

COMMUNICATIONS SECURITY manual. Deception, Tactics, Codes, New. $11. Details free. Eustis Press, Division 18, Box 189, Goldenrod, FL 32733.

COBRA COMMAND CALL FM TRANSCEIVER, featured in September '83 POP-COMM's Survival column. $49.95 each, postpaid, ALSO—Telephones and Accessories. Big discount catalog $2.00, refundable. Telcom Electronics, 815-C East Third Street, Beardstown, IL 62618.

SCANNER CRYSTALS! America's leading mail order specialist, sent to you postpaid and factory fresh! Lowest prices anywhere, so low we can't even print them here! Send for free catalog and special order form! Z-Tech, P.O. Box 70, Hauppauge, NY 11788.

"RAIL-SCAN" by Tom Kneitel. New scanner frequency directory! Largest & most comprehensive railroad industry communications directory ever! 4,200 frequencies, 863 major RR's, short lines, narrow gauge, government, miniature, movie, museum, scenic, industrial traction, mass transit lines, private car owners, RR police, car/locomotive builders & service companies, regulatory agencies, accident/emergency channels, RR addresses, trackage data, lots more. Only $7.95 (add $1 for 1st Class Mail). Order now or ask for free info. CRB Research, Box 56-PC, Commack, NY 11725.

225 TO 399.95 MHz (MILITARY AIRCRAFT) IN 3500 SYNTHESIZED CHANNELS. AN/GRC-168 is completely solid state, has digital tuning, current issue equipment, operates on 120 vac, 60 cps. Excellent condition, ready to use. $350.00 + shipping. S.A.S.E. and $1 for specs and pictures of this and other current military communications equipment for sale to: Michael P. Murphy, 11621 Valle Vista Rd., Lakeside, CA 92040 (619) 561-2726.

EXPERIMENTER VLF-HF antenna preamp, coupler, trap, board and housing kits; Loran-C RF-GRI boards; for info send 20¢ stamp; Burhans Electronics, 161 Grosvenor St., Athens, OH 45701.

CAN YOU: Trace anyone, anywhere, get unlisted telephone numbers, beat the lie detector and PSE, tail or ditch a tail, run driver's license, property, credit and personal record checks, open virtually any lock or safe in a few seconds? Do you know what device listens thru almost any wall, what exotic surveillance gear works and where to buy it at a savings of 30-500%, how to alter common objects into electronic surveillance gear, the 11 undetectable bugs, what (CIA) chemical lets you read thru envelopes, how to buy super cheap night vision devices, what countermeasures work and those that don't; how to defeat bug detectors, worldwide sources for exotic gear? One NBC reporter calls it "the most dangerous book ever published." *How To Get Anything On Anybody.* $29.95+ $4.00 handling. TOLL FREE 1-800-345-8112, in PA call 1-800-662-2444, or write: AW, 584 Castro No. 351, San Francisco, CA 94114.

THE BOOTLEGGERS BIBLE, $12.95 and other CB Radio Books, Kits, Modifications, Catalog $1.00 refundable! APS, POB 263PC, Newport, RI 02840 (401) 846-5627.

NEW! JERROLD AND OAK CABLE CONVERTERS, Decoders, Catalog $1.00 Refundable With Purchase. APS, POB 263PC, Newport, RI 02840 (401) 846-5627.

NEW! TOP SECRET REGISTRY OF U.S. GOV'T FREQUENCIES by Tom Kneitel. Yes, it's finally here! The NEW 5th Edition is now 168 pages BIG in large 8½" × 11" format (same page size as *POP'COMM*). Latest federal scanner frequency listings for FBI, FCC, Border Patrol, ATF, Immigration, Secret Service, CIA, Customs, Coast Guard, Armed Forces, and much more. Tens of thousands of call signs, frequencies, locations. The ultimate scanner directory also reveals many HF listings plus complete historic roster of all federal land stations authorized in 1923 (60 years ago!). New 5th Edition is $14.95 postpaid by Book Rate Mail, or add $2 if First Class Mailing wanted. Order your copy now! CRB Research, P.O. Box 56, Commack, NY 11725.

COMMUNICATIONS SHOP

AD INDEX

The Bearcat® DX1000 makes tuning in London as easy as dialing a phone.

Direct access keyboard tuning brings a new level of simplicity to shortwave radio. With the *Bearcat® DX 1000,* dialing in the BBC in London is as easy as dialing a telephone. And you can switch from the BBC to Peruvian Huayno music from Radio Andina instantly. Without bandswitching.

Featuring the innovative microprocessor digital technology made famous by *Bearcat* scanner radios, the *DX 1000* covers 10 kHz to 30 MHz continuously, with PLL synthesized accuracy. But as easy as it is to tune, it has all the features even the most sophisticated "DXer" could want. 10 memory channels let you store favorite stations for instant recall—or for faster "band-scanning" during key 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 you to your favorite shortwave station. Or, it can be programmed to activate peripheral equipment like a tape recorder to record up to ten different broadcasts—any frequency, any mode—while you are asleep or at work.

The *DX 1000* also includes independent selectivity selection to help you separate high-powered stations on adjacent frequencies. Plus a noise blanking system that stops Russian pulse radar interference.

There's never been an easier way to hear what the world has to say. With the *Bearcat DX 1000* shortwave radio, you have direct access to the world.

For the name of your nearest retailer dial toll-free... 1-800-SCANNER.

Frequency Range: 10 kHz to 30 MHz continuously. **Tuning:** Direct keyboard entry, selectable 3 or 24 kHz per revolution knob tuning, or manual step tuning in selectable 1-99 kHz steps. **Sensitivity:** 1.0 μV AM, 0.5 μV CW/SSB/FM, 1.6-30 MHz. **Image and IF Rejection:** 70 dB or more. **Memory:** 10 frequency capacity. **Frequency Stability:** Better than 100 Hz after warm-up. **Modes:** AM/LSB/USB/CW/FM. **AGC:** Selectable Fast/Slow release times. **Filter Bandwidths:** 2.7 kHz, 6 kHz and 12 kHz. **Filter Selection Independent of Mode.**

CIRCLE 24 ON READER SERVICE CARD

Bearcat® DX 1000
shortwave radio.

Direct Access To The World.

Electra

Electra Company
Division of Masco Corp. of Indiana

300 East County Line Road
Cumberland, Indiana 46229

ICOM IC-751

The New Standard of Comparison

NEW Competition Grade Transceiver!

ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade ham receiver, a 100KHz to 30 MHz continuous tuning general coverage receiver, and a full featured all mode solid state ham band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable/field day package.

Receiver. Utilizing an ICOM developed J-FET DBM, the IC-751 has a 105dB dynamic range. The 70.4515MHz first IF virtually eliminates spurious responses, and a high gain 9.0115MHz second IF, with ICOM's PBT selectivity. A deep IF notch filter, adjustable AGC and noise blanker (can be adjusted to eliminate the woodpecker), audio tone control, plus RIT with separate readout provides easy-to-adjust, clear reception even in the presence of strong QRM or high noise levels. A low noise receiver preamp provides exceptional reception sensitivity as required.

Transmitter. The transmitter features high reliability 2SC2097 transistors in a low IMD (-32dB @ 100W), full 100% duty cycle (internal cooling fan standard), 12 volt DC design. Quiet relay selection of transmitter LPF's, transmit audio tone control, monitor circuit (to monitor your own CW or SSB signal), XIT, and a high performance speech processor enhance the IC-751 transmitter's operation. For the CW operator, semi break-in or full QSK is provided for smooth, fast break-in keying.

Dual VFO. Dual VFO's controlled by a large tuning knob provide easy access to split frequencies used in DX operation. Normal tuning rate is in 10Hz increments and increasing the speed of rotation of the main tuning knob shifts the tuning to 100Hz increments automatically. Pushing the tuning speed button gives 1KHz tuning. Digital outputs are available for computer control of the transceiver frequency and functions, and for a synthesized voice frequency readout.

32 Memories. Thirty two tunable memories are provided to store mode, VFO, and frequency, and the CPU is backed by an internal lithium memory backup battery to maintain the memories for up to seven years. Scanning of frequencies, memories and bands are possible from the unit, or from the HM 12 scanning microphone. In the Mode-S mode, only those memories with a particular mode are scanned; others are bypassed. Data may be transferred between VFO's, from VFO to memories, or from memories to VFO.

Standard Features. All of the above features plus FM unit, high shape factor FL44A, 455 Khz SSB filter, full function metering, SSB and FM squelch, convenient large controls, FM option, a large selection of plug-in filters, and a new high visibility multi-color flourescent display that shows frequency in white, and other functions in white or red, make the IC-751 your best choice for a superior grade HF base transceiver.

Options. External frequency controller, external PS-15 power supply, internal power supply, high stability reference crystal (less than 100Hz, -10°C to +60°C), HM12 hand mic, desk mic, filter options: SSB: FL30
CWN: FL52A, FL53A
AM: FL33

CIRCLE 57 ON READER SERVICE CARD

ICOM
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

751683