

POPULAR COMMUNICATIONS

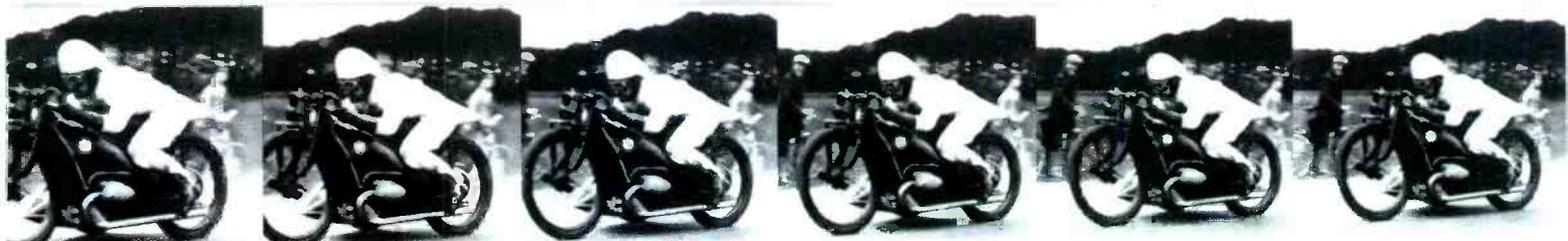
NOVEMBER 1982 \$1.75

- Insider's Guide to Spy Lingo
- DXploring USSR
- Radio
- Is Your Telephone Privacy For Sale?
- Deciphering Secret RTTY and Scanner Transmissions



How Satellites Are Changing Your TV Viewing Habits





INTRODUCING THE LATEST HEIR TO 59 YEARS OF GERMAN ENGINEERING.

While the fine lines and sculpted features of most sport bikes spring from the drawing tables of stylists, those of the BMW R65LS had a different birthplace.

The drafting tables of German engineers.

As a result, they are the recipients of the same pragmatic consideration and evolutionary refinement as the legendary engine that powers this 650cc machine.

The shapely sport fairing, for example, provides much more than cosmetic appeal. It helps reduce front-wheel lift by over 30%.

The LS handlebars are low, compact, and help to provide a seating position that "is sporting in a way that Japanese bikes, even with red paint, have not discovered" (Cycle World). (High bars are also available.)

The bike's sender tail,

artful as it too appears, was created in one of the most aesthetically indifferent environments known to man: the massive BMW wind tunnel in Ismaning, Germany.

Even the wheels of the LS possess a beauty that goes far deeper than their gleaming enamel. Each rim section is made of a highly rigid aluminum alloy; each hub and spoke assembly is separately cast from a far more elastic aluminum alloy to provide added flexibility. And then everything—hubs, spokes and rims—is cast as a single unit. Cul-

minating in an exceedingly resilient "composite" wheel that not only helps

increase handling prowess but decreases unsprung weight.

In the end, the BMW R65LS is one sports bike whose graceful lines do not serve as camouflage for weak engineering. For it is a machine as adept at slicing through the wind and rounding corners as it is at turning heads.

Its price? A lofty \$3,790*.

But as a motorcycle columnist of AutoWeek observed, "a bad motorcycle is worthless; a good motorcycle is worth whatever it costs... By that standard, the R65LS is a bargain."

*Manufacturer's suggested retail price \$3,790. Actual price will depend upon dealer. Price excludes state and local taxes, dealer prep, destination and handling charges. © 1982 BMW of North America, Inc. The BMW trade name and logo are registered trademarks of Bayerische Motoren Werke AG.

THE LEGENDARY MOTORCYCLES OF GERMANY.



ZX81



Introducing the Sinclair ZX81.

If you're ever going to buy a personal computer, now is the time to do it.

The Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only \$99.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers.

The ZX81 is a major advance over the original Sinclair ZX80—the first personal computer to break the price barrier at \$200.

In fact, the ZX81's 8K extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics

THE \$99.95 PERSONAL COMPUTER.

- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function

useful for both games and serious applications

- 1K of memory expandable to 16K
- A comprehensive programming guide and operating manual

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. It comes with a comprehensive programming guide and operating manual designed for both beginners and experienced computer users. And you can use a regular cassette recorder to store and recall programs by name.

Sinclair technology is also available in Timex/Sinclair computers under a license from Sinclair Research Ltd.

Order at no risk.**

We'll give you 10 days to try out the ZX81. If you're not completely satisfied, just return it to Sinclair Research and we'll give you a full refund.

And if you have a problem with your ZX81, send it to Sinclair Research within 90 days and we'll repair or replace it at no charge.

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If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just \$79.95.* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

A leader in microelectronics.

The ZX81 represents the latest technology in microelectronics. More than 10,000 are sold every week. In fact, the ZX81 is the fastest selling personal computer in the world.

We urge you to place your order for the ZX81 today.

To order.

To order, simply call toll free. Or use the coupon below. Remember, you can try it for 10 days at no risk.** The sooner you order, the sooner you can start enjoying your own computer.

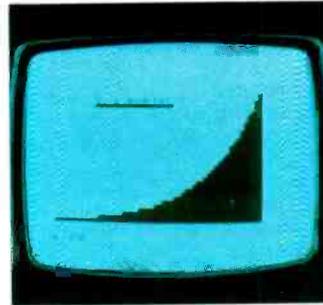
Call toll free 800-543-3000.

Ask for operator #509. In Ohio call: 800-582-1364; in Canada call: 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. If you just want information, please write: Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

**Does not apply to ZX81 kits.



NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81. Cost is \$49.95, plus shipping and handling.

sinclair

To order call toll free: 800-543-3000

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ZX81 Kit	79.95		
16K Memory Module	49.95		
Shipping and Handling	4.95		\$4.95
TOTAL			

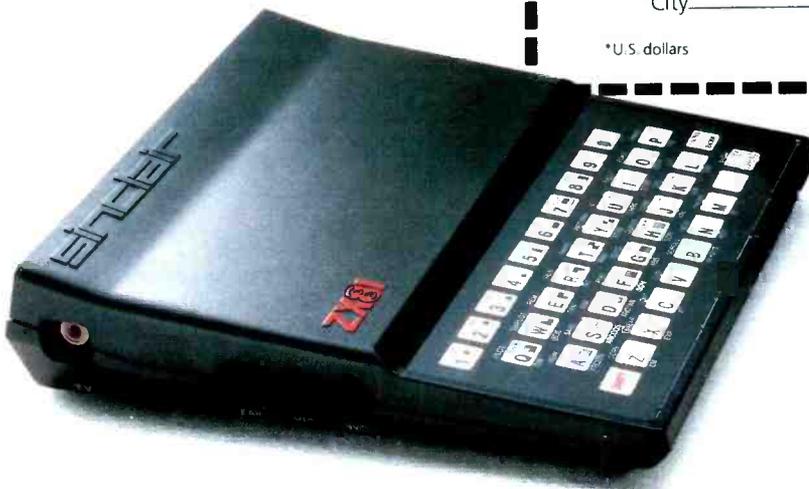
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One Sinclair Plaza, Nashua, NH 03061.

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*U.S. dollars



Synthesized Hand-Held Scanner!

Communications Electronics™, the world's largest distributor of radio scanners, now has even lower prices on our radio scanners. Chances are the police, fire and weather emergencies you'll read about in tomorrow's paper are coming through on a scanner right now.

With your scanner, you can monitor the exciting two-way radio conversations of police and fire departments, intelligence agencies, mobile telephones, energy/oil exploration crews, and more. Some scanners can even monitor aircraft transmissions! You can actually hear the news before it's news. If you do not own a scanner for yourself, now's the time to buy your new scanner from **Communications Electronics**. Choose the scanner that's right for you, then call our toll-free number to place your order with your Visa or Master Card.

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 scanner today from **CE!**

NEW! Bearcat® 350

The Ultimate Synthesized Scanner!

List price \$599.95/CE price \$384.00

7-Band, 50 Channel • Alpha-Numeric • No-crystal scanner • AM Aircraft and Public Service bands. • Priority Channel • AC/DC Bands: 30-50, 118-136 AM, 144-174, 421-512 MHz. The new Bearcat 350 introduces an incredible breakthrough in synthesized scanning: Alpha-Numeric Display. Push a button—and the Vacuum Fluorescent Display switches from "numeric" to word descriptions of what's being monitored. 50 channels in 5 banks. Plus, Auto & Manual Search, Search Direction, Limit & Count, Direct Channel Access, Selective Scan Delay, Dual Scan Speeds, Automatic Lockout, Automatic Squelch, Non-Volatile Memory. Order your Bearcat 350 today!

Bearcat® 300

List price \$549.95/CE price \$336.00

7-Band, 50 Channel • Service Search • No-crystal scanner • AM Aircraft and Public Service bands. • Priority Channel • AC/DC Bands: 32-50, 118-136 AM, 144-174, 421-512 MHz. The Bearcat 300 is the most advanced automatic scanning radio that has ever been offered to the public. The Bearcat 300 uses a bright green fluorescent digital display, so it's ideal for mobile applications. The Bearcat 300 now has these added features: Service Search, Display Intensity Control, Hold Search and Resume Search keys, Separate Band keys to permit lock-in/lock-out of any band for more efficient service search.



NEW! Bearcat® 350

Bearcat® Rebate Offer

Get a coupon good for a \$30.00 rebate when you purchase a Bearcat 100; \$15.00 rebate on model 210XL; \$10.00 rebate on model 200. Offer valid only on purchases made between September 1, 1982 and October 15, 1982. Limit of one rebate per household. Offer good only in the U.S.A. Void where taxed or prohibited by law. Resellers, companies, clubs and organizations—both profit and non-profit, are not eligible for rebates. Employees of Electra Company, their ad agencies, distributors and retailers of Bearcat Scanners are also not eligible for rebates.

Bearcat® 210XL

List price \$349.95/CE price \$229.00

6-Band, 18 Channel • Crystalless • AC/DC Frequency range 32-50, 144-174, 421-512 MHz. The Bearcat 210XL scanning radio is the second generation scanner that replaces the popular Bearcat 210 and 211. It has almost twice the scanning capacity of the Bearcat 210 with 18 channels plus dual scanning speeds and a bright green fluorescent display. Automatic search finds new frequencies: Features scan delay, single antenna, patented track tuning and more. When you purchase the Bearcat 210XL between September 1, and October 15, 1982, you'll also get a factory rebate coupon good for \$15.00.

NEW! Bearcat® 20/20

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7-Band, 40 Channel • Crystalless • Searches AM Aircraft and Public Service bands • AC/DC Priority Channel • Direct Channel Access • Delay Frequency range 32-50, 118-136 AM, 144-174, 420-512 MHz. The Bearcat 20/20 automatic scanning radio replaces the Bearcat 220 and monitors 40 frequencies from 7 bands, including aircraft. A two-position switch, located on the front panel, allows monitoring of 20 channels at a time.

NEW! Bearcat® 200

List price \$269.95/CE price \$179.00

8-Band, 16 Channel • AC only • Priority Dual Scan Speeds • Direct Channel Access Frequency range: 32-50, 138-174, 406-512 MHz. The Bearcat 200 is a scanner with high performance. Sealed one-piece keyboard lets you program each channel for automatic scanning. There's automatic lockout to by-pass individual channels. Direct Channel Access to go instantly to any channel. Plus Automatic Squelch, Dual Scan Speed, Selective Scan Delay and Automatic Search to let you find hidden frequencies.

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The first no-crystal programmable handheld scanner.

List price \$449.95/CE price \$284.00

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The Bearcat 100 produces audio power output of 300 milliwatts, is track-tuned and has selectivity of better than 50 dB down and sensitivity of 0.6 microvolts on VHF and 1.0 microvolts on UHF. Power consumption is kept extremely low by using a liquid crystal display and exclusive low power integrated circuits.

Included in our low CE price is a sturdy carrying case, earphone, battery charger/AC adapter, six AA Ni-cad batteries and flexible antenna. The Bearcat 100 is in stock for quick shipment, so order your scanner today.

NEW! Fanon FCT-200 Cordless Telephone

CE price \$149.00

Looking for an excellent cordless telephone? We recommend the Fanon model FCT-200. This cordless phone is designed and engineered to provide many years of reliable service and put an extra measure of convenience into your home or office. It features extended range, automatic secure protection, two-way intercom between the Fanon-phone handset and a conventional phone plugged into the base. Manual secure lock override. Two-way call alert. Last number memory redial. High-low volume control and low battery indicator light. Full duplex, simultaneous conversation capability. Operates with most touch tone or rotary dial systems. FM quality—quiet operation. Rechargeable Nickel-cadmium batteries included. Under ideal conditions, the range is 700 feet. Order today!

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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).

CIRCLE 73 ON READER SERVICE CARD

Bearcat® Four-Six ThinScan™

List price \$189.95/CE price \$118.00

Frequency range: 33-47, 152-164, 450-508 MHz. The incredible, Bearcat Four-Six Thin Scan™ is like having an information center in your pocket. This four band, 6 channel crystal controlled scanner has patented Track Tuning on UHF, Scan Delay and Channel Lockout. Measures 2 3/4 x 6 1/4 x 1". Includes rubber ducky antenna. Order crystal certificate for each channel. Made in Japan.

Fanon Slimline 6-HLU

List price \$169.95/CE price \$104.00

Low cost 6-channel, 4-band scanner!

The Fanon Slimline 6-HLU gives you six channels of crystal controlled excitement. Unique Automatic Peak Tuning Circuit adjusts the receiver front end for maximum sensitivity across the entire UHF band. Individual channel lockout switches. Frequency range 30-50, 146-175 and 450-512 MHz. Size 2 3/4 x 6 1/4 x 1". Includes rubber ducky antenna. If you don't need the UHF band, get the Fanon model 6-HL for \$94.00 each, and save money. Same high performance and features as the model HLU without the UHF band. Order crystal certificates for each channel. Made in Japan.

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NEW! Regency † D810 Scanner	\$259.00
NEW! Regency † D300 Scanner	\$199.00
NEW! Regency † D100 Scanner	\$159.00
Regency † M400 Scanner	\$229.00
Regency † M100 Scanner	\$195.00
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CHB-6 Fanon AC Adapter/Battery Charger	\$15.00
CAT-6 Fanon carrying case with belt clip	\$15.00
AUC-3 Fanon auto lighter adapter/Battery Charger	\$15.00
PSK-6 Base Power Supply/Bracket for SCMA-6	\$20.00
SP50 Bearcat AC Adapter	\$9.00
SP51 Bearcat Battery Charger	\$9.00
SP58 Bearcat 4-6 ThinScan™ carrying case	\$12.00
FB-E Frequency Directory for Eastern U.S.A.	\$12.00
FB-W Frequency Directory for Western U.S.A.	\$12.00
FFD Federal Frequency Directory for U.S.A.	\$12.00
TSG "Top Secret" Registry of U.S. Government Freq.	\$10.00
ASD Frequency Directory for Aircraft Band	\$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
A-135cc Crystal certificate	\$3.00

Add \$3.00 shipping for all accessories ordered at the same time.

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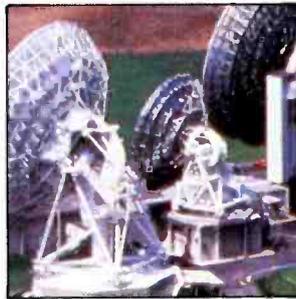
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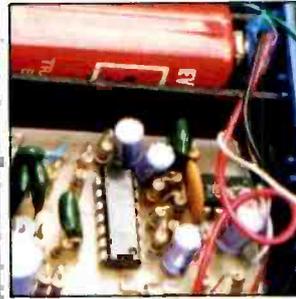
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BY TOM KNEITEL, K2AES

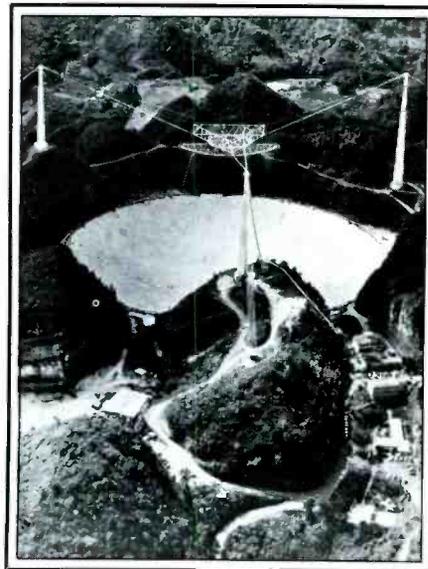
AN EDITORIAL

An Ear Towards The Sky

The dream that inhabitants of our planet will be able to make radio contact with, or at least receive signals from, galactic civilizations, has been circulating around for a long time. It's been explored by everybody from scientists to science fiction authors to crackpots. The ideas for actually accomplishing this feat, however, have been somewhat stalled by the staggering financial investment which faces anyone seriously considering tackling the job. This is assuming, of course, that there is someone or something out there, that they have any interest in communicating with the inhabitants of Earth, and that their technologies are compatible with that which we generally refer to as "radio." Let's face it. For all anybody knows, they could well be communicating by cosmic waves, X-rays, magnetism, gravity, psychic methods, tom-toms, semaphore, or any of several hundred other possible methods, including many which are not only outside of our technologies but even our scope of knowledge.

More than twenty years ago, our government was experimenting with a program called *Project Ozma*. This involved sending out and listening for radio signals which might initiate two-way communications with aliens or extra terrestrials, or whatever you might wish to call them. Somehow, that project ran out of steam and budget simultaneously. This was more than likely due to the requirements of funds for the manned space programs of the 1960s and the lack of instant results produced by *Project Ozma* — for certainly we are a nation which seeks instant gratification for our efforts. We have only minimal interest in investing time or money in long range experiments which would show results for future generations while not producing any benefit for our own generation.

After *Ozma*, the fate of SETI (search for extra terrestrial intelligence) projects became tenuous and isolated. Several universities and independent astronomers have been working at it, and the Russians have shown an interest. Within the United States, SETI has had a mixed fate with such projects facing political fallout, budget problems, and divisiveness within the ranks of astronomers. NASA has been trying to get between \$2 million and \$2.5 million per year set aside for a SETI operation to develop and test a highly sophisticated computerized radio receiver. This receiver would simultaneously scan millions of frequencies, but NASA has been turned down by Congress for those funds several times.

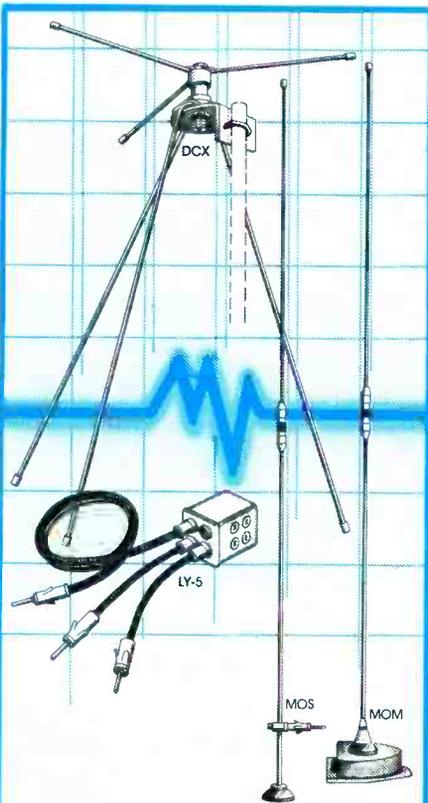


All of this hardware may not be necessary to hear other civilizations — so says a university astronomer. He says you can do it yourself, and lots easier.

The first time NASA asked, as if on cue, Sen. William Proxmire (D-Wisc) quickly seized the opportunity to turn SETI into a cheap-shot *cutsie-pootie* public relations joke. He cited SETI for one of his unfunny and tiresome "Golden Fleece" awards as an example of federal waste. Of course, Proxmire's idiotic awards have long been cause for some wags to speculate if we might first make a concerted search for terrestrial intelligence (especially in Congress) before we start probing for it in the cosmos.

Nevertheless, the public itself has never relaxed its interest in the quest for alien life forms—and Hollywood's biggest recent blockbusters (such as *Close Encounters*, *E.T.*, *Star Trek II*, *Star Wars*, etc.) amply prove this. Most of the public seems to think that should we ever succeed in locating and making such contact, the E.T.'s will not only be friendly but will also instantly reveal to us all of the mysteries of the universe and scientific technologies. Little speculation has been given to the concept that they might be quite hostile towards us, rip off whatever natural resources we haven't already destroyed by our own carelessness, or even spread harmful viruses or bacteria across the

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- 20 lines of 36 characters or
- 16 lines of 72 characters on screen
- Two pages of video display
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Write or call for more details. See the CWR-6700 at your favorite HAL dealer.



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217-367-7373

The Satellite TV Revolution

BY MARK LONG (WA4LXC/G5DEM)
AND JEFFREY KEATING (WB4KDH)

Since 1965, the world has been linked via satellite, bringing live television from around the world into our homes. Today over North America, there are 12 satellites handling the relay of television newsfeeds and entertainment programming for major television and cable TV.

These programs were once the exclusive domain of the networks. But the deregulation of small receiving equipment by the Federal Communications Commission, coupled with major cost breakthroughs in the necessary electronics, has made it possible for satellite television to be received in your own backyard! For a modest investment, it is now possible for you to own a satellite receiving system so that you can directly and independently view more than 75 channels of television programming from your easy chair.

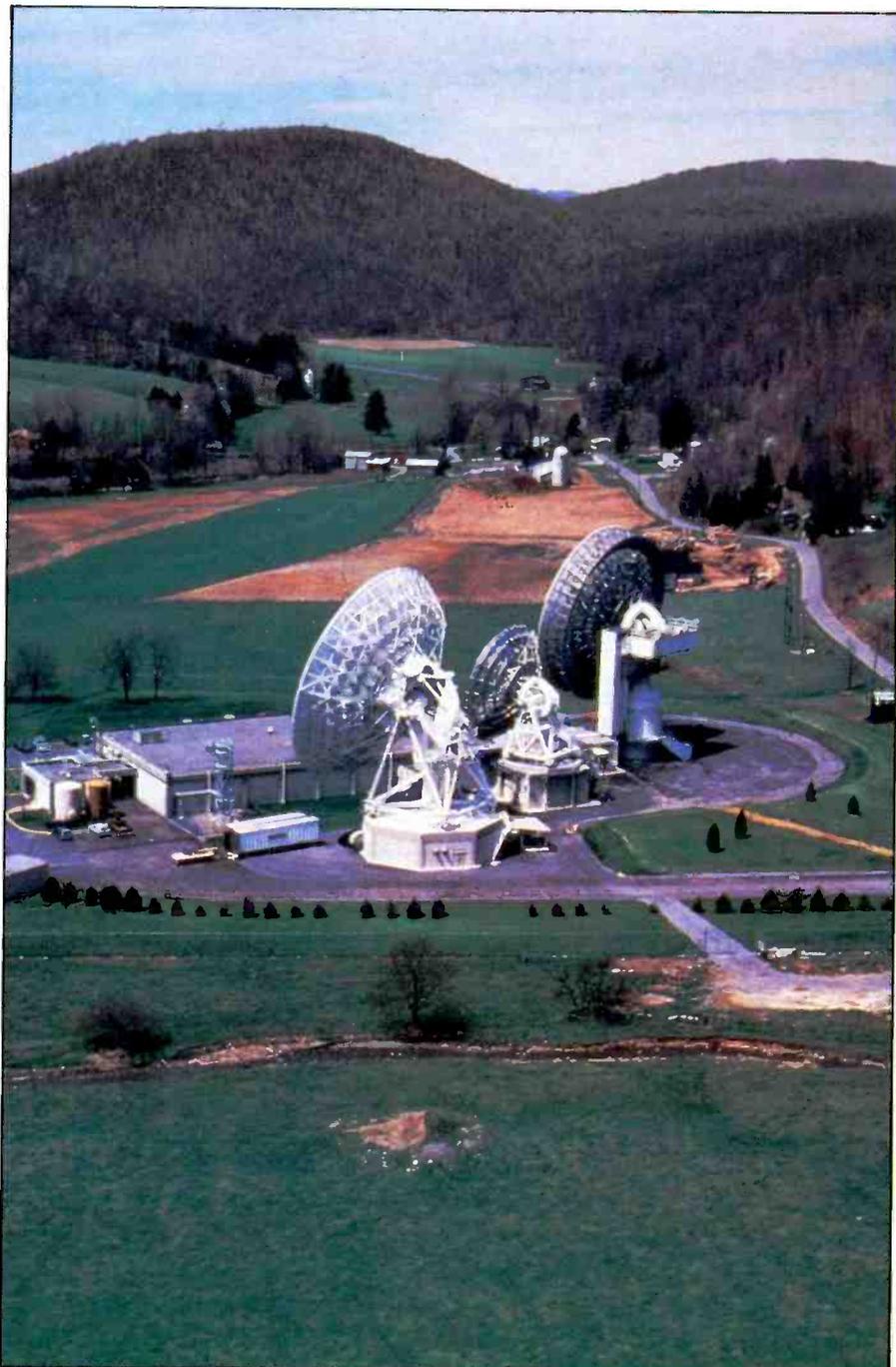
A home satellite receiver puts you in the studio control room where you can choose from a variety of unedited newsfeeds and programs. There are satellite channels completely devoted to uncut feature movies, news, sports, music, and other entertainment with many of them operating 24 hours a day. There are a wide variety of educational programs for children and adults. And, anywhere in North America, you can watch Superstations from Atlanta, Chicago, New York, or even Mexico City. With the addition of several more satellites this year, there will be more than one hundred channels for you to choose from.

Satellites:

How Do They Work?

Each satellite is both a transmitter and a receiver. A ground station transmits a 6 GigaHertz (1 GHz = 1,000,000,000 Hertz or cycles per second) signal up to the satellite. This circuit is called an *uplink*. The satellite automatically retransmits the received uplink signal down to other stations on the ground. This second signal, called the *downlink*, is transmitted on one of the channels that fall within the 3.7-4.2 GigaHertz frequency band.

INTELSAT Uplink Earth Station, Etram, WV. Photo courtesy of Comsat.



Introducing incredible tuning accuracy at an incredibly affordable price: The Command Series RF-3100 31-band AM/FM/SW receiver.* No other shortwave receiver brings in PLL quartz synthesized tuning and all-band digital readout for as low a price.† The tuner tracks and "locks" onto your signal, and the 5-digit display shows exactly what frequency you're on.

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communications accurately with BFO Pitch Control.

Want to bring in your favorite programs without lifting a finger? Then consider the Panasonic RF-6300 8-band AM/FM/SW receiver (1.6 to 30 MHz) has microcomputerized preset pushbutton tuning, for programming 12 different broadcasts, or the same broadcast 12 days in a row. Automatically. It even has a quartz alarm clock that turns the radio on and off to play your favorite broadcasts.

The Command Series RF-3100 and RF-6300. Two more ways to roam the globe at the speed of sound. Only from Panasonic.

*Shortwave reception will vary with antenna, weather conditions, operator's geographic location and other factors. An outside antenna may be required for maximum shortwave reception.

†Based on a comparison of suggested retail prices.

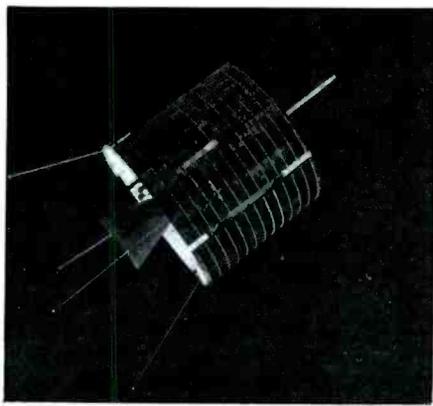


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CIRCLE 49 ON READER SERVICE CARD



Early Bird, the first Trans-Atlantic television satellite. Photo courtesy of Comsat.

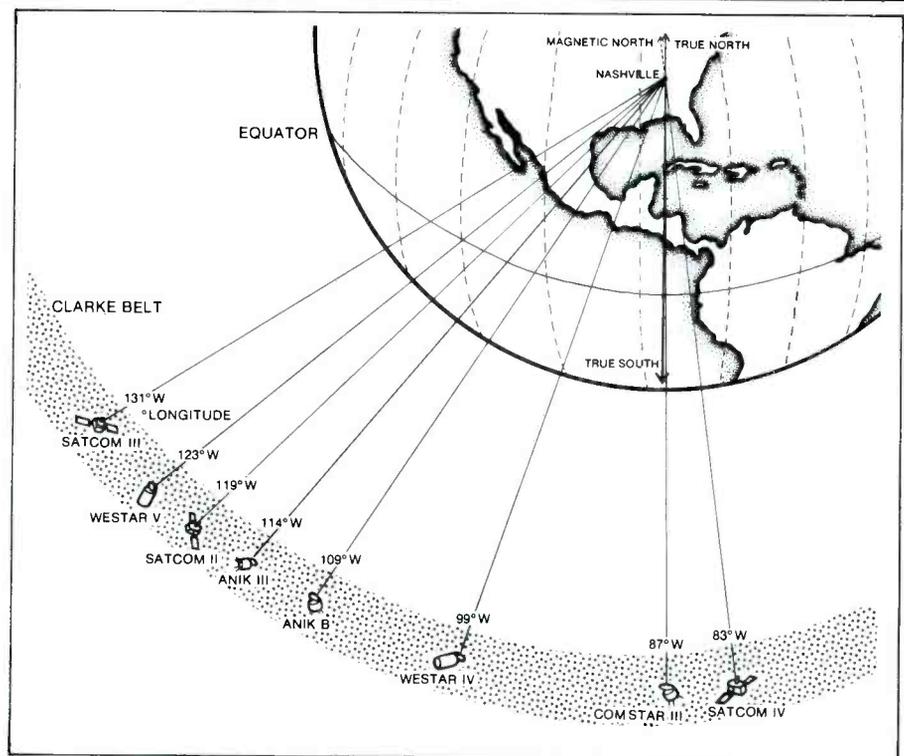
The antenna used on the downlink transmits the television signal in a particular shape, called a *footprint*. Each satellite has its own characteristic footprint, with the signal strength strongest at the center and diminishing outwardly from there. Those who live in the center of the footprint will have an easier time of receiving the signals than those out on the edges. This can be compensated for by increasing the size of your antenna. A person in Florida may need a 12 foot dish antenna to receive the same quality as a person in Colorado with an 8 footer. The most common backyard dishes are 10 feet. Once the receiving dish antenna has been precisely pointed at the satellite, no additional adjustments need to be made.

Satellites operate on frequencies high above those used by the regular TV channels. These microwaves are not affected by adverse weather conditions or sunspot activity. Their use for satellite communications makes for extremely reliable coverage 24 hours a day. Satellites transmit low power signals, usually in the neighborhood of 5 watts—only about as much as a CB radio uses on transmit. By the time the satellite signal reaches you, it is very weak indeed. That is why such large dish antennas are needed to pull it out of the background noise. Each satellite can have up to 24 channels (called transponders by the industry), each capable of transmitting one TV signal or hundreds of telephone conversations. Most long distance telephone calls are now routed through the satellites.

Conducting Your Own Site Survey

Before you go running out and spending somewhere between \$2,000-\$5,000 for an earth station, it would be wise to look at your proposed location of that 10 or 12 foot dish which is so necessary for good reception. Tall buildings, trees, power poles and lines, or any other obstacles between your dish and the satellites can block the incoming signals and degrade or even eliminate reception. The satellite signals travel in a straight line, like a beam of light, and they must fall upon your antenna for you to receive them.

The simplest preliminary survey would be



to stand in your yard facing the southern horizon. Are you blocked to the south by tall buildings or other obstructions? If so, you had better look for another location for your dish. The best receiver in the world won't help you if there is a mountain range in the way! If you have a clear and unobstructed view of the southern sky extending from the southeast to the southwest, you are in luck.

But if your home is like most people's, then you'll have some blockage in certain areas, while other areas will be open. In order to determine what satellites can be viewed in this case, a more detailed survey is necessary. Many of the companies that sell satellite equipment will conduct a survey of your site for a small fee. Make sure that you can get the satellites that carry those programs you want to watch before going any further.

It is also possible for you to conduct your own survey with the aid of a couple of simple tools and some basic information. To find a particular satellite, you'll need to know two coordinates: the bearing of the satellite (called the *azimuth*), and the look angle of the bird (known as the *elevation*). This information will not only help you tell whether the bird is visible from your location or not, but also help you zero onto it once you've got that new dish and receiver.

In order to find out the elevation and bearing of any particular satellite, you need to know the specific coordinates of latitude and longitude for your location. These can be determined from national or regional maps. This information can be entered into a computer program which will give the elevation and bearing at your location for any satellite now in operation. A complete printout for your location can be obtained by writing the company listed at the end of this article.

The direction of any satellite can be deter-

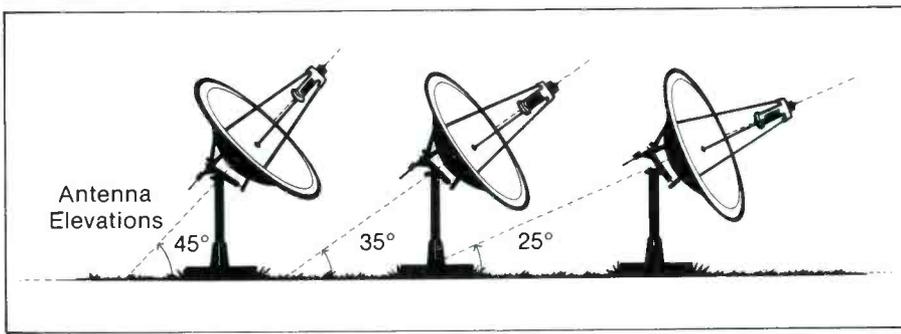


A rural DBS receiving dish. Photo courtesy of STC (Satellite TV Corporation).

mined by using its bearing and a compass. To judge the elevation of any satellite a simple device called an inclinometer is used. A site survey kit complete with inclinometer, compass, computer print out, and detailed instructions is available.

Purchasing Your Own TVRO System

A complete satellite television earth station is made up of several specialized electronic components. A parabolic dish antenna captures the weak microwave signals from the satellite and beams them into a feedhorn that sits at the focal point of the dish. Attached to the back of the feedhorn is a Low Noise Amplifier (LNA) which amplifies the incoming signal and sends it down a coaxial cable to the downconverter. At the downconverter, the 4 GHz signal is stepped down to a much lower Intermediate Frequency (IF), usually 70 MHz. This signal is then sent onto a special receiver located near your television set. This receiver peels off the video and audio information from the IF signal and feeds it to your color television via a Radio Frequency (RF) modulator. The



modulator acts as a miniature transmitter for channel 3 and hooks up to the antenna input on the back of your TV.

The price and quality of a TVRO system will vary greatly from manufacturer to manufacturer. The more expensive systems generally utilize a higher level of precision in the manufacture of the basic components which can give you a more accurate and more durable setup. There are also several additional features which can improve the performance and the ease of operation. Ask your local TVRO dealer what features their system offers. The best test for you is to see the system in operation while receiving several satellites. Tune from transponder to transponder while observing the signal quality. Do not settle for anything less than crystal clear reception on all channels.



The TVRO dish installation at the authors' home QTH. Photo courtesy of Solar Electronics.

Scrambling

As of the time of writing, there is no specific law prohibiting the ownership or use of a satellite earth station. Currently there are 50,000 home earth terminals, and that figure is expected to more than double by the end of next year. Many of the available channels offer religious and advertiser supported programming. The companies initiating these services encourage their reception by home satellite enthusiasts. Other channels offer subscription programming on a pay-per-view basis to cable TV companies, which provide a means of collecting the revenues owned. Consequently, companies like Home Box Office are actively pursuing new transmitting systems which would scramble their programs, requiring a descrambler on the receiving end.

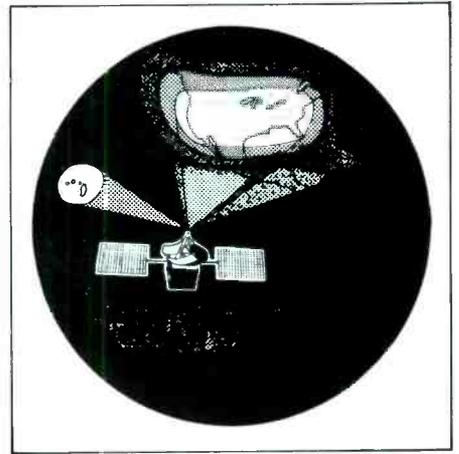
HBO's scrambling circuits will separately reprocess the video and audio of their programs, digitally encoding them. Each authorized receiver will also need a specific access code in order to receive their programs. There are two problems encountered by pay TV companies who are investigating scrambling techniques.

One problem is the large cost of equipping all authorized viewers with descramblers. HBO estimates that it will cost them more than \$5 million to change over their authorized cable affiliates. Additional costs are also incurred at HBO's uplink end in order to ensure equivalent quality of their signal. These high costs are making other subscription services think twice about following suit. Even if others do eventually go to scrambling, there will be enough free, or advertising-supported channels available, to make your TVRO investment worthwhile.

DBS: A New Generation Of Satellites Going Up

Those readers who have neither the space nor the wherewithal to install a 10 foot or larger dish antenna in their yard may consider a much smaller one which they could even rent. This is the wave of the future.

The satellites we have been talking about so far broadcast in the 4 GHz range and are intended to be received by cable operators with large dishes who then distribute some of the program channels to their subscribers.

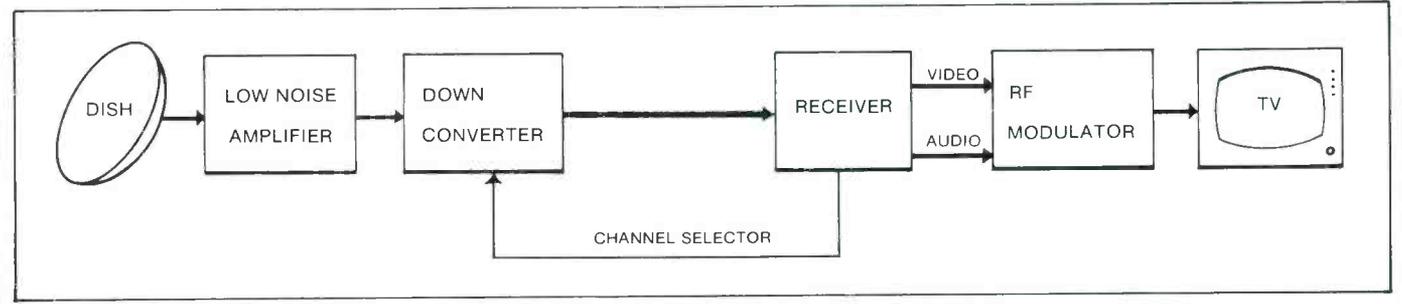


Coming your way is a new service on satellites operating in the 12 GHz range. Called DBS (Direct Broadcast Satellites) they are intended for you to pick up directly at home with a small (less than 4 foot) dish mounted on your roof.

Several companies have plans to bring you these new services. Because of the high cost of starting a DBS system (estimated at \$750 million) and the sudden overall increase in the number of TV channels these days, the FCC has opted to let the marketplace determine which of these DBS plans will succeed. It should be noted that these are at best only interim plans, which may be



DBS rooftop dish installation. Photo courtesy of STC (Satellite TV Corporation).



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Rivals long wires

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\$99⁹⁵



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Steve Birkill: Satellite TV Pioneer



Indian woman received off of ATS-6 from the SITE (Satellite Instructional TV Experiment). First satellite TV reception by S.J. Birkill. Photo by S.J. Birkill.



Saudi Arabian TV received off of INTEL-SAT IV-A. Photo by S.J. Birkill.

Much credit has gone to American satellite innovators for bringing the possibilities of satellite television to the attention of the public. There is one satellite pioneer who perhaps has provided more technical assistance to the early electronic developers of satellite television equipment than any other individual. His regular technical articles on design parameters and innovative reception techniques have been the benchmark in the industry since his initial involvement in the American scene in 1978. His name is Steve Birkill.

We visited with Birkill at his Sheffield, England home shortly before he was to leave for the U.S. to join the engineering staff of an American satellite TV company. Birkill has been an Amateur Radio enthusiast (G8AKQ) since 1965. He has been interested in TV DXing since 1959. During the late 1960s, he was very active in Amateur TV experimentation. But then Birkill's interest in television waned.

However, in 1975, he heard of an experimental television channel that was being broadcast from an American satellite into India on 860 MHz. This satellite instructional TV experiment (SITE) was initiated to provide educational community reception in Indian villages across the country. Although the satellite's beam antenna was focused on the Indian subcontinent and the satellite was fairly low in the horizon to Birkill's Sheffield, England home, he set out to try and put together a satellite TV receiver station that could pick up these experimental television signals. Utilizing only a five foot dish, he was able to receive these 1975 transmissions, although they were hardly of broadcast quality.

Excited by the results, Birkill continued to experiment with a variety of circuits. He suspected that much of the available video traffic was being run on satellites operating in the 3-4 GHz band.

He home brewed his own LNA for this band and was able to come by an 8 foot Andrews dish that was formerly used by the BBC. Other satellites soon came under his scrutiny. The Intelsat series of birds were examined and disclosed several half-transponders of video. He was able to view Transatlantic newsfeeds, and the domestic programming of Spain, Sudan, Saudi Arabia, Zaire, Nigeria, Oman, Niger, and Algeria. Even though these satellites were designed to provide video into terminals with dishes 30 feet or larger, Birkill was able, by using variable bandwidth techniques, to watch television programming from a variety of countries.

But the most powerful TV stars in the European sky proved to be the Russian Intersputnik satellites. The spot beams on a few of these Soviet birds offered more transmitted power than any other satellite system in the world, with an estimated 41 dBW at Steve's home earth station. Other areas to the Northeast of England were found to receive even higher signal levels!

Birkill became such an expert in the operation of these Russian satellites that the United States Senate Committee on Aeronautical & Space Sciences asked him to prepare a written report for them on the particulars of their operation. In fact, he has videotaped many of these programs and during our visit played back a number of them. Some of the more interesting ones had originally been relayed from Cuba to Moscow on the Atlantic Gorizont bird (14 degrees West), including *Close Encounters of the Third Kind* and *Bruce Lee martial arts movies*, all with Spanish subtitles. He has also investigated the Franco/German SYMPHONIE I & II satellites on 4 GHz and provided satellite enthusiasts in Europe with first hand information on the operation of these birds.

Birkill continues to pioneer new developments in satellite receiver electronics. He is currently working on low-cost receiver circuitry that will make the satellite revolution more available to the average consumer.



P.S. Kutakhov, Supreme Marshal on Soviet TV via Gorizont-4. Photo by S.J. Birkill.



Programma I: The logo of Moscow Television off of the Russian Atlantic Gorizont Satellite. This is viewable from the eastern states of the U.S. Photo by S.J. Birkill.



Author's TVRO dish installation with solar/wind generating station in the background.



Comsat Satellite Operation Headquarters. Photo courtesy of Comsat.



Ford Aerospace Construction Lab for IN-TELSAT satellites. Photo by Comsat.

subject to change when the Regional Administrative Radio Conference meets next year to determine frequency use, satellite spacing, and orbital spots for the countries in the western hemisphere.

As it stands now, the first DBS service could start next fall. It will be directed to the northeastern part of the country. Oak Communications has leased transponders on an upcoming Canadian satellite. They will offer two new channels of entertainment, news, cultural, and special interest programming. Both channels will be scrambled and require a special decoder to be leased from them. Each decoder will be individually addressable, thus allowing you to receive special pay-per-view programs. They can also turn you off by remote control if you don't pay your bill. Nationwide DBS service may take a few more years to develop. Phase two of Oak's plans call for expanded coverage and at least two additional channels.

One of the most interesting plans is that of CBS to introduce, through its DBS system, a whole new standard for television. Initially, CBS will not offer a lot of new programming on its three proposed DBS channels, but will offer what is on its terrestrial system in high definition. This needs explanation.

Currently U.S. television uses 525 scanning lines across the screen to produce the pictures you see. This standard was set back in 1941. As new TV screens get larger, the picture and color tends to appear progressively more washed out. The new HDTV (High Definition Television) technology offers 1125 scanning lines, more than twice the density, and the resulting video is said to equal that of 35 mm film. With an HDTV set or large screen you will receive cinematic quality at home.

Even with such a remarkable change, everyone won't be able to rush out and buy a

new HDTV set. But you will be able to watch HD signals on your conventional set. By offering parallel services, CBS hopes that gradually more people will acquire HDTVs, allowing this new technology to phase-in similar to the way that color TVs replaced black and white.

If you'd like to find out more information about satellite television, our latest book, *The World of Satellite Television*, is available from The Book Publishing Co., 156 Drakes Lane, Summertown, TN 38483. The price is \$7.95. Also available: *Satellite Coordinates Computer Printout* (please include your longitude/latitude); price: \$3.00.

The Satellite Site Survey Kit includes inclinometer, compass, satellite coordinates computer printout, and detailed instructions. The price is \$25.00.

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AEA Brings you the Breakthrough!

The Insiders' Guide To The Secret Lingo Of Spies!

BY TOM KNEITEL, K2AES, EDITOR

Every group of folks toiling in a specific line of work eventually evolves its own little set of buzzwords—a shorthand which when spoken or written has a clear meaning to others who are similarly engaged, but which is either mildly confusing or absolutely baffling to outsiders.

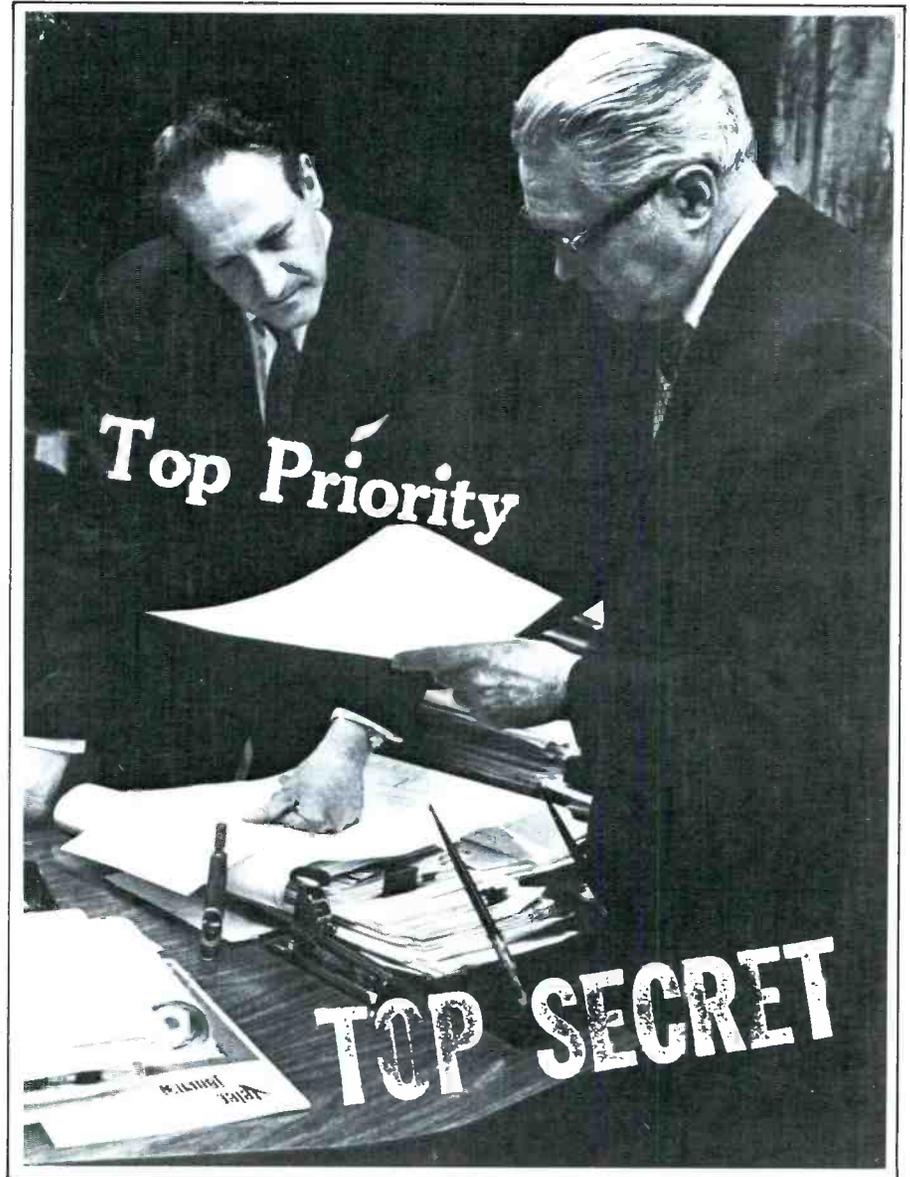
Go into a diner and hear them say things like “Adam and Eve on a raft” and “86”; musicians will talk about getting a new “axe,” while on a movie set they exchange words like “gaffers,” “grips,” and send for the “best boy.” The Intelligence Community is no different, except that in other lines of work the language is more in the realm of slang than anything else. Spies and their ilk have very clearly defined buzzwords which are an actual part of the language of the Intelligence Community, with various types of information categorized by one or more specific catch phrases, buzzwords, or esoteric abbreviations. Sometimes such “words” are used in the spoken language, while other times they are stamped on documents or contained in the texts of communications. Here’s a primer of some of the ones which would seem to be in heaviest current use.

Classifications

The most basic and well known examples of these buzzwords would be—ranging from bottom to top in order of importance—CLASSIFIED, SECRET, and TOP SECRET. There used to be a lower classification in use, RESTRICTED, but with so many documents now considered unsuitable for public consumption, that lightweight category has fallen into disuse.

As noted recently in *The Quill*, the publication of Sigma Delta Chi (Society of Professional Journalists), “. . . all modern presidents—Eisenhower, Nixon, and Carter, to name but a few—have found, until now, that the secrecy stamp was being used to hide mistakes, muzzle internal criticism, and shield acts of public officials from public scrutiny.” Last April, President Reagan signed an Executive order which added new teeth to the government’s ability to classify various materials it generates and the message came through louder than ever before—*when in doubt, stamp it SECRET!*

One example of how this new Executive order was recently used was when a U.S. Navy Lieutenant wrote an article questioning the ability of two large U.S. aircraft carriers



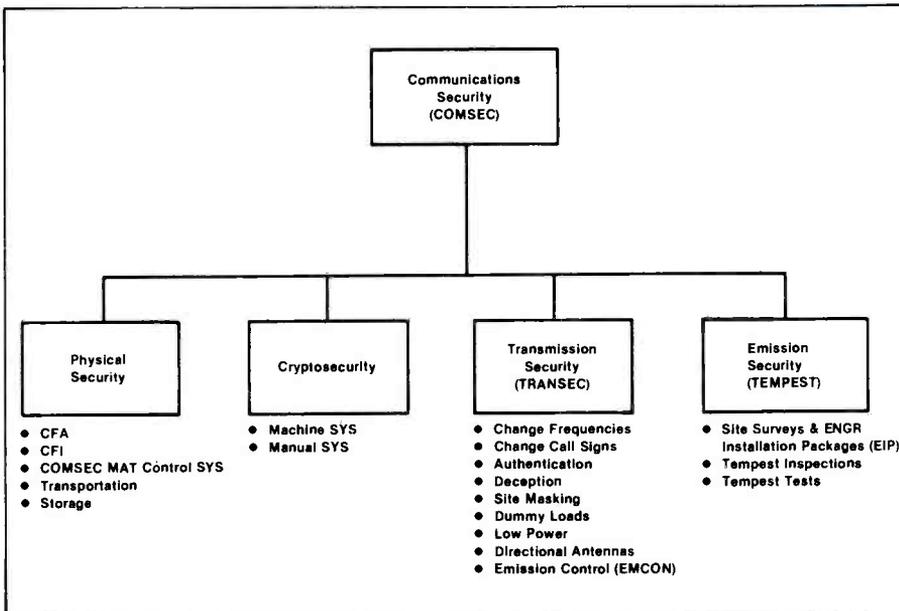
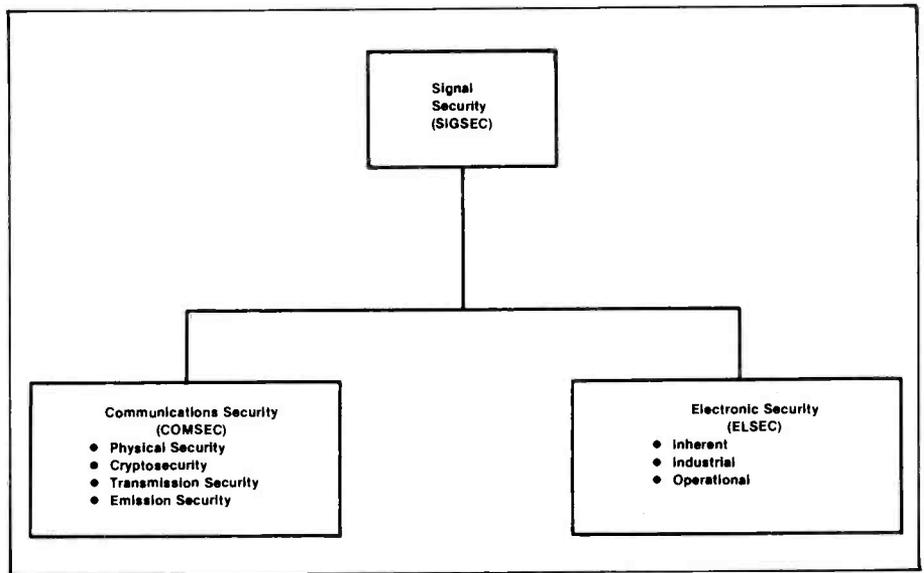
to survive simulated Soviet attacks. He submitted the article to the Naval Institute’s magazine, *Proceedings* (an informative but unofficial publication), which routinely passed it along to the Navy for review. The Navy had been looking with much favor upon a \$6.8-billion project calling for the construction of two more nuclear powered aircraft carriers—a concept the Navy Lieutenant’s article didn’t endorse. His manuscript also found its way to the hands of Sen. Gary Hart, a leader of the Congressional

critics of the project. These critics claim that the aircraft carriers would be sitting ducks in a future war because of the weaponry carried aboard missile-carrying aircraft and attack submarines.

Before the article could be printed, however, the Navy placed a SECRET stamp on its cover. They insisted this was done because the article revealed classified data and not because the story undercut the Pentagon’s pro-carrier position. *The Quill* said that “the fact remains, however, that a gov-

Here's the breakdown of those things which make up the SIGSEC (Signals Security) classification.

COMSEC means Communications Security in the lingo of the intelligence community. This is what it covers.



telemetry, navigational, weapons guidance, target acquisition, or jamming (countermeasures) signals. Intelligence can even be developed simply by noting an increase or decrease in the amount of station activity on particular strategic frequencies, regardless of the content of the transmissions.

SIGINT is the term used to describe COMINT and ELINT, taken as a whole and combined into an overall intelligence picture. It is considered a valuable tool in planning and conducting EW (electronic warfare) operations, by providing the technical data required to plan any necessary ECM—electronic countermeasures, or ECCM—electronic counter-countermeasures.

Keeping It Secret

Classified documents and messages of any category or type often contain various abbreviations and buzzwords which offer advice as to distribution restrictions set upon the information. They can even include methods used to protect them from being perceived by undesirable eyes and ears.

About the strongest such restriction on a document would be the eerie NODIS—no distribution—which means that the information is so profoundly sensitive that only the one who originated the document should have it or (if marked EYES ONLY) should even be permitted to see it, know what it contains, or perhaps even know that it exists. This seems to have achieved the apex of paranoia or, as William Safire speculates in his book *On Language*, it is closest to the facetious, “burn before reading.”

Next down on the ladder of distribution would be a message or document categorized as EXDIS—exclusive distribution. Such information might be carefully distributed to perhaps 10 to 15 select persons. Following closely is LIMDIS—limited distribution—which is the lesser of these categories and indicates that it isn't for handing out all over but might be offered to about 50 or so persons who would have use for its contents.

Sometimes specific persons or agencies to receive the information may be spelled out in detail, the listing of same preceded by

ernment employee who disagreed with the official line was silenced with a rubber stamp.”

At the present time, 'most anything is liable to show up stamped with all sorts of SECRET type classifications. Furthermore, the SECRET classifications used today may well be amplified by other add-on code words which not only give clues as to the source and reliability of the information being tendered, but may also specifically restrict the distribution of the information to an ever narrowing group of recipients.

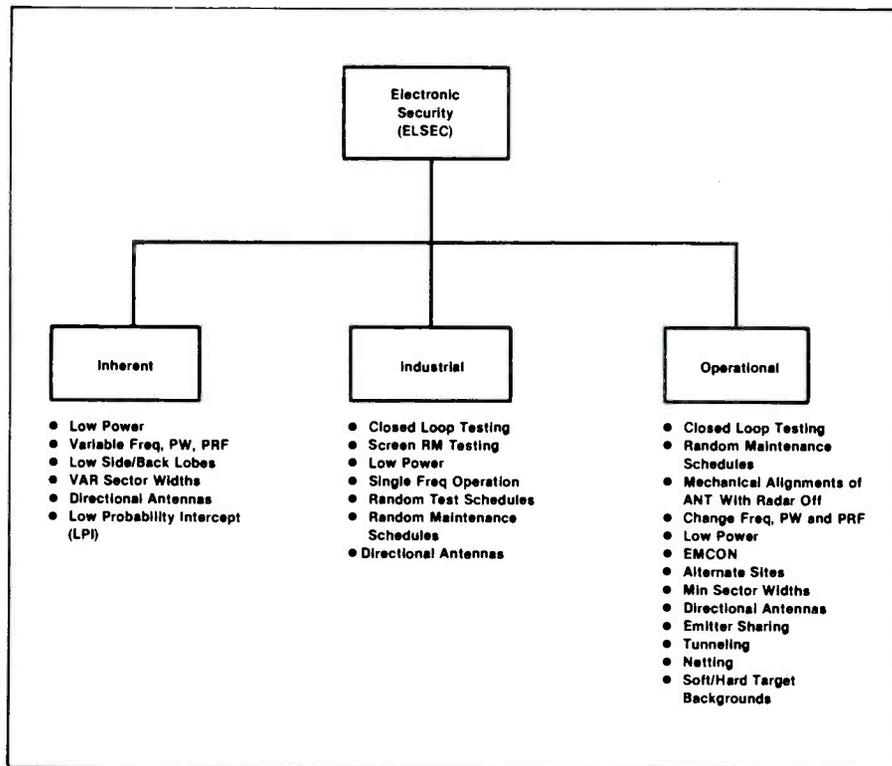
For instance, the code word WNINTEL stamped on a document, report, or message immediately informs its beholder that it is based upon intelligence operatives using surreptitious techniques which might well include (amongst other things) wiretaps, room bugs, visual surveillance, monitoring of radio transmissions, etc. Once such a warning has been stated, the reader might further be informed as to the sources on a more specific level. As an example, SIGINT means “the intelligence is derived from the interception and processing of electromag-

netic radiations other than those caused by a nuclear detonation.” This could include anything and everything from a simple wireless room bug all the way to monitoring reports processed through sophisticated equipment located aboard a spy ship or aircraft anywhere in the world—even information obtained by monitoring equipment aboard a spy satellite. It, however, does not include intelligence gathered by “hard wired” telephone taps or wired room bugs.

Further narrowing down the source of the intelligence might bring into use the descriptive term COMINT—communications intelligence—which means that somewhere, somehow, someone latched onto a tactical message which was sent out via voice or non-voice methods (AM, SSB, CW, RTTY, FAX, FM, spread-spectrum, digital, digital burst, or other modes) on a radio frequency anywhere between VLF and microwaves.

The term ELINT—electronics intelligence—would be used to describe information which has been developed by monitoring transmissions which were not actual messages, but may have been radar signals,

Electronic Security is simply called **ELSEC** to the agent or operative. Its various components are shown here.



the term REL. If the person or agency which originated the message or document is the one who is able to call the shots as to the dissemination of the information, it may be marked ORCON—originator controlled.

A document or message which is marked NFIBONLY indicates that it is for distribution only within the National Foreign Intelligence Board, and if it's stamped FGI it notifies its recipient that it contains foreign government information (that is, data either from or about a foreign government).

The curious, but apparently necessary warning of PROPIN may appear on a document to put you on notice that it contains or is about proprietary information. That means it contains something which is held under a patent, trademark, or copyright.

When messages are to be passed via electronic means, we encounter some additional buzzwords related to keeping them diverted from those who aren't supposed to know what's going on. Actually, it's the flip side of the coin of SIGINT, COMINT, and ELINT.

Now we encounter SIGSEC—signals security, and its two components, COMSEC—communications security, and ELSEC—electronic security. In an oversimplified nutshell, it means making plans and efforts to counter the other guy's plans to derive SIGINT from your electronics technologies. COMSEC includes not only the use of cryptosecurity, emission security, and scrambling, but also physical security of the communications facility, its equipment, personnel, data, etc.

TRANSEC—transmission security—may be used in a COMSEC program. This consists of using tactical identification, signal authentication, switching around of radio frequencies, etc. Another COMSEC ingredient is TEMPEST, which means to avoid making any compromising or inadvertent transmissions. ELSEC efforts would include the use of low transmission power, highly directional antennas, and short-range operating frequencies.

All of the SIGSEC procedures would be a part of OPSEC—operations security. This includes security arrangements relating to the overall mission being undertaken.

A Curiously Abused Restriction

The code word NOFORN plainly states that "foreign nationals" are not allowed to peruse the message or document. To put it in the most straightforward way, *Americans only*. Of course, it doesn't always work out the way it was planned by the originating agency. When Iranian "students" stormed the U.S. Embassy in Tehran in November of

1979, they found that they were privy to a huge number of diplomatic reports, manuals, documents, messages, telexes, and cables, many of which were not only marked SECRET but also carried the admonition NOFORN written clearly where it might be seen by all. And just in case they didn't quite understand what NOFORN actually meant, the full explanation, in all of its glory, was spelled out—"not releasable to foreign nationals"—right in the text!

As might be expected, they read all of those NOFORN documents and messages, and any which had been previously run through the paper shredding machine were laboriously reassembled into whole sheets for intelligence purposes. Some of the NOFORN documents proved so absolutely titillating to the Iranians that they assembled them into a 13-volume set of paperbacks which were promptly placed on sale to the general public in Iran. They could be purchased at newsstands, throughout the nation; yet, when three CBS reporters attempted to bring a set into the United States from Iran, our own government agents confiscated them! A bizarre backfiring of NOFORN if ever there was one!

NOCONTRACT is yet another restriction on a sensitive document or message. It means that only federal employees may know the contents of the document and that it can't be released to government contractors or contractor/consultants. This, as with other restriction or classification words, is taken quite seriously by those who are professionally concerned with such intricacies of information dissemination.

Several years back I had a government contract to write training films for the Army Signal Corps. While non-classified films could be written on my own turf, those

which were determined to be SECRET had to be worked on at the Army Pictorial Center in Astoria, NY. I had to be there early in the morning and obtain my working materials from the MP's who guarded them every night in a security cage. Then I'd be locked into a little room for the day where I worked on my script. At the end of the day I had to bring all of my notes and scripting efforts back to the security cage, along with my wastepaper basket and its contents, for storage or disposal by the MP's. I'd also have to go through a minor security search each time I checked out for the day.

One day when they let me out of my little room to get some chow at the PX, I picked up a copy of *Playboy* left by someone who had walked off and forgotten it, and I brought it back with me to my work room. Remembering that in one of the drawers of my desk there was a convenient supply of classification rubber stamps, I sorted through and extracted some of them—SECRET, EYES ONLY, NOCONTRACT, etc.—for use in decorating the *Playboy* centerfold and other pertinent and impertinent sections of the magazine. I thought it would be a cute touch to show to my pals when I finished up work for the day.

Unfortunately, the MP at the security gate didn't share the good humor of the moment. First he told me that I wasn't permitted to take any paperwork home with me and when I explained that it wasn't part of my script he wanted to examine it. The sight of the rubber stamped classification words all over the magazine, if anything, got him both annoyed and suspicious. He said that I wasn't supposed to have anything marked NOCONTRACT and wanted to know how I came to obtain it. I thought he was kidding—at least until he picked up the phone

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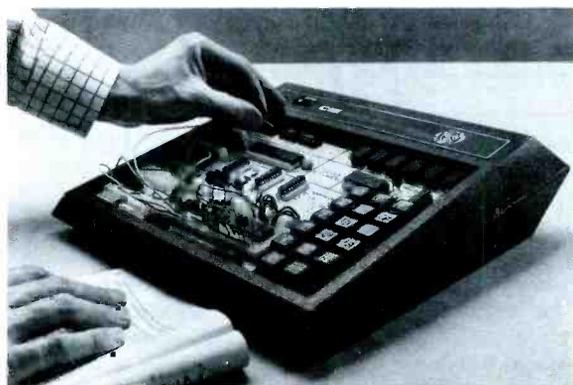
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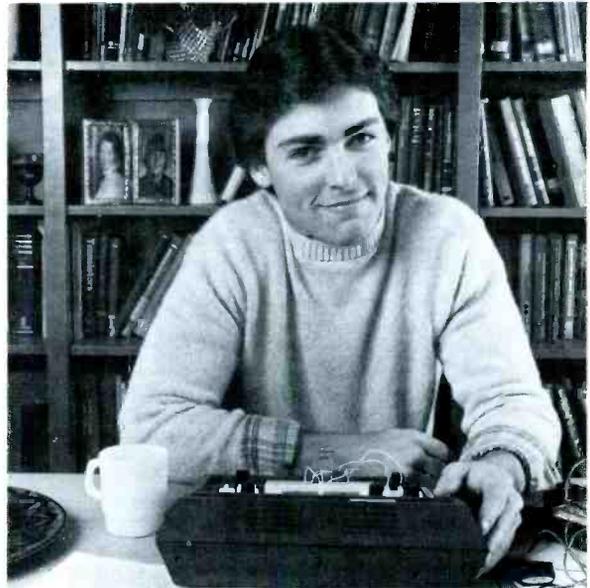
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A simple cipher type code where there is a direct 1-on-1 substitution used. It's not too difficult to crack, but sometimes several steps of coding are used which makes it a bit hairy.

secret
noforn-nocontract-orcon

KEY LETTERS/NUMBERS	
	F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M
F	F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F
X	X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X
E	E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E
B	B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B
7	7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7
P	P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P
I	I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I
L	L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L
Z	Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z
3	3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3
5	5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5
W	W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W
N	N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N
Ø	Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø
A	A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A
J	J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J
C	C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C
T	T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T
O	O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O
D	D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D
1	1 U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1
U	U 6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U
6	6 2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6
2	2 H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2
H	H S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H
S	S Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S
Y	Y K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y
K	K 8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K
8	8 V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8
V	V 4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V
4	4 Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4
Q	Q 9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q
9	9 G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9
G	G R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G
R	R M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R
M	M F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R M
	F X E B 7 P I L Z 3 5 W N Ø A J C T O D 1 U 6 2 H S Y K 8 V 4 Q 9 G R F

CIPHER TEXT LETTERS & NUMBERS

March 1979
Israel
Foreign Intelligence and Security Services



secret

and summoned not only a Master Sergeant but also a Captain. They weren't amused either, and my explanation only caused me to be questioned at considerable length concerning the entire "matter." Ultimately, they asked me to sign a receipt for the magazine, which they confiscated—advising me that they might be "in touch" at a later date." I am certain that locked away in a "pending" bin at some military security office is a copy of the March, 1961 issue of *Playboy* marked SECRET, EYES ONLY, NOCONTRACT.

These are definitely situations which do not allow for levity.

Encrypt/Encypher/Encode

Although not specifically part of the things discussed thusfar, it will be of related interest to briefly discuss the terms encrypt, encypher, and encode inasmuch as to many people they would appear to be synonyms of one another and can be interchanged freely. This isn't quite true.

A cypher relates to messages which are concealed or hidden by means of a direct 1-on-1 substitution of letters. It's like saying that when put into the form of a cypher, the word "bullets" would possibly emerge as something like "gnrrvko."

Here's a part of the cover sheet of one of the secret documents found by the Iranian "students" when they stormed the U.S. Embassy in Tehran. Apparently they didn't know what "NOFORN" meant since they read the whole thing, and then published it and put it on sale—although American agents attempted to confiscate all copies entering this country! An ironic twist!

A code is a way of disguising the content of a message so that actual words may be used in the transmission. However, their meaning is totally different than what they appear to be stating. The message, "The fish are swimming in the lagoon," for instance, could be one way of putting in coded form the instructions, "Invasion time is set for 2130 hours."

To encypher or encode is to place a message into one of these forms, both being covered under the general descriptive term "encrypt." To extract the meaning from anything which has been encrypted would require decyphering or decoding, depending upon the method used for concealing the message.

One of the interesting things you may well come upon while you're listening to a scanner or communications receiver is the use of various codes. On a non-governmental level you'll hear so-called "10 codes," or frequency designators such as "F-1" or "F-2." These aren't always used for security purposes; more often than not this is basic vocal shorthand intended to convey a message in its most simple and (to the recipient of the message), least confusing form.

On federal frequencies it's usually an effort to achieve some measure of privacy. Thus we have tactical identifiers used for stations instead of callsigns, or frequencies referred to as "Blue 3," or "Black 4." Various operatives or agents are often referred to by a number rather than by name, and code names are used to designate those who are under the protection of the Secret Service.

On the military frequencies, locations may be coded as well as various instructions and orders. Stations may also be monitored giving verifying codes which indicate to the other station in the contact that the station(s) calling them are exactly who they claim to be and not some spurious imitation station set out by an adversary for deceptive purposes.

Probably, the hidden messages you'll encounter with a communications receiver most often are coming from so-called "spy numbers" stations. These stations, which are generally reported as transmitting in Spanish, German, and English, are prone to sending messages in the form of 5-digit groups called *code groups*. In the system used by these stations, each 5-digit group represents a complete word which may consist of any number of letters. The method used to set this up is by both stations having a prearranged listing of words together with corresponding 5-digit code groups representing each of the words. Without having that list, or a key to a book or dictionary from which the list was made, it is virtually impossible to decrypt such messages, especially if the list is one which changes regularly.

When it comes right down to it, classified information and codes are an integral part of our daily lives. Classified information amounts to all of the data in the world which someone else says you can't have access to, while telephone numbers (codes in the purest sense) give you easy access to unlimited information!

LEARNING THE MORSE CODE?

Try the All New AEA BT-1 — Basic Trainer For Morse Code



AEA, in conjunction with ETS (Educational Technology and Services)*, has developed the BT-1 Code Trainer. ETS methodology, based upon research by a prominent mid-west university, has demonstrated that a typical student using this system and the BT-1 can learn Morse code to speeds of 20 WPM in four weeks based upon two 20 minute daily training sessions.

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*Education Technology & Services, see page 81 October 1981 Issue of Ham Radio Magazine.

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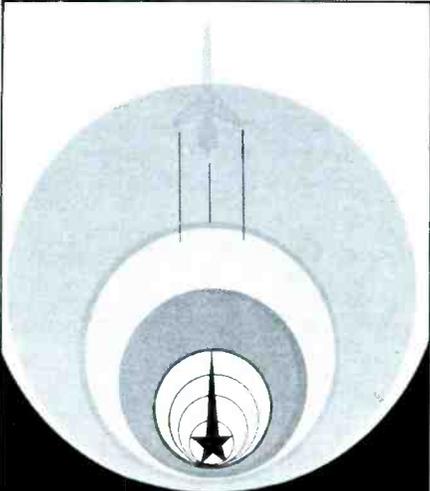
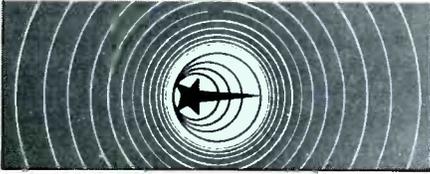
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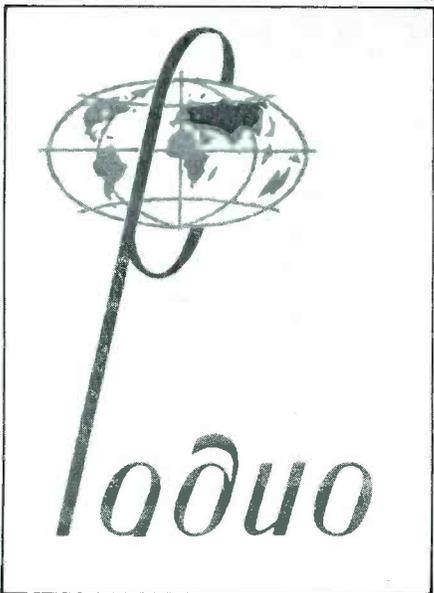
**РАДИО RADIO
МОСКВА**



**Радио
Москва**



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QSLs from Radio Moscow are continually changing in design and are much more varied than they were years ago.



DXing The Soviets

BY GERRY L. DEXTER

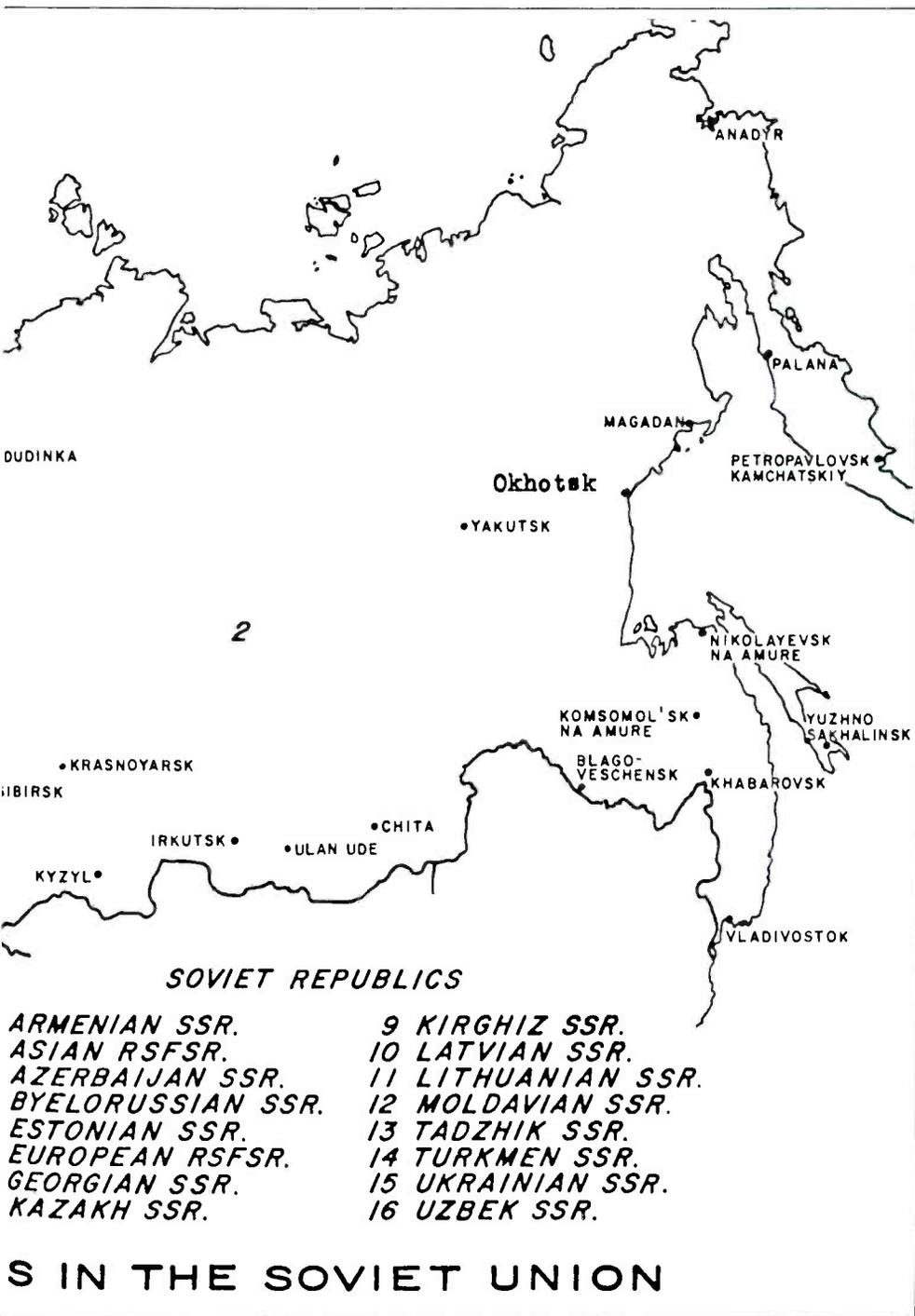
The Soviet Union is a behemoth. Its presence is felt, one way or another, in every corner of the globe. It is the largest country in the world, the third most populous, and around the top militarily, depending on how you count your missiles.

The Union of Soviet Socialist Republics consists of sixteen individual republics. Russia proper has been further divided by DXers into European and Asiatic Russia for the purpose of radio "country" counting, with

the dividing point being the Ural Mountain range. So that makes seventeen radio countries. One, Moldavia, is inactive on short-wave, so the DXer has a possible sixteen Russian countries he may add to his log.

Like the country itself, Soviet broadcasting is large, varied, and complex. But the Russian radio bear can be tamed by the DXer who is willing to invest the necessary time, study, patience, and detective work!

The major broadcasting organization in



Map courtesy of SPEEDX.

Russia is the familiar Radio Moscow—one of the first stations a beginning listener is likely to hear and one of the very first of today's thousands of shortwave broadcasters to go on the air. Radio Moscow is a mammoth, providing various programs and service in a wide variety of languages which are beamed to every corner of the globe.

Radio Moscow operates around the clock, seven days a week. It transmits in English to the East Coast of North America daily from 2200 to 0400 Greenwich Mean Time. And there's also a Pacific Coast service aired from 2200 to 0700.

Actually, Radio Moscow's English language broadcasts to all corners of the world were incorporated into a "World Service" a couple of years ago. The service was more

or less patterned after the BBC World Service and operates virtually around the clock.

But all of this is just the tip of the iceberg. There are regular transmissions to Central and South America, Africa, China, South Asia, the British Isles, and so on.

Radio Moscow operates still other services. There is the First Program, which is intended for home consumption, but even so can be heard on many shortwave frequencies most of the day. You can tell you're listening to the First Program by its use of the sound of the Kremlin Bells which open each transmission, and also by its nine note interval signal.

The Second Program, which is more commonly known as "Mayak" (meaning Lighthouse), is primarily a music service and

can be easily spotted by its interval signal, a portion of the song "Midnight in Moscow." Also, listen for the six time pips transmitted on the hour.

The Third Program is concerned mainly with literature and music. It is not widely transmitted on shortwave.

Yet another service is Radiostansiya Yunost (Youth Radio Station), the special program for young people. But don't expect it to sound much like a Top 40 station in the United States!

All of these services and programs are intended for an internal audience within the USSR. Shortwave is used to cover the vast distances involved. For the rest of the world, there are still a number of services!

Radiostansiya Rodina broadcasts programs which are produced by the Committee for Cultural Relations with Compatriots Abroad. Another name for it is the Voice of the Soviet Homeland.

A number of different political groups sponsor programs on Radio Station Peace and Progress. You're quite likely to run across it in Spanish with the identification Radio Paz y Progreso. This one is on the air several hours each day on a wide variety of frequencies.

Radio Leningrad is beamed to Russian seamen in the North Atlantic. But, don't count on it actually being transmitted from Leningrad. More on that later.

Radiostansiya Atlantika, or Radio Station Atlantic, is also beamed to Soviet sailors, at least in part. Its Pacific counterpart is Radio Tikhy Okean (Radio Pacific Ocean) whose programs come from Vladivostok but are transmitted from several Asiatic cities. All of these transmissions are, in actuality, part of the Fifth Program.

There is a special transmission to Chile, a country which had a brief experience with Communism. This one is called Radio Magdallenes and is on the air for half an hour each evening, again over various Radio Moscow transmitters.

In addition to all of this, there are still a number of regional or republic stations operating in the various Soviet republics. In the Ukraine, Radio Kiev; in Estonia, Radio Tallin; in Uzbekistan, Radio Alma Ata, etc.

It is impossible to even attempt to list all of the frequencies and schedules for all of these stations and services. They change almost continuously. Radio Moscow revises its times and frequencies of transmissions about ten times a year! And the compilation of the entire schedule for all the programs and services can easily run to 50 pages. There are a few DXers who spend virtually all of their DXing time attempting to sort out this ever-changing picture, keeping track of what's where, when!

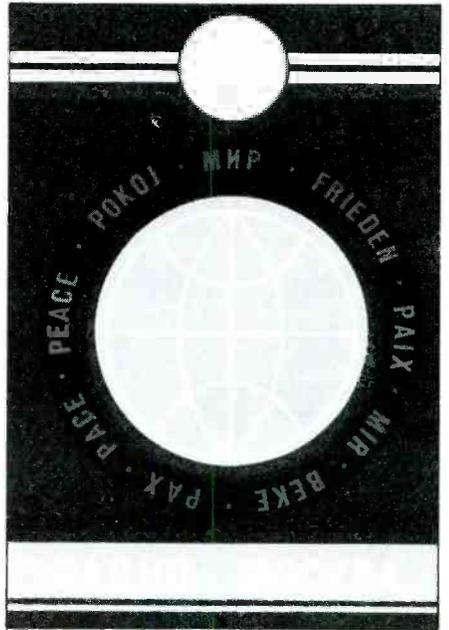
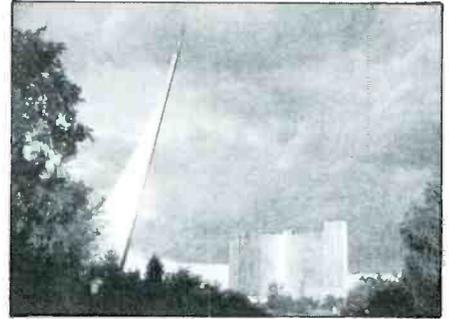
If all of this sounds confusing, look out! There's more! The real fun begins when you realize that, although you may be listening to a program from Moscow, nine times out of ten that broadcast is actually being transmitted from somewhere else! A case of listening to Moscow but not listening to Moscow.

Radio Moscow programs, along with the



Radio Moscow's English language staff from a few years ago. Left to right: Terry Kapustin, Sergei Rudin, Annabelle Bucar, Annette Setyaeva, Lucy Praudina, and the well-known Joe Adamov. In the center, standing, is Mrs. Eugenia Stepanova, head of English language correspondence.

Radio Moscow often sends "extras" such as calendars, pins, program schedules, post cards, even reception report forms.



RECEPTION REPORT ON RADIO MOSCOW BROADCASTS

Program date _____  Language _____
 Receiver _____ Antenna _____

Time GMT	Frequency mc/s	In-Band	S*	I*	N*	P*	O*	Type of interference

Details of program: _____

Favourite programs: _____

Suggestions for improving broadcasts: _____

Questions I would like answered: _____

If this report corresponds with your station log, I should be very glad to receive your verification card.

Age _____
 Occupation _____

Name _____
 Address _____

*** NOTE:**

S — signal strength; I — interference; N — atmospheric noise;
 P — propagation disturbance; O — overall merit

other services mentioned earlier, are actually broadcast from dozens of different cities within the Soviet Union (as well as a couple in the satellite countries). These too, are constantly on the move. You may be hearing Radio Moscow's North American Service via Lvov in the Ukraine on one frequency, the same program at the same time on another frequency but this one coming from Tula in European Russia! A week or a month later and the entire picture may change completely.

Most DXers take the view that one broadcasting organization transmitting from more than one site is countable as a separate station for each site it uses. Thus, great possibilities are opened up for adding new stations when one DXes the Soviets — once you

learn how to play the game of Russian Radio Roulette, that is.

The game can be approached in different ways. The "shotgun" method involves logging all one can on as many different frequencies as possible, then sending in reception reports requesting the transmitter sites be placed on the QSL cards. This will probably work for awhile. But when one gets down to a dozen or so sites that are still needed, the shotgun method brings with it a lot of wasted effort with less results the more it's used.

Arming yourself with information in advance is a far better way to approach things. If you own a fat wallet, you might subscribe to the *International Telecommunications Union's Tentative High Frequency Broadcast Schedule*. This publication, known also as *The White Book*, is issued four times a year and contains listings of frequencies, sites, operational hours, power, beam direction, and so on. Each issue costs about \$125, and even at that the information is of-ten suspect.

The California-based DX club, SPEEDX, publishes *A Guide to Soviet Broadcasting*, available for just \$1 from SPEEDX, P.O. Box E, Elsinore, CA 92330.

Three dollars, or six international reply coupons, will get you a copy of the Australian Radio DX Club's publication *DXing the USSR*, an excellent general guide to the subject. Write to ARDXC, 3 Kadana Street, Oack Park, Victoria 3046, Australia.

Once you have some reception reports written they can normally be sent directly to Radio Moscow. The only address you need is simply Moscow, USSR. Usually the QSL you receive in return will show the site if you have requested that information. Radio Moscow's official policy is to confirm only reports sent in the language of the broadcast heard, but they will sometimes make exceptions to this. By directing your report to the Radio Moscow service you've heard, and make an attempt to write in the language used by the broadcaster (many clubs have form reception reports in various languages available), you can be reasonably sure of fair success in verifying a number of Russian transmitter sites.

Normally it is not the practice for Radio Station Peace and Progress, Radiostansiya Rodina, and the other program services to issue site QSLs. You are probably better off staying with Radio Moscow transmissions for QSLing purposes.

The regional stations such as Radio Baku, Radio Alma Ata, and so on, are quite inconsistent with replies. A few of them will be very good for a while, then some will go "black." Those with some form of overseas service will generally prove to be more responsive. Occasionally, Radio Moscow will supply a QSL for one of these, but don't count on this approach. The best way with the regionals is to stay with the direct route and keep at it until you've been successful.

Now, just to keep you on your toes, you should be aware that even after you've received a QSL complete with a site on it, there is no one hundred percent guarantee it

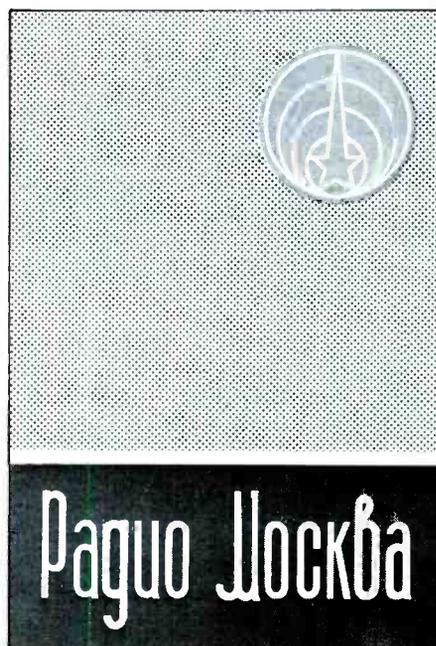
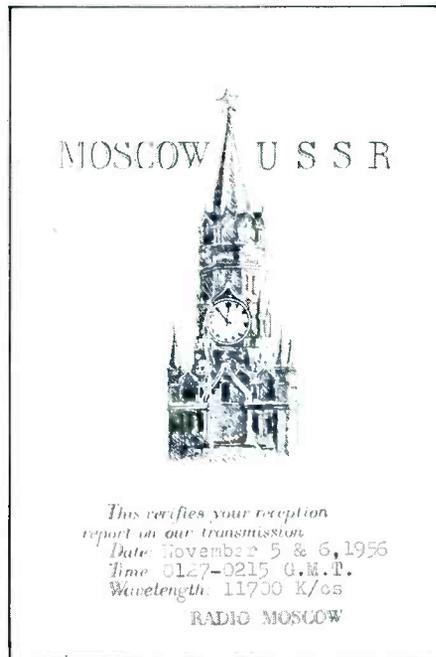


is the site that was actually in use after all! For various reasons, including the difficulty Radio Moscow has in keeping up with its own changes, they will often confirm reception of an out-of-date site. Or, for reasons of its own, Radio Moscow will intentionally confirm the wrong site, preferring not to admit that a certain site is being used. One or two DXers who specialize in such things have proposed a theory based on satellite photos, topographical maps, and so on, to the effect that many of the places where Radio Moscow lists shortwave transmitters, there are, in fact, no transmitters at all.

There is little to be gained in trying to second guess Radio Moscow in these matters. DXers have come to adopt a "take what you can get" approach. With extensive listening over a period of years, one is quite likely to confirm all of these sites anyway, even though a particular card or two may miss on a site. Volume, if nothing else, provides insurance. While this might appear to be a rather slipshod approach to things, it simply takes into consideration the nature of the beast and is a practical approach to a difficult situation.

At one time or another it is estimated that some 100 transmitter sites are on the air from the USSR. A few DXers who have spent years on the chase have managed to verify about two-thirds of these. If you get all 100, it is safe to say you'll be unique in the world.

DXing the Soviet Union, even without getting into QSL chasing, is a fascinating aspect of shortwave broadcast listening and is well worth at least a testing of the waters. Dasvidanya!



A small selection of Radio Moscow QSL cards. Note that some do not show sites.

PRODUCT SPOTLIGHT

Secrecy And Other Codes Used In Radioteletype

BY THOMAS P. HARRINGTON, W8OMV

For many years, The Standard Radio Teletypewriter Code has been the Baudot or Murray 5 level code. Recently, the ASCII 7 level code has been used for high speed transmission; ASCII is now approved for Amateur Radio transmission and is found on some of the popular Amateur RTTY frequencies. ASCII is used more in the higher baud rate transmissions up to any including 1200 baud rate, and is standard in 110, 150, 300, 600, and 1200 baud rates. The accepted baud rates for Baudot code is 60 WPM (45 baud), 66 WPM (50 baud), 100 WPM (75 baud) and 132 WPM (100 baud).

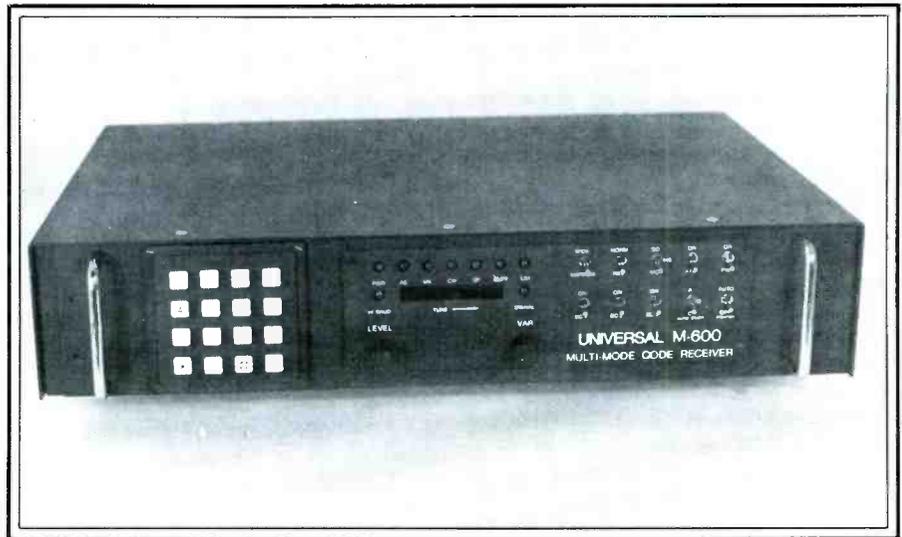
The HF frequencies are very busy with Standard Baudot Radio Teletypewriter traffic from various sources, including press stations around the world, weather stations, military, aero weather reports, governments, Amateur Radio, RTTY, plus others.

Most standard RTTY terminal units, "demodulators," and converters, will decode the standard Baudot, ASCII, and Morse (CW) modes. However, there are other radioteletypewriter codes being used that cannot be decoded by these standard converters. An M-600 unit must be used for these services that transmit in codes other than Baudot and ASCII. Some services want to discourage the casual listener, so they use BIT Inversion and other code types to accomplish this end. These stations are not sought after for general SWL eavesdropping because most standard non-commercial RTTY units produce a garbled printout of these transmissions. A special converter must be used to decode these other types of RTTY codes.

TOR is another non-Amateur code used to achieve error-free copy. With this short background, we can now look at some of the common codes used. Many of these are, no doubt, the stations that defy your receiving intelligent copy with the standard RTTY units that are now being used. This has now changed, however, and the M-600 unit adds several of the most used non-Amateur RTTY codes plus the standard codes—a true multi-code converter.

BIT Inversion

A simple and easy way to afford a RTTY transmission some amount of privacy is done by changing one or more of the five in-



formation BITS to the opposite sense, i.e. mark inverted becomes a space. When printed, BIT Inversion looks like encrypted Baudot.

To copy these many BIT Inversion transmissions, a terminal unit capable of doing a search to determine which of the 32 possible combinations of BITS of the codes are inverted (sampling of signal) and reinverting these bits to produce valid characters. The new M-600 Code Receiver (TU Unit) accomplishes this automatically and produces a read-out of the BIT Inversion codes. There are many stations that have been using BIT Inversion successfully for many years.

BIT Transposition

This method could be classified as a simple Cipher and is accomplished by interchanging two or more BITS of the regular character code on a regular basis. This code is not readily deciphered on standard RTTY equipment as the BIT Transposing can change at the will of the transmitting station. Another form of security system would be a combination of BIT Inversion and BIT Transposition combined to yield a transmitted signal that cannot be copied by the normal RTTY systems.

TOR Codes

TOR means teleprinting over radio; the names Sitor and Spector are trademarked

versions of the TOR systems. This code is a seven BIT synchronous code with provisions for error checking by means of a constant ratio of 3 marks to 4 spaces in each character. The normal transmitting speed used by the TOR systems is 100 baud rate (132 WPM) using 170 Hz shift.

ARQ—Automatic Retransmission Request

Traffic is exchanged between two RTTY stations using the same frequency; this mode can also contain an error correcting system. All three TOR modes provide potential for error detection. The ARQ mode is the most certain means of error correction. In the two stations that are communicating, the station that initiates the communication is the master; the receiving station is the slave.

If an error occurs in the block of three characters, the transmitting station awaits a reply from the receiving station indicating it has received error-free and valid data; then the next set of three characters is sent from the master. If an error is detected, the transmitting station repeats the character group. The request for error-free data can be called for many times. The receiving station must have transmitting facilities. However, copy can be accomplished with receive-only equipment. The ARQ mode practically guarantees error-free copy.

FEC (Forward Error Correction)

In this mode, one station can transmit to one or more receiving stations, as this mode does not require a reply. Also, there is no repetition of groups of characters that have been sent. To insure good copy, each group of 4 characters is sent twice, with the same 3-space, 4-mark ratio in a character-interleaved format. The receiving station examines the first set of characters and stores them for print-out if they are error-free. Otherwise, it rejects sets of characters containing errors. The FEC mode does not have any active error correcting features. Any station on the correct frequency can receive the FEC station with an FEC Decoding Terminal Unit (decoder).

SEL-FEC – Selective Calling Forward Error Correction

In this mode, a transmitting station transmits to one or more selected receiving stations. Selective calling allows directing transmissions to a selected station and to exclude others. In order to distinguish SEL-FEC from FEC, the data is sent with the mark space sense inverted over normal. Copy of SEL-FEC stations require only the reverting of the mark-space sense and the correct frequency.

FDM – Frequency Division Multiplexing

This mode of transmission consists of several narrow shift radioteletype channels running together and spaced about 170 Hz or so apart. Highly specialized equipment is required to copy this type of transmission. The FDM signals sound like a buzz saw or buzzing type of signal.

Other Types Of Codes Or Systems

There are many RTTY signals on the air today that defy decoding by standard RTTY equipment. Many of these are military and as such are meant to be secure by the nature and extent of their highly encrypted transmissions. They are no doubt impossible to break, as they are devised to be secure. Information gained from several reliable sources suggests these systems use high level computer-based systems that code each character on a changing basis.

The Universal M-600 Multi-Code Converter

Through the use of micro-processor technology, a new multi-code converter is now available which will decode and print BIT Inversion, most types of TOR, weather stations, plus the regular Baudot, ASCII, and Morse modes.

Features Of The Universal M-600 Multi-mode & Crypto-decoder

The RTTY Unit That Decodes

BIT Inversion: method used for security and privacy by governments, businesses, press, and others, automatic system opens up a new world of RTTY. Listening copy those stations that defied copy on standard RTTY units.

TOR-Sitor: Both ARQ and FEC modes used by marine, telegrams, World Press, coastal stations, and government services copy approaches error-free copy.

Variable Shift Capabilities: Used by some RTTY services to effect a form of security to their transmissions by the use of non-standard shift or RTTY signals, quite common in commercial RTTY. Wide range of shifts possible.

Weather Format: Allows reception in straight text of many weather stations with the use of standard weather map symbols in everyday use around the world. Very interesting to tune into.

PLUS All speeds and shifts of Baudot, ASCII, and CW *AMTOR when approved.

Transit Mode-plug-in M-300 keyboard for Transmit, Baudot, Morse, and ASCII. *AMTOR when approved.

Features

ASCII 110, 150, 300, 600, and 1200 baud rates.

Baudot 60, 66, 75, 100, and 132 WPM.

Morse CW-auto-range up to 60 WPM; excellent CW copy.

TOR-Sitor Both ARQ and FEC modes with full receive only function on these codes. *AMTOR when approved.

BIT Inversion 5 level security BIT Inversion for Baudot decoding from key pad. Decodes any combination of BIT Inversion being used for security.

Weather Text Weather bureau symbols, arrows, and other weather type uses. Key pad controlled.

2 SEL Calls Factory programmed—for Amateur or RTTY listening.

SEL Calls Displays actual programmed Sel call on screen.

3 Video Fonts Weather box and standard ASCII font key pad controlled.

Screen Print Feature Printout of entire page shown on the screen with no lost information, if desired. Allows you to capture information after it appears on video screen. Key pad controlled.

Speed Readout ASCII and Baudot—automatic search gives correct speed of transmission, key pad controlled.

Multiple Scroll Inhibit Selected from key pad; prevents paper wastage on printer.

Un-shift On Space Unit will automatically colon shift of space character to give good copy on space; only part of signal allows copy of weak and fading RTTY signals. Key pad controlled.

Self-test System Novel built-in self-test system from key pad for RTTY & Morse. Allows check out of M-600 operation.

Shifts Key pad selectable shift selection, 170, 425, and 850, plus variable space channel allows copy on many non-standard shifts being used as security mode, plus separate demodulator for 150 through 1200 baud rate high speed RTTY. No compromise reception, and separate demodulator for low baud rates.

Audio Inputs 4-600 ohms .25 vp-p.

Video Outputs Composite video, 1.5v p-p, negative sync, 5 x 7 dot matrix, white letters on black background, 64 character ASCII set (upper case only). Four formats, 36 or 72 characters per line, 16 or 25 lines of print (switch selectable). Cursor on/off (jumper selectable). Scrolling (each line of characters move up a line when that line is completed). No breakup of words less than 5 characters at end of line.

Printer Driver Isolated loop, MIL 188 or RS232 and optional parallel ASCII all with hand-shaking available. Baud rates of 45, 50, 57, and 74 in Baudot and 110, 150, and 300 in ASCII. All switch selectable by user. The M-600 will drive almost any printer available at any of the input modes.

Printer Mode Baudot 60, 66, 75, and 100 are featured.

Printer Speeds ASCII 11, 150 and 300—parallel ASCII.

Printer Buffer A 2K printer buffer allows reasonable down conversion and hand-shaking of printer.

Loop Supply 60 MA/20MA auto adjusting loop supply available as option.

Status Line 25th line of video indicates status of all functions controlled by key pad.

Front Panel Controls: SEL-Call, Select 1, 2, 3, Auto Start Mode Select, Auto Threshold Control, Filter Select, Mark Only, both, space only, Normal or Reverse Phasing Switching Threshold, side or narrow Printer, Auto-start or Off-line Power, Input Gain Control, Variable Shift Control.

Front Panel Indicators: 10 step bar graph LED display for tuning, Mark & Space LED's, Power "ON" LED, Auto-start LED, Buffer Full LED, Morse Lock LED, HI baud tuning LED, Fine tuning LED, Input limiter LED.

Rear Panel Jacks M-300 C keyboard for transmit on Baudot, ASCII, and Morse all speeds. Isolated loop parallel printer (optional), serial printer auto-start audio input. Aux. tuning scope power line filter/AC jack combination.

Options Built-in loop supply, parallel printer, output rack handle & mounting ear kit available.

Warranty Limited 6-month warranty on parts & labor.

Power Requirements 115/230v 50/60HZ 25 watts

Size 16-3/8 x 3-1/2 x 10-3/4 deep.

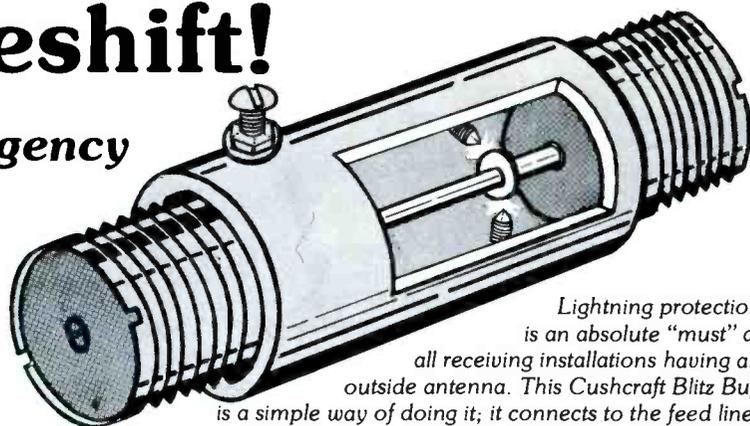
Weight 9 pounds—shipping weight 12 pounds.

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Make It Makeshift!

Ideas For Preparing Emergency Receiving Antennas — Use 'Em In A Pinch!

BY TONY EARLL, KNY2AE



Lightning protection is an absolute "must" at all receiving installations having an outside antenna. This Cushcraft Blitz Bug is a simple way of doing it; it connects to the feed line.

Makeshift antennas are different things to different people. You might regard them as an emergency or backup system to use at a survivalist installation or even at home when your regular antenna has been demolished by severe weather or the landlord. Or maybe, like me, you just like tinkering with various metallic objects to see how they'll do when connected to the antenna input of a receiver or scanner. In any event, everybody likes them because they're inexpensive to construct, can be whipped together faster than a bowl of instant rice! With things being what they are, you'll want to keep this information on tap for quick reference.

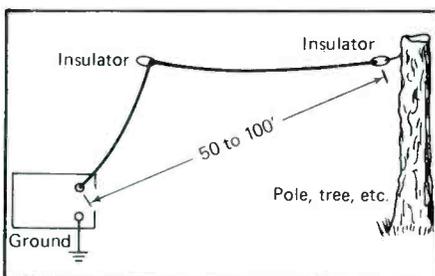


Fig. 1— Random length longwire antenna.

The Basic Idea

No matter how fancy and complex the antenna system you regularly use, always keep a spool of wire on hand for fast use as an improvised antenna. In a pinch, a simple long wire antenna strung between your receiver and some distant point will provide reception. Use insulated (vinyl or plastic covered) #12 or #14 solid copper wire, and put a ceramic insulator between the antenna's far end and whatever you've connected it to. Another ceramic insulator should be used at the point where the antenna enters your house. Try to run at least 50 to 100 feet of antenna from the point where it leaves the house to the far end, and mount it as high and in the clear as possible. As with all antennas, don't attempt to mount it anywhere near a power line—not only because power lines generate lots of noise, but mainly because they constitute a definite safety hazard to antennas or persons erecting antennas

who might come into direct contact with the voltages they carry.

Although the wire doesn't *have* to be run in a straight line, if it is basically straight and mounted vertically it will be omnidirectional (receive equally well in all directions). If mounted horizontally (or at an incline up to about 45°) you'll find that the reception off the antenna's end isn't as good as in the two directions which are broadside to the antenna. If you can't get a decent straight run for the wire, then you can zig-zag it; but place an insulator at each point where it zigs and zags.

If you are primarily interested in monitoring a specific frequency or frequency band rather than using the antenna for general reception, your best bet would be to try to erect the antenna broadside to the specific station you want to hear. Then, cut the antenna wire to a length which is a half wavelength (or at least a quarter wave multiple) of that station's frequency.

For general reference, here are some approximate measurements for cutting a half wave receiving antenna at various points in the radio spectrum:

Frequency	Half wave antenna
1 MHz	490 feet
6 MHz	80 feet
9 MHz	55 feet
12 MHz	40 feet
15 MHz	33 feet
17 MHz	29 feet
22 MHz	22 feet
27 MHz	18 feet

The Indoor Long Wire

It could turn out that you have no options but to mount your receiving antenna completely indoors. If you're in a metal frame building, this is a tacky problem and you'll find that reception will be poor no matter what you try. However, in a wood frame structure (or one made from cinder blocks), mounting the antenna indoors is a feasible second choice to outside mounting.

Unless you can string the greatest length of your long wire diagonally across the ceiling of a large room, it may well be that you'll have to run it up and down room corners, across moldings and window frames and in

an every-which-way pattern. While this isn't the world's greatest way of putting up an antenna, it will nevertheless provide reception. For attaching the antenna to the walls and ceiling, use glass, porcelain, or plastic topped push-pins. You can get these at any art supply store, as well as many stationery and dime stores which carry artists' supplies. Just wrap the wire once or twice around the head of the push-pin and stab it into the wall or ceiling. You might want to experiment with different configurations to see which one produces best results.

The Old TV Antenna Trick

Don't overlook the possibility of getting your TV antenna system to provide your shortwave receiver with some worthwhile signals while it still functions as an antenna system for the boob tube. If your TV set is connected to its antenna by means of 300-ohm ribbon-type twin lead, that twin lead can be made to serve your communications receiver as a long wire antenna. This can be accomplished by means of a few components in a circuit constructed on a small square of phenolic, or in a little plastic box—the parts strictly junk box vintage and homebrew. For instance, the two capacitors, C1 and C2, can be anything from 20 to 50 uuf (don't go over 50). These capacitors permit the TV signals to get to the *idiot box*, but the coil (L) forbids the TV signals from scrambling along the antenna and into the communications receiver via the antenna terminal (A)—although it permits the longer waves to pass through.

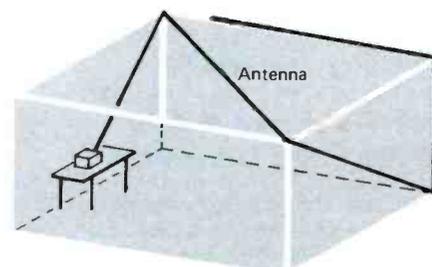


Fig. 2— Type of layout for an indoor long-wire antenna.

The coil is made from 40 turns of #22 wire on a 1/2-inch form. The center tap is a loop brought out at turn number 20. The coil is mounted on the phenolic square (or box, or whatever) by means of holes.

To prevent your communications receiver from sending interference into the TV set, take a lead from the ground terminal (or the chassis, if the radio receiver doesn't have a "G" terminal) and twist it along the antenna lead for a foot or so. The "G" (or ground) terminal is the grounded; naturally, you shouldn't fool around with this idea if you're using an old AC/DC type receiver as grounding the chassis could prove to be quite a hazard.

Quick Like A Bunny

Another quickie emergency antenna can be made from TV "rabbit ears" indoor antennas, although because of their short length they'll provide only mediocre reception at best. Opening the dual telescoping sections out all the way provides you with a mini-dipole, having element lengths of about 35 to 45 inches each. This would make it a half-wave antenna, which is resonant at approximately 60 MHz—far above any frequency your communications receiver will tune. Nevertheless, by experimenting with different element lengths and separation angles (they can usually be adjusted from 0° to 180°), you'll have a makeshift antenna which can be pressed into emergency receiving service. Just connect the antenna's 300 ohm twin lead to the antenna and ground connections of the receiver.

Such an antenna might also offer the chance for fair reception of signals going into a scanner. However, the mismatch between the 300 ohm TV twin lead and the scanner's 52 ohm antenna input would best be reduced by means of a small antenna matching transformer. Even a 300 ohm to 75 ohm type made for TV use will improve the situation here. For scanner use, place the rabbit ears elements in a vertical position, leaving them extended almost all of the way for reception of VHF low band signals, and crunching them down to about 18 inches for VHF high band use.

Folded Dipole Antenna From TV Twin Lead

A somewhat better antenna for shortwave reception than the one suggested here in "the old TV antenna trick" can be made by turning the 300 ohm twin lead into a folded dipole antenna. Two considerations here: 1) you'll be removing the 300 ohm twin lead from the TV set's antenna system, so the TV set will no longer have an antenna, and 2) you'll want to match this to your receiver with a transformer to cut down on the difference between the antenna's 300 ohm design and your receiver's 52 ohm input—unless your communications receiver will readily accept a 300 ohm input (as some will). Use the TV antenna matching transformer trick (300 ohms to 75 ohms) if your communications receiver has a 52 ohm input.

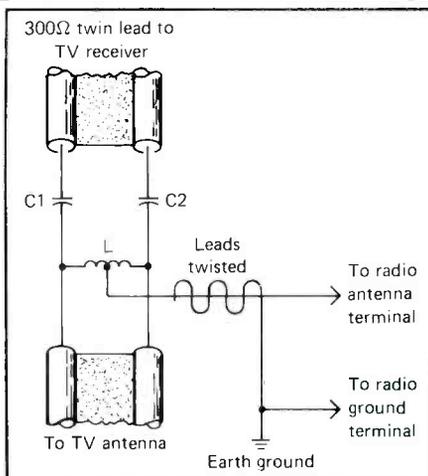


Fig. 3- The old TV antenna trick.

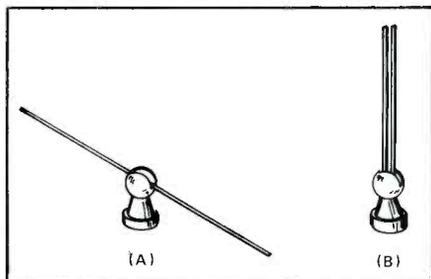


Fig. 4- TV rabbit ears can be pressed into service. For general shortwave reception, extend the elements fully and orient them horizontally (A). For scanner use, shorten them and position them vertically (B).

The basic idea is to rip out the 300 ohm twin lead from between the TV set and the antenna and then fashion the twin lead into your folded dipole. Although the antenna will be less adaptable for all general frequency use than a simple long wire, its ability to be at least reasonably effective on one band may be a bonus—that is if you have enough of the twin lead available in order to construct it for the frequency range you want most. For broadcast band use you'll probably find that you won't have enough twin lead available to construct it—it would need to be about 400 feet in length! Here are some typical lengths for frequencies along the shortwave spectrum:

Frequency	Folded Dipole Antenna
6 MHz	66 feet
9 MHz	44 feet
12 MHz	34 feet
15 MHz	26 feet
17 MHz	24 feet
22 MHz	18 feet
27 MHz	15 feet
40 MHz	10 feet
160 MHz	2½ feet
450 MHz	1 foot

This can be mounted in either a vertical or horizontal plane for shortwave reception, but would best be vertical for scanner use. When mounted in a horizontal position, it will show directivity and you'll want to see about hanging it so that it offers you optimum reception of the stations you want to

hear most. Outside mounting gives the best reception.

A diagram of the folded dipole described here shows that it is simple to construct. Don't forget the matching transformer at the input of the scanner or 52 ohm antenna connection of a communications receiver.

The Cobra

The so-called cobra antenna comes in handy if you have a length of 52 ohm coaxial cable to work with, such as might be left over after whatever antenna you once had connected to it on your roof no longer exists because of unfortunate circumstances. You can then take the former feedline for that antenna and make it into this antenna, which is a form of a basic dipole.

First, decide which band is your prime interest and then (of course), based upon how much coaxial cable you've got available to work with, you can see if you've got enough to work with. If you don't have enough for that band, then you'll have to work with the cobra set up for the lowest frequency band which can be accommodated with the coaxial cable you've got on hand.

The dimensions of this antenna are based upon ¼-wave each for the upper and lower sections. However, the upper section requires a small loop in the cable to be used for hanging purposes, and although the overall length of the cobra will not be changed because of this, when the upper section is prepared for use, a few extra inches should be included. The actual final measurement should be made after this hanging loop is formed.

Here are the measurements for each of the sections (upper and lower) individually for various frequencies you may want to monitor, although it probably won't be very probable that you'll have enough cable on hand for anything below 15 MHz.

Frequency	Cobra: each section
6 MHz	33 feet
9 MHz	22 feet
12 MHz	17 feet
15 MHz	13 feet
17 MHz	12 feet
22 MHz	9 feet
27 MHz	7½ feet
40 MHz	5 feet
160 MHz	15 inches
450 MHz	6 inches

You may have noticed that the combined length of the upper and lower sections comes out to the length of the folded dipole made from TV twin lead described earlier. The upper length consists of the center conductor of the coaxial cable with the white insulating material left intact. Just cut through the black outer insulation and copper braid which surrounds the inner core of the cable so that you're left with the upper section of the cobra equalling the measurements shown for the frequency you want. For the lower section, measure off the same length from where the black outer covering starts at the bottom of the upper section; then, form a couple of 6 inch loops and tape them to-

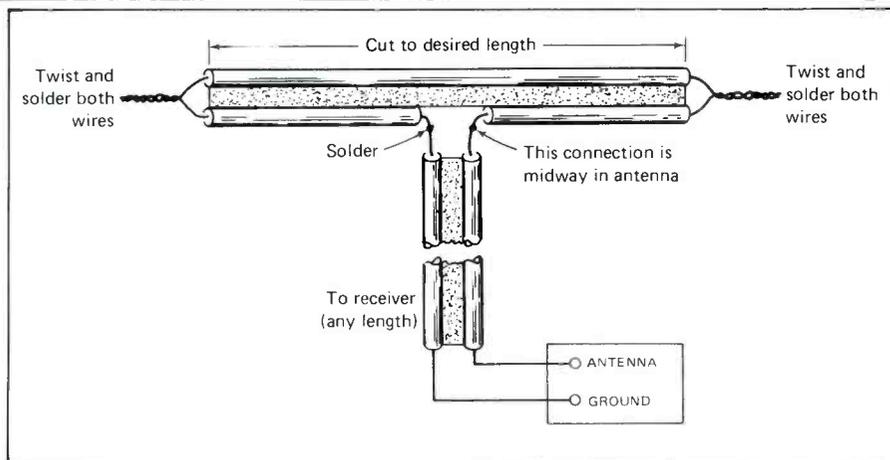


Fig. 5- Folded dipole from TV twin lead.

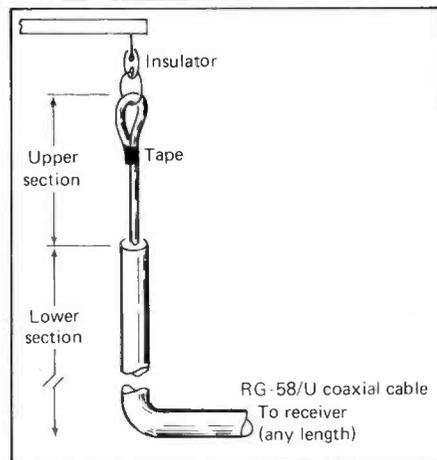


Fig. 6- The cobra antenna.

gether, but don't cut anything. The antenna is then ready for use.

The antenna is best hung from a tree or point on the structure by means of an insulator. In a pinch, you can use a few strong rubber bands or a bent piece of plastic.

Really Last Gasp Ideas

A short length of wire connected to the antenna input of your receiver can come in handy if it has an alligator type clip attached to its far end. That will enable you to try gripping it to various metallic objects to see which one might serve your purposes if all else fails or if you haven't got anything to work with.

For instance, try hooking it to the box springs of a bed, or a metal slinky toy, or a window screen! Or try the metal finger-stop of a dial telephone! Don't laugh—it's not great but it's better than having no antenna at all when you want to get your receiver working! If you find a spot which offers good results, you might wish to solder the wire to the object to get the best connection.

Here are some final thoughts. Most antenna systems will work best if the receiver is properly grounded to a cold water pipe. Outside antennas, for safety purposes, should have adequate lightning protection; normally, this is in the form of a lightning ar- restor. A number of schemes abound which

seek to use the 117 volt household power lines as receiving antennas. This is a tricky and potentially hazardous practice which is best avoided by persons attempting to prepare makeshift antennas.

Using these ideas, you should be able to be reasonably assured that you'll always be able to feed enough incoming signals into your receiver to at least get it to provide you with far more reception than you would have otherwise had without a proper antenna. Keep in mind that these antennas are not intended for anything more than being makeshift emergency antennas in a pinch, and they are suggested for receiving only, not for transmitting.

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THE EXCITING WORLD OF RADIOTELETYPE MONITORING

Before we introduce this issue's emphasis on demodulators, I would like to emphasize the patience and effort needed to successfully copy commercial RTTY.

There is an unlimited, worldwide flow of data to be sure, but not without its trials and tribulations. Initially, it is easy to assume that the new demodulator was damaged in shipping, or your receiver is set to the wrong frequency, or even that your antenna fell down. But no—the actual problem is none of these. The fact is that only one out of four or five RTTY transmissions are plaintext. The rest are either encrypted military, secure utilities, multiple shift Cyrillic, Moore code, TDR code, weather (METEO), or simple privacy codes.

Now, if your equipment is set up to 425 Hz shift 50 baud, the displayed or printed output will be non-readable if an attempt is made to read the above potpourri of codes. The multitude of non-copyable (we will explore techniques for decoding some of these in future issues) transmissions is only *part* of the challenge.

Brief transmissions, changing frequencies, multipath distortion, fading, and language barriers all add to the difficulty of acceptable copy. The ultimate reward, though, is knowing the news (sometimes days) before the general public.

After much patience selecting the published frequencies, many commercial stations will be logged. The difficulty of finding new RTTY stations exceeds general AM SWLING and offers an additional dimension to the DXing hobby.

The previous RTTY column introduced the basics of tapping the vast store of world news by outlining the necessary equipment. Now, we will explore the various terminal units, or demodulators, in detail. The demodulator is probably the most critical component of the three necessary ingredients:

1. A stable shortwave receiver
2. Demodulator
3. Video display, printer, or computer

The selection of a demodulator may limit the choice of a video display and necessitate the need for a complete computer. Each option offered should be carefully considered in order to maximize useful benefits. For example, many demodulators are designed for the Amateur Radio operators and not the RTTY DXer—hence limiting certain features and enhancing unused others. A demodulator will accept a 2125 Hz tone to convert to a mark or binary one output. A 2550 Hz (425 Hz shift) will then become a binary zero or space.



This is the HAL portable Telereader, Model CWR-685, one of the smallest RTTY Terminal Units with a built-in screen.



The Info-Tech M-200F offers an enormous amount of versatility as an individual component unit.

The basic function of a demodulator is to convert audio tones to a recovered level of +5 volts mark, 0 volts for a TTL compatible output, or -12 volts, +12 RS232C output. Typically, news agencies transmit with a shift of: 400 Hz (2125 Hz mark, 2525 Hz space), 425 Hz (2125 Hz mark, 2550 Hz space), 600 Hz (2125 Hz mark, 2725 Hz space), or 850 Hz (2125 Hz mark, 2975 Hz space), with 425 Hz as the most popular.

After the binary data is recovered, then serial Baudot characters are constructed from recognizing the start bit, five data bits, and stop bit(s). Baudot characters are displayed directly on a video display outputted to a printer or sent directly to a computer depending on the demodulator options. A fairly complete list of demodulator manufacturers are supplied in Figure 1A.

A simple list of "ideal" demodulators is not feasible since, depending on your needs, one would select a demodulator based on personal needs. For example, ideal low cost complete terminal units would include the MBA-RO reader, Kantronics Mini-Reader, or the Microcraft unit. Each offers a

IRL, Inc.
700 Taylor Road
Columbus, OH 43230

Dovetron Company
627 Fremont Avenue
South Pasadena, CA 91030

Microlog Systems
4 Professional Drive
Gaithersburg, MD 20760

Xitex
9861 Chartwell Drive
Dallas, TX 75243

Digital Electronic Systems, Inc.
Info-Tech
1633 Wisteria Court
Englewood, FL 33533

HAL Communications Corp.
Box 365
Urbana, IL 61801

Kantronics
1202 East 23rd Street
Lawrence, KS 66044

Advanced Electronic Applications
MBA-RO Reader
P.O. Box 2160
Lynnwood, WA 98036

Microcraft Corp.
P.O. Box 5130
Thiensville, WI 53092

Flescher Corp.
507 Jackson
P.O. Box 976
Topeka, KS 66601

Frederick Electronics
P.O. Box 502
Frederick, MD 21701

Figure 1A

small, portable unit with a built-in single line display. Any difficulties in comprehending a single line display is offset by their low cost and serial output ports for expansion.

A more expensive portable demodulator with a high-density display is the HAL Telereader CWR-685A. This is a complete terminal in one small 12.75" x 11.75" package. The ultimate versatility is offered in the individual component units, such as the INFO-TECH 200F, HAL Telereader CWR-670, and the IRL-1000. Each requires a separate

Frequency	Location	Time	Language	Shift	Baudot Rate	Normal/Reverse Phase
13.563 MHz	Taipei, Taiwan	1338 GMT-logged on Sunday	English	850 Hz	50 baud	Reverse
PAP, or Polska Agencija Prasowa, the official Polish News Agency, was noted in <i>Popular Communications</i> at 20.495 MHz and 9.391 MHz. An additional frequency was logged:						
17.492 MHz	Warsaw, Poland	1705 GMT	English	425 Hz	50 baud	Reverse
Care to monitor the Argentine Navy or Argentina's weather?						
19.438 MHz	Puerto Belgrano, Argentina	1200 GMT	5 Letter Coded Data	850 Hz	50 baud	Reverse
18.093 MHz	Buenos Aires, Argentina	1312 GMT	Weather	850 Hz	50 baud	Reverse
The Northern Africa News Agency is the Mutuelle Africaine de Presse, or MAP for short. Transmissions out of Rabat, Morocco—specifically beamed for North America—include:						
17.555.9 MHz	Rabat, Morocco	1150 GMT	English	425 Hz	50 baud	Reverse
MAP beamed to Europe and Asia:						
18.224.9 MHz	Rabat, Morocco	1657 GMT	French	425 Hz	50 baud	Reverse

output display or printer for proper operation. For those with an unlimited budget, I would recommend a Frederick D3 System with a built-in spectrum display.

As you can see, there is no such thing as an optimum system for everyone. Make a complete list of your requirements and check off the corresponding features. A review and definition of features will help create this list.

1. Regenerated outputs—ASCII code, TTL, or RS232. If you plan to use this with a computer or printer, an RS232 or TTL compatible ASCII interface is a must.

2. RTTY speeds should include 45 baud, 50 baud, 57 baud, and 75 baud—predominantly 50 baud and some 75 baud for the News Networks.

3. Variable shift is desirable due to the often encountered non-standard shifts of 400 and 600 Hz shift. Many demodulators offer a "stagger shift" tuning for the non-standard shifts. A shift of 425 Hz shift is absolutely needed on the demodulator.

4. An oscilloscope output is useful, but not necessary, for tuning in order to peak mark and space and to observe selective fading conditions.

5. Composite video output—useful if a display is not integral to the unit. A display format of 72 characters x 25 lines, or 80 characters x 24 lines to be preferred.

6. A reverse/normal switch provides a means of inverting the signal output from the demodulator. Some transmissions have the mark and space tones reversed. This switch will match the transmitter's format.

Minimizing the effects of fading and multipath distortion is critical on a demodulator. An automatic threshold control or variable decision threshold will compensate for bias errors caused by unbalanced tuning of the mark and space tones. This remarkable circuit was invented by Elmer Thomas in the late 1950s, patent number 2,999,925. A reduced error effect of propagation disturbances is noted with demodulators using variable decision threshold logic. Deep selective fading, where one tone (either mark or space) has dropped out, signal recovery is also possible.

What can we expect from future demodulators? Digital bandpass filters are becoming more feasible, offering any programmable shift with unmatched versatility. The advent of single chip microcomputers offer Baudot to ASCII conversions, allowing most personal computers to readily interface to 50 baud Baudot press services.

The listings this month will cover particularly volatile parts of the world, as logged personally by the author.

Receiver selection will be reviewed in upcoming issues of *POP/COMM*. Emphasis will be placed on optimum RTTY reception with recommended receiver enhancements such as external audio filters. Again, send in your favorite FSK loggings so we can collectively act as one "big ear"! All loggings are verified and updated in order to present accurate time and frequency data.

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RADAR REFLECTIONS

RADAR DETECTORS AND THEIR USE

Anti Radar Judge Fights Own Ticket

Judge Alfred Nesbitt of Miami banned radar evidence in speeding cases in his courtroom because he was convinced that police radar was unreliable. Now he must convince a Collier County judge.

Nesbitt was cited for speeding last July by a Florida Highway Patrol trooper who said he clocked the judge traveling 63 mph where the speed limit is 55 mph. Nesbitt says the radar was wrong and that he intends to fight the \$25 fine as a matter of principle.

"This is the first speeding ticket I've had in 45 years of driving, my first personal experience with radar," the 64-year-old judge said. "Now I know. It doesn't always work."

Nesbitt said the cruise control on his 1979 Chevrolet Caprice was set at 55 mph. He couldn't have been speeding, he told the trooper, Ralph Strader.

"Maybe your speedometer's wrong," remarked Strader.

"Maybe your radar's wrong," the judge retorted.

In May 1979, Nesbitt ruled that radar guns are so unreliable their readings couldn't be used in his court. In a hearing that attracted national attention, he dismissed about 80 radar-related speeding cases and later served on the governor's radar study commission, which made several recommendations on use of the devices. The controversy came after a series of television newscasts that showed radar guns clocking a house moving at 28 mph and a stand of trees at 86 mph.

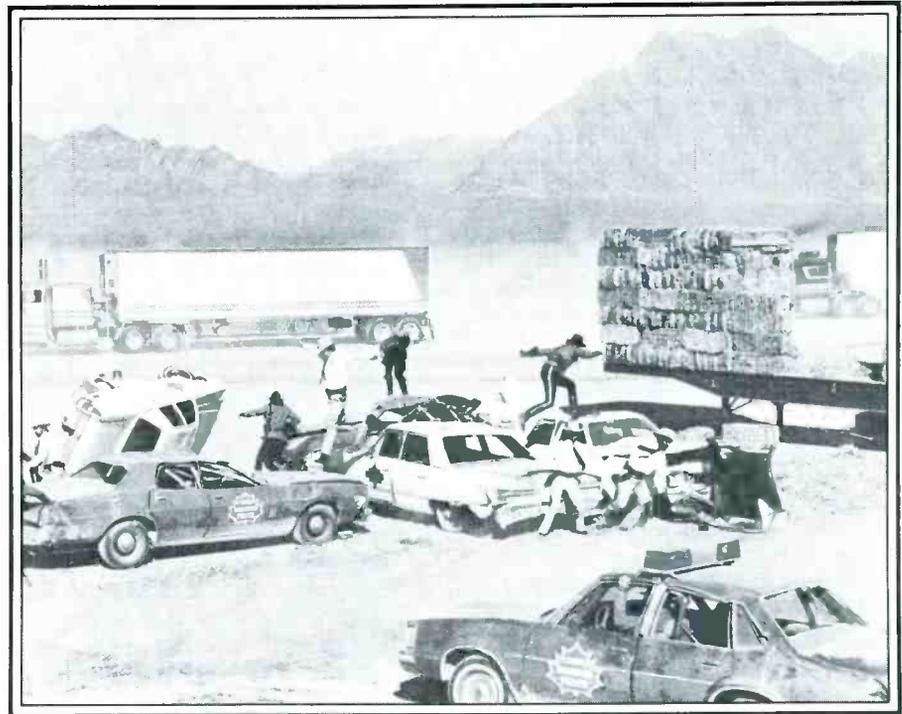
Nesbitt said his run-in with the law reaffirmed his belief in the unreliability of the radar guns.

"Any lingering doubts I had about my radar ruling in 1979 were completely resolved here."

Monitoring Police Traffic-Radar Problems

The accuracy of police traffic radar has been the focus of numerous court battles in the last few years. One concern is the question of which target a radar displays when more than one vehicle is present within the radar's antenna beam. Recently, researchers at the Georgia Institute of Technology showed that all techniques for processing the returned radar signals studied thus far "will cause questionable data to be displayed under certain target conditions."

Gene F. Greneker, senior research associate in the radar applications division, concluded in a report given last week at the 1982 Carnahan Conference on Security Technology in Lexington, KY, "The greater the traffic volume and/or the closer the traf-



"Cool it guys, here comes the judge!"

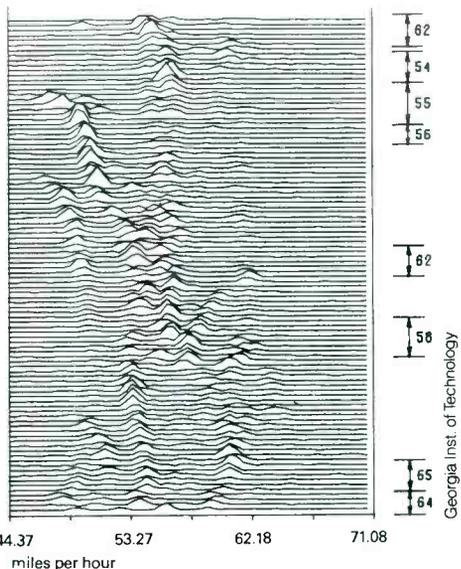
fic spacing, the higher the probability of radar processing errors."

Greneker said "The most serious problem is the untrained operator." Anyone using speed-timing radar must be trained to recognize the conditions under which the particular kind of radar used will give accurate results and when the capabilities of the radar are exceeded.

The researchers analyzed a variety of traffic situations by videotaping roadway scenes, recording sounds produced by reflected radar signals and displaying the unfiltered radar data. They compared the display—which showed traces for all the vehicles present—to the single speed displayed by the speed-timing radar. Depending on the radar unit, the largest target was not always the target tracked, they found. In the example shown (diagram), no speed was displayed when return signals fluctuated rapidly or when several signals were almost equal in strength. This particular radar unit also had a tracking filter, which allowed it to follow the highest speed signal even when the target signal was small, rather than the largest signal.

For several years, the National Highway Traffic Safety Administration (NHTSA) has been involved in developing performance standards for police speed-measuring devices and training programs for police officers. Early in 1980, a hearing in Dade County, FL, highlighted several radar problems, including a radar unit that in two tests ap-

peared to show the house moving and the trees at more than 80 miles per hour. Marshall J. Treado of the National Bureau of Standards' Law Enforcement Standards Laboratory investigated the problems. He



This plot displays the speed of vehicles at various times (increasing upward on the vertical axis). The amplitude of a trace at a given time and speed represents the signal strength reflected from a particular target. The radar unit displayed the speed values listed on the right.

showed that in one case the sensitive radar unit probably reacted to the fan motor in the car carrying the radar. In the other, it reacted to a CB radio transmission from the car. In neither case was a moving vehicle present. When an appropriate target was present, the radar registered speed correctly.

The investigation revealed a variety of other shortcomings and conditions under which then available traffic radars would not function properly. In January 1981, the NHTSA proposed rules for radar units. In November, the Reagan administration chose to institute a voluntary program instead of mandatory rules. However, under the voluntary program, the National Bureau of Standards is still planning to test radars and publish a "qualified products list." Instead of government imposing the rules, defense attorneys will make sure people buy approved radars, says Treado.

Greneker suggests that manufacturers should provide systems with better signal processing techniques: "The more information you give the officers, the more accuracy you're going to get," he says. Treado says manufacturers have already eliminated the automatic lock—which automatically displayed the highest speed and prevented the officer from obtaining a tracking history—and added sound so that an officer can distinguish receding and incoming targets more easily.

Greneker says state and local law-enforcement agencies should look for quality in their equipment rather than accepting the lowest bid. He also warns that if signal processing is improved, law enforcement officials may need to get used to systems that display no speed instead of a possibly incorrect speed when the signals are ambiguous.

The 1980 National Bureau of Standards study concluded, "Police radar which measures vehicle speeds is a reliable tool for police use when carefully installed and properly operated by skilled and knowledgeable operators." The demise of police traffic radar predicted after the Dade County hearing has not occurred.

(Monitoring Police Radar Problems reprinted with permission from Science News, the weekly news magazine of science, copyright 1982 by Science Service, Inc.)

Melissa, Another Texas Speedtrap?

Melissa, TX is a dusty, old town with a population of about 587 residents. For years the town went unnoticed—until now.

Melissa has been accused of setting up deliberate speedtraps along the interstate 40 miles north of Dallas in hopes of grounding leadfooted drivers. The money collected from speeding tickets is allegedly used to pay for the new capital improvements like the \$73,000 fire engine and the 2 new police cars equipped with radar. That may not seem so unusual, but when you consider that this town could hardly pay its electricity bills for its 14 street lights three years ago, it's a big difference.

The city council voted last year to annex a two mile section of the interstate and increase its share of two nearby state roads. Soon afterwards, a full time police department was created—the first one in the town's 136 year history.

The cops in Melissa, four of them, now write an average of 451 tickets a month, bringing in nearly \$167,000 a year!

New Use For Radar

Radar and computer gear fastened on a farmer's tractor are not for amusement, but are trouble-shooting signs of the electronic age. The purpose is to take guesswork, and some of the risk, out of farming.

The radar guns are similar to the units police use to catch speeding motorists. Mounted on the side of the tractor and pointed toward the soil, they send out a microwave beam that measures the distance covered by the machine.

Fed into a micro-computer, that information tells the farmer the total acreage he has planted, his ground speed, plant population, and other information. It gives him accurate information on fuel and machinery function.

Although they are not a new idea, the computer monitors that sit atop the dashboards are getting more sophisticated. Most popular models fit in with the radar units.

They supply the farmer with data on his planting, but most of all assure him that the seed is dropping into the soil. If the seed doesn't fall, an electric eye catches the malfunction and alerts the driver with a beeper and visual display on the box.

Some farmers might find it hard to dig up \$580 for a radar unit and \$1,400 for a computerized monitor. However, most farmers predict that almost everyone will have one within the next five years.

Troopers May Turn Radar Back On In Central Florida

State troopers in a seven county area of Central Florida may soon be turning their radar guns back on, according to Colonel Eldridge Beach, director of the Florida Highway Patrol. A three-month experiment in radarless patrolling failed to reduce traffic deaths, Beach said. Beach will delay a decision until after he makes a personal inspection.

The experiment's intent was to focus trooper's attention on non-speeding violations, since speeding in only the third leading cause of fatalities in Florida and the seventh leading cause of all accidents. But the seven-county area patrolled without radar by Orlando-based Troop D recorded 71 fatalities during March, April, and May, two more than during the same three-month period last year.

On The Lighter Side

Jurors waiting for Superior Court duty in Bridgeton, NJ used to describe their hot, steamy waiting room as "the dungeon."

Now they can while away the hours playing Pac-Man or watching television.

"This room is something we have long needed," said Superior Court Judge Philip Guccio. "We're trying to make the jurors' stay here happier."

The waiting room has chess, checkers, and backgammon games, a color TV, and a video game in the snack bar next door.

Last November, 69 of 70 jurors signed a petition protesting their occasional displacement to an unfinished portion of the basement. So the courts' Administrative Office in Trenton told Superior Court officials to make life for waiting jurors a little less boring.

"They have sent around—from the administrative office budget—chess games, checkers . . . and different types of things to whittle away the day," the judge said. "In order for our jury system to work at its best, it is necessary that we understand the needs of those who are called to serve and make it comfortable . . ." stated Guccio.

Driver Loses Day In Court Over Ticket

Claire Kelly got her day in court, but she was less than pleased with the outcome. The North Olmsted, OH woman, acting as her own attorney, spent seven hours in the courtroom trying to convince Berea Municipal Judge William C. Todia to overturn a speeding ticket she received February 8th. She was accused of going 71 mph on the Ohio Turnpike.

When the smoke cleared, however, Todia ruled against her and fined her \$16 along with \$28 in court costs. It was the same fine she would have received had she not contested the citation, court officials said.

The verdict was attacked by Ms. Kelly, who did not rule out a possible appeal.

"A trial is supposed to be a search for the truth, not a search for a hole to bury it in," she said.

Ms. Kelly insisted that she did not exceed the speed limit and that large trucks in front of her and behind her caused the radar unit to record the 71. She also argued that, in any event, the 55 mph speed limit is unconstitutional because it is aimed at conserving gasoline rather than ensuring safe driving.

Ms. Kelly had started the proceedings just like most attorneys do—by submitting a series of motions to Todia, including a motion to dismiss and a motion to interview the judge on his impartiality as she would a prospective member of the jury. Her motion for dismissal was on the grounds of "invidious discrimination" against motorists who, she said, are the only gasoline users who are regulated by speed.

"Motorists are discriminated against because they do not limit the speeds on airplanes or boats, We're singled out because we are there. It's convenient to get the motorists."

As for an appeal, she said, "I have to think about it. I'm not sure what I will do. It's very clear that, no matter what, they want the money."

San Angelo, Texas Chief Says Ticket Tactics Were Wrong

The decision to clamp a lid on a controversial selective traffic enforcement program called SAVE II was made because the project "had lost sight of its original objectives and become a system of numbers to raise revenue," Police Chief Travis Johnson said last week. Johnson terminated the eight-year-old program, which had produced thousands of traffic tickets since it was activated and boosted traffic fine collections above the half million dollar mark last year.

"The program wasn't doing what I thought it should be doing, so I stopped it," Johnson said as he commented on off-the-record complaints by some policemen whose special overtime pay has been cut several thousand dollars per year. He made no attempt to hide his displeasure with the complaining officers or the city program.

Police Sgt. Jerry Watkins, former supervisor of SAVE enforcement activities, refused to comment on the cancellation.

Johnson, who declined to comment on suggestions by some police officers that the cutoff was politically motivated, said he "is not worrying about politics. My job is to enforce the law."

The chief also confirmed that he has advised City Manager Stephen Brown that he "is not interested" in any additional federal selective enforcement funds which state traffic safety officials believe might become available later this year.

"We can have an effective program in bringing about compliance with the traffic law without federal and state interference," Johnson said.

No Permit, No Radar, No Tickets

The anathema to the motorist in a hurry—the police speed radar gun—is out of commission in Chesterton, IN. But authorities are warning drivers not to exceed the speed limit—after all, police say, there are other methods of nabbing speeders.

Police stopped issuing tickets after noticing that the license for the department's radar guns had expired. The guns must be relicensed by the Federal Communications Commission every five years.

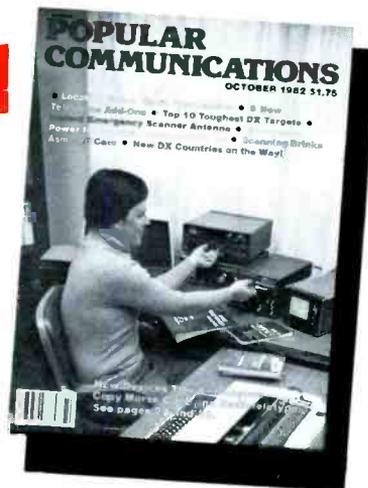
"It was an oversight on my part," Police Chief James Killoski said. He has applied for a new license, which he expects to be approved in about 10 days. Until then, he said, ticketed speeders nabbed by the gun could challenge their arrests as invalid and probably would win.

But Kent W. Douglas, telecommunications engineer with the Indiana State Police, said officers can borrow a radar gun from another police agency, as long as it has a valid license. "And they can always fall back on the old, reliable methods—clocking them with their own speedometers, or between two fixed points," Douglas said.

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EQUIPMENT REVIEW:

The Capri Electronics M-11 Scanner Unscrambler

Voice scrambling is a factor which comes into the picture very often when you're dealing with monitoring the scanner bands, especially on public safety frequencies. Many different methods for scrambling might be used by the agencies involved, and the primary purpose is to achieve some degree of communications privacy. Of course, human nature being what it is (we're curious little devils, aren't we?), as soon as someone decides to take extraordinary measures to conceal what they're talking about, it makes us more interested in finding out exactly what it is they've decided we shouldn't hear.

To achieve whatever degree of privacy is desired, while remaining within the budgetary limitations facing the agency, a method for voice scrambling is selected. No matter which type of system is selected, each and every communications unit within the system must be equipped with the hardware to both send and receive that particular method of transmission. Needless to say, this can run into a staggering amount of money if the network of base, mobile, and hand-held transceivers is sizeable.

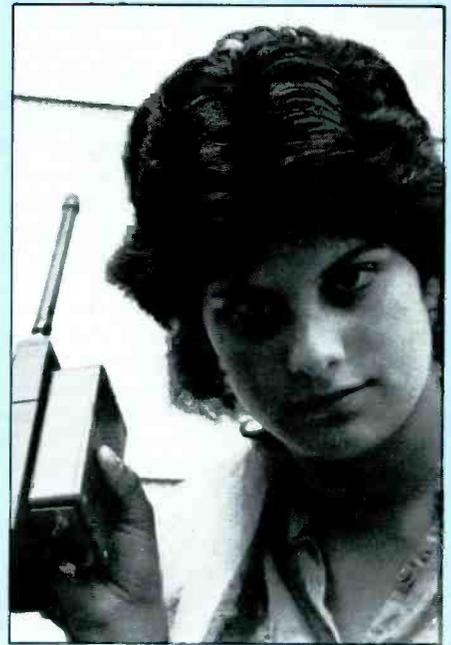
Some of the more complex digital scrambling systems can actually run into an expenditure of well over \$2,000 for each individual station; when multiplied by the number of units in a large system, the resulting total amount to be spent for scrambling more often than not precludes use of the more exotic scrambling systems now available for possible use. As a result, the majority of local agencies seeking communications privacy appear to be selecting the basic and straight-

forward *phase inversion* approach to scrambling. It is not anywhere near as expensive to implement as digital or other more sophisticated methods and is effective in shutting the door on the casual listener—that is the person who figures that the day the scrambling began was the end of his ability to monitor that system.

Those who are not easily put off nor discouraged by scrambling efforts have, however, been seeking effective methods of reconstituting these garbled messages so that they are restored to their original comprehensible state. Even now, there are monitoring enthusiasts experimenting with some of the more sophisticated communications privacy systems; it's a sure bet that their efforts will eventually be successful.

Unscrambling the commonly encountered phase inversion scrambling system, however, has been accomplished and is available in the form of unscrambling accessories to be used with scanners. Such accessories are now being produced by several companies with varying amounts of success and quality. While it is not the intention here to delve into technical explanations of the techniques of scrambling, nor open the door on a lengthy discussion of the merits, ethics, moralities, uses, and possible motives of scrambling, we thought we would check out one of the unscrambling accessories currently available to scanner owners who are faced with monitoring phase inversion type scrambling systems.

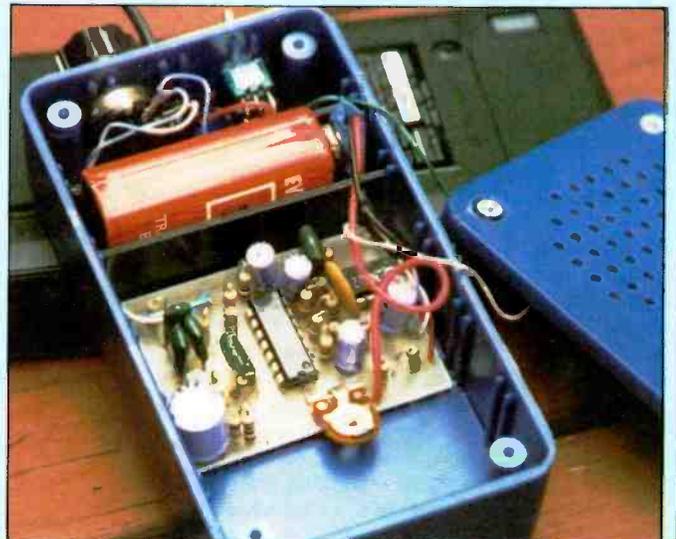
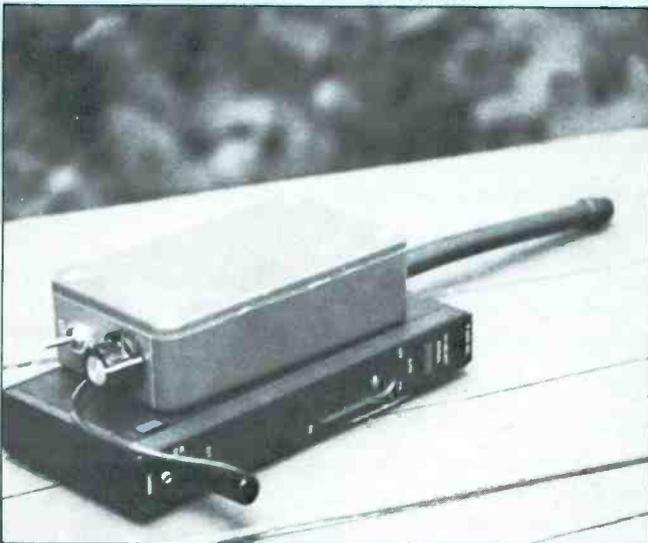
The unit selected was the Model M-11, produced by Capri Electronics, Route 1,



A handy little handful, the Capri unit attached to any hand-held scanner and will unscramble the more-often encountered "hidden" messages on scanner frequencies. It can also be used with desk-type scanners.

(Below left) The small Capri unit requires only two controls in order to operate it. It plugs into the scanner's headphone jack.

(Below right) Here's what's inside the Capri M-11. It's housed in a sturdy plastic case.



Canon, GA 30520. This small sized device sells for less than \$50 and was designed primarily for use with pocket or hand-held scanners, although it is suited to operation with any type of scanner (such as one at a "base" station), and the one design may be used with any make and model you have.

The Capri M-11 weighs only 7 ounces and measures 1 1/4" x 2 1/2" x 4 1/2" — which makes it dandy for use with the smallest hand-held scanner. Capri furnishes a Velcro strip, making it a cinch to stick the M-11 right to the side of your scanner. The M-11's innards are housed within a rugged blue plastic case which (although they don't specify it as being high-impact resistant) withstood several respectable accidental falls onto a hard floor surface from table-top height.

While some unscramblers we've seen connect into the cables going to a scanner's internal loudspeaker, the M-11 has its own built-in speaker. That eliminates the scanner owner having to perform any internal cutting and splicing to fire it up.

To connect it to a scanner all you have to do is plug it into the jack which many scanners have for earphone/headset or external speakers. The M-11 comes all wired with a plug for this purpose, so it's just a matter of unpacking it and plugging it into that jack — with no further fuss or effort. It has its own internal power, too, and the 9 volt battery should give about 3 or 4 months of service under normal use. The battery is easily changed by removing the M-11's cover by means of four Phillips head screws.

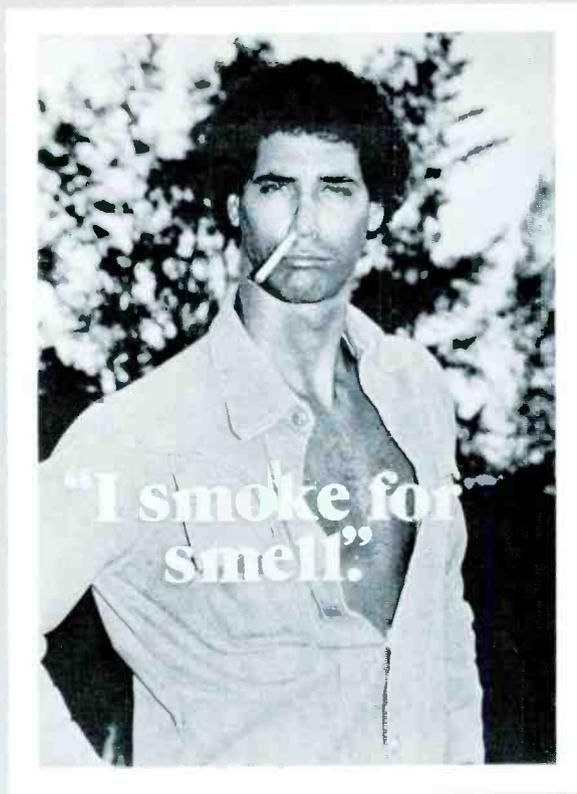
The only controls on the Capri M-11 consist of an on/off toggle switch and a variable pot. When a scrambled message is encountered, you flip on the switch and adjust the tuning control for the clearest sound. When the scrambled message is completed, the M-11 can be switched off. Because of the significantly louder volume produced by standard scanners (as opposed to hand-helds), the manufacturer suggests keeping the scanner's volume setting below the half way point to avoid damaging the M-11's loudspeaker.

The Test Of Steel

With the Capri M-11 hooked up, I sought out an area public safety system which had installed voice scramblers a few months ago. With the M-11 turned off, all I heard was a sound which reminded me of Alvin and his chipmunks. A flip of the switch and a slight quick adjustment of the tuning knob and *bingo* — the voices were easily readable. That's what they said it would do — and it did it! What more could you ask? Voice quality had only *slightly* diminished in quality after unscrambling, as opposed to what it sounded like in the days prior to scrambling.

If you've got an agency using phase inversion scrambling — which is the one most popular with civil agencies — here's a way to monitor them in the clear.

Reviewed by Rick Maslau, KNY2GL



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Perhaps you have been lured by the billion-dollar-a-year advertising campaign of the tobacco industry.

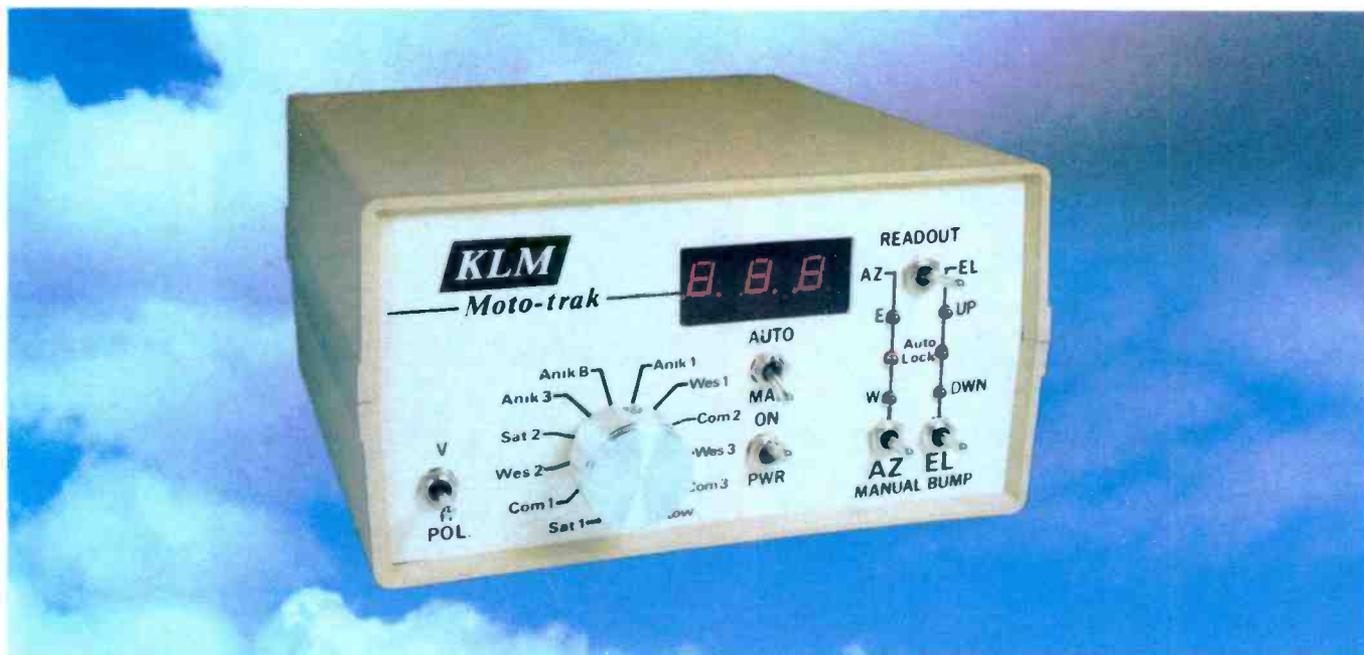
Ask any of this year's 120,000 lung cancer victims just how sexy, sophisticated and successful smoking has made them.

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- Spot LED "travel" indicators
- Constant LED Azimuth/Elevation readout
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- 12' solid aluminum dish or 16' screened dish for a perfect picture

And, enjoy the reliability of a motorized mount that's precision engineered from the ground up. Not an afterthought or a flimsy add-on, KLM's Moto-trak uses industrial quality reduction motors, gear, and screw drives, state-of-the-art motor control electronics.

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CIRCLE 27 ON READER SERVICE CARD

Send for KLM's
SITE SURVEY KIT
AZ-EL Tester, Manual,
Sat-Coordinates \$29.95

SR-3

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The SR-3 Satellite Receiver . . . once again, more of the performance, features, and convenience you've come to expect from KLM. Handsomely styled cabinet outside, state-of-the-art single conversion circuitry inside. Install the SR-3 up to 1000 feet from the dish; a single 50 ohm feedline makes it clean and easy. Select KLM's separate remote downconverter or the revolutionary "Ampliverter" that combines LNA and downconverter in one very compact package. And, enjoy these easy-to-look-at/easy-to-use features:

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- Positive detent channel tuning plus fine tune
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CIRCLE 35 ON READER SERVICE CARD

ESTABLISHING SURVIVALIST COMMUNICATIONS SYSTEMS

Windpower: A Step Toward Independence

If it hadn't been for the "great depression," people in rural America probably would not have had electric bills. In the 1920s, rural America was energy independent. Our grandfathers powered their electrical tools with batteries charged by the wind, while grandma did her vacuuming with a 32 volt vacuum cleaner. If the family lived in a low wind area, or didn't have a wind machine, grandpa put a quart of gasoline in the Delco generator and let it run for an hour or so until the batteries were recharged.

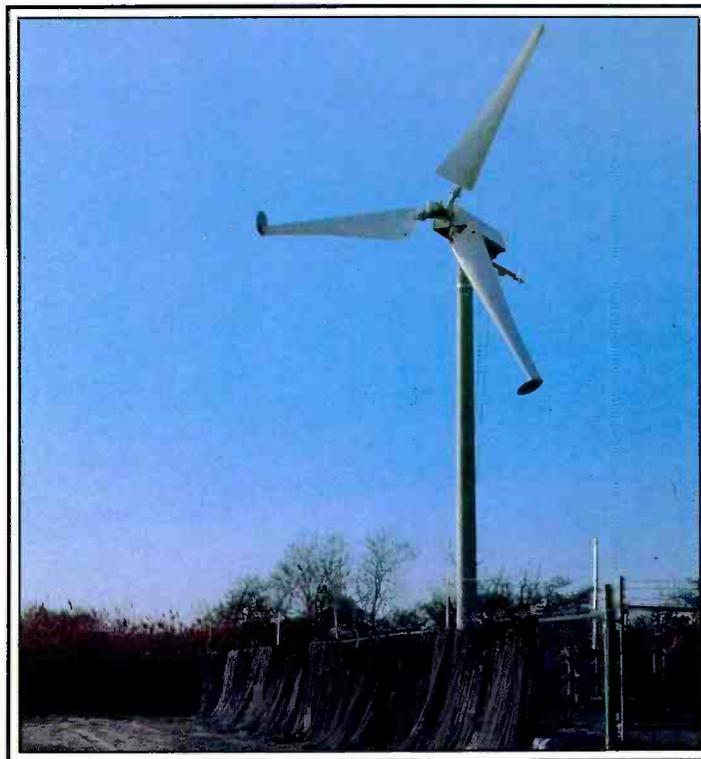
Rural America was energy self-sufficient. Grandpa couldn't use as much electricity as his grandson can now, but he could light his house, run the shop, listen to the radio; grandma could vacuum the floors, do the washing, and curl her hair with the power they made.

What Happened?

America was in a depression. During the depression era, remember, America was a rural country. More people lived on farms than lived in cities. Appliance manufacturers needed markets for appliances that required ever larger quantities of energy. A decentralized power station (which is what grandpa had) has a limited capacity. A large centralized plant 200 miles away does not have the capacity limitations of the small system grandpa had been using.

Using government (tax) dollars, FDR brought the power lines into rural homes in the early 1930s. A junkies' first fix is free. Rural America's first commercial power was cheap. The Rural Electrification Authority (REA) used government money to subsidize utilities to bring their spider's web of power lines to the country. Personal property was confiscated to provide for the power company's "right of way."

Rural areas could now enjoy the benefits of toast and electric ovens. For the privilege, they gave up their energy independence. They were now dependent on the utilities. Their dependency had been bought with one of the largest subsidy programs in the history of the United States as the federal government subsidized the utilities. More power hungry appliances could be purchased, and men were working to ensnarl the countryside with the tangles of wires the centralized utilities said were needed. For the next 50 years, they would become more and more dependent on the centralized power grid. They would believe the people that told them windpower wouldn't work. You couldn't tell Grandpa that.



Wind Works! Your Utility Will Tell You It Doesn't

In America, if you have the money, you can sell almost any idea or product. The utilities have lots of money. Listen to the constant din of their TV commercials. They are selling you the idea that they are your friends and want to help you. Don't believe it. Friends wouldn't ask you to live next door to a nuclear power plant.

If an insurance company can make money selling insurance on something, it will. The premium must be high enough to justify the risk. Insurance companies are very astute. They understand the risk that they are assuming when they insure something.

No insurance company on the planet will assume the risk of a nuclear power plant. No premium is high enough, no location is remote enough for any insurer to accept responsibility for the consequences of operating any nuclear power plant in the United States or any other country in the world. Think about that! They feel that the risk is unacceptable. Yet you are required to accept that risk when the utility builds a plant in your area of the country. These are the people telling you they are your friends. These are the people telling you that windpower won't work. Don't believe them.

Building Your Own Power Plant

A wind system is no more complicated than your car's charging system. It works. It is an ideal method of providing energy independence for your family. The technology involved is easily understandable. The wind generator is used to charge batteries just as the alternator in your car is used to charge your automobile's battery. A large bank of batteries is used to store the electrical energy (stored as chemical energy); then, it can be released as you need it.

Essentially, you are building your own small power station. Your power station has one large advantage over commercial power stations. You can store the power that you produce. A large station cannot do this because cost becomes prohibitive. This allows the small power station owner to harness the uneven power available from wind.

Wind is merely another form of solar energy caused by uneven heating of the earth's surface. You may use your wind generated electricity at any voltage you design your system to work at. Twelve volt systems allow you to use appliances designed for the RV industry. We operate a small 12 volt TV as well as a Drake TR-7 Ham transceiver from 12 volts. A properly designed system will

not cause radio/TV interference. The generator charges deep cycle storage batteries that are designed for many charge/discharge cycles. Golf cart batteries are excellent for this application.

Electricity may be used at the 12 volt level or as 110 volts AC with an inverter. The inverter changes the low voltage Direct Current supplied by the batteries into 110 volts Alternating Current as is used by most appliances. The storage battery may also be charged by photovoltaic and gas or diesel powered generators.

Windpower can supply the low RPM direct drive generator you can use to build your own machine, or an entire system, including wind generator, controller, inverter, and backup battery charging generator (their address is given at the end of this article.) Wind energy may be harnessed as part of an independent power station suitable for applications ranging from running Ham equipment on field day for extra multiplier points to running your entire home.

Wind electricity isn't the answer to everyone's energy problem. It worked for many of our grandfathers, however, and modern technology allows far more efficient designs than were available to our grandfathers. Next time a utility spokesman tells you that windpower doesn't work, remember these are the people who want you to depend on them.

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America's leading mail-order supplier!

Let Z-Tech Enterprises be your prime source of precision scanner crystals. We are specialists in crystals for federal frequencies, public safety, aero band, business/industrial, maritime. Shipped to you factory fresh and ready to zero in on the stations you want to hear. Low prices, too! We'll be pleased to send you our special order form offering the best prices you've ever seen for precision custom-cut scanner crystals. Just ask us for it!

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CIRCLE 70 ON READER SERVICE CARD

Sources of further wind information:

- Windpower
16341 E 8 Mile Rd.
Stanwood, MI 49346
- Earthmind
4844 Hirsch Rd.
Mariposa, CA 95338
- Garden Way Publishing
Dept. 171 X
Charlotte, VT 05445

Information generators and parts; also Inverters:

- Publisher of *Homebuilt Wind Generated Electricity Handbook*, \$9.95, By Michael Hackleman.
- Publisher of *Harnessing the Wind for Home Energy*, By Dermot McGuigan.

This month's column by Jim Baughman, WA8RHZ.

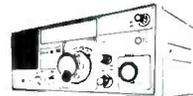
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YAESU FRG7700

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SAVE \$70

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The answer for the serious BCB DXer. Rotates to null out that local station and open the airwave to those DX stations you didn't know were there.

One loop amp required \$77.50
Choose 1 or more loops for your favorite band(s) \$59.95 ea.

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Stay in touch with world events, monitor weather, ship traffic, and radio amateurs. Connect to your receiver and display shortwave radio teleprinter and Morse code transmissions.

INFO-TECH M 200F

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The Ultimate in Morse, CW, and Teletype reception. Fill your TV screen with never ending printed information from around the world. CW-RTTY-ASCII. News services converted to video.



Sale \$549
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AEA-MBA Top of the line self-contained CW-RTTY-ASCII Reader. Bright blue 32 character display. MBA is ideal for SWLs. Hams and for monitoring news or weather broadcasts even while at sea. MBA \$299.95 12VDC Supply \$14.95 **BOTH ONLY \$289.95**

KANTRONICS Mini-Reader CW-RTTY ASCII Reader with clock all in one compact unit. Fits into palm of your hand. Readout on moving display. 10 easy to read characters. Mini-Reader Ext. 12V Pwr. Pk. Demo Display Tape. Retail at \$289.95

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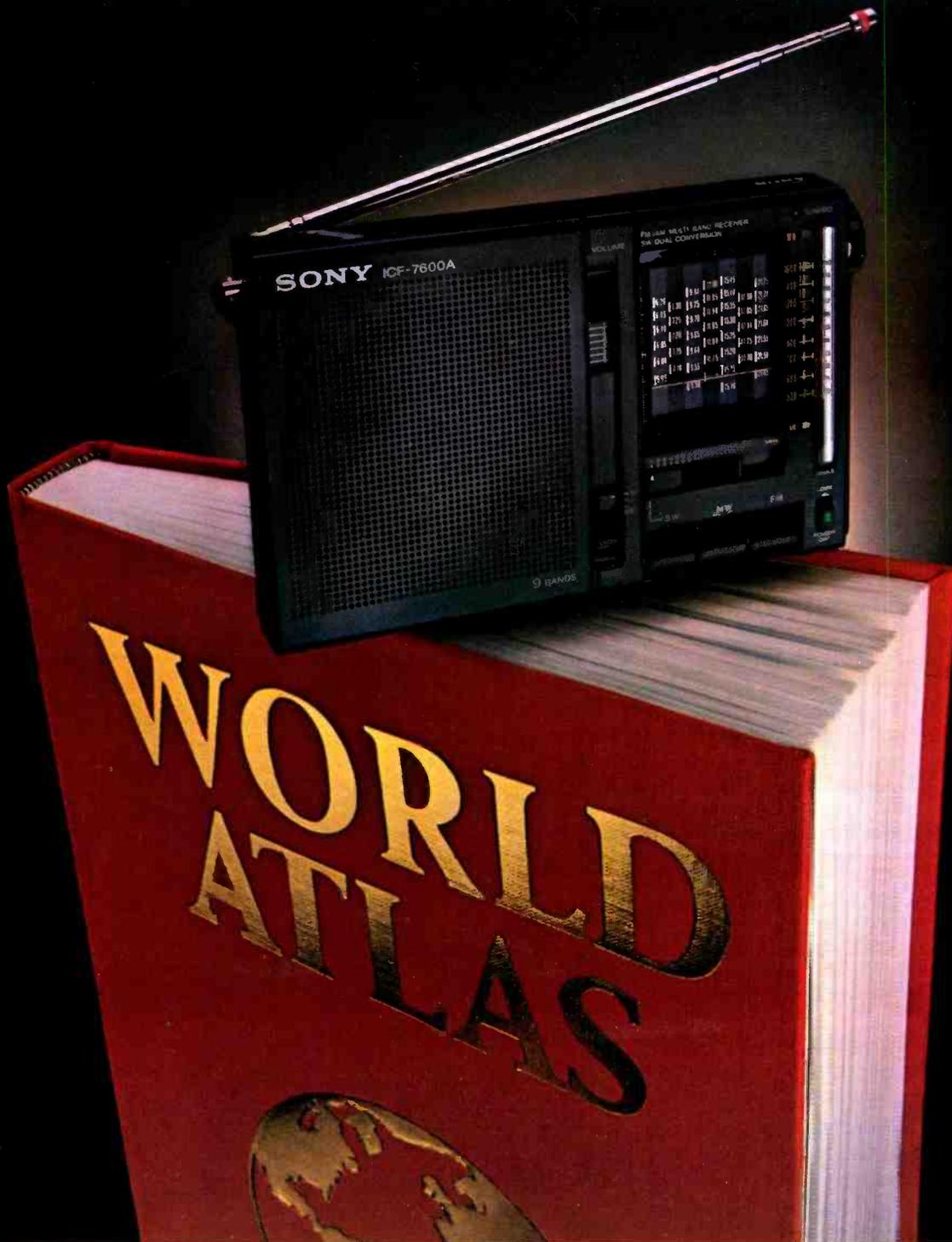
*1982 WRTWH The World's Most Authoritative Directory of International Broadcasting	\$16.50
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CIRCLE 67 ON READER SERVICE CARD



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Your eyes aren't deceiving you. You're looking at a Worldband radio that's very, very small.

Almost as small as a paperback book.

Gone are the days of a room filled with monstrous radio equipment and all its knobs and dials. The easy-to-use Sony ICF-7600A stands neatly on a desk if you're looking to bring the world into your home. And fits neatly into a briefcase should you travel and like to take the world with you.

It's a wonderful thing to own.

It has seven shortwave bands,



plus AM and the full 76 to 108 MHz FM band.

Its special circuitry (including dual conversion) pulls in the signal while filtering out the interference.

The RF amplifier brings in clear interference-free reception. And separate crystal oscillators keep that reception stable.

So even though you're listening to a station thousands of miles away this Sony will make it sound like it's coming from around the corner.



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Buy a Sony Worldband radio and you're eligible to win a free trip for two to the faraway place of your dreams. See your participating Sony dealer for details.

CIRCLE 74 ON READER SERVICE CARD

www.americanradiohistory.com



BY STU WINGATE, KFL4KV

Monitor The Busy New York City Fire Department

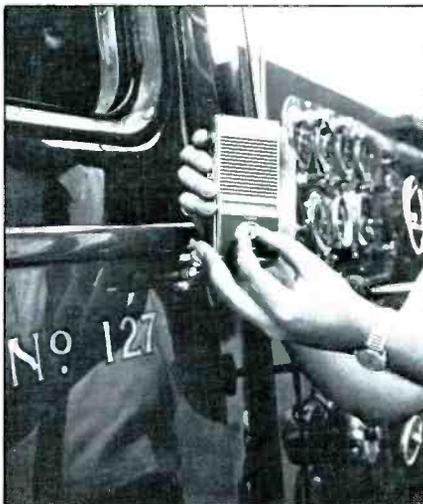
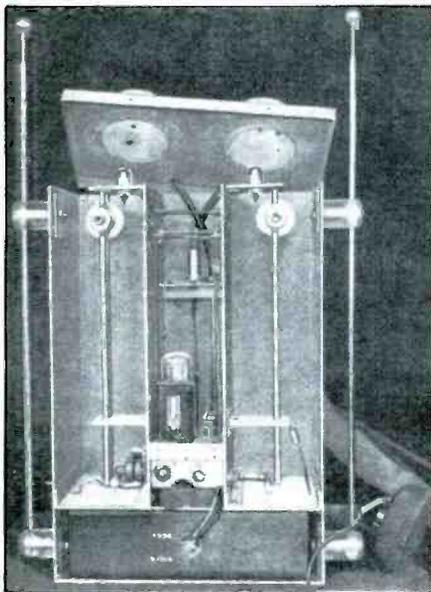
**One Of The World's Busiest –
It's Been 10-8 Since The 1930's!**

One of the earliest fire communications systems in the United States was the one established with the callsign WNYF. It was operated by the New York City Fire Department, first starting out on 1596 kHz in 1931 (50 watts) with the callsign WCF. Later, it became WNYF on 1630 kHz.

The NYFD's old 1630 kHz channel, located at the high frequency edge of the AM broadcasting band, was within easy tuning of most of the radios which were in peoples' homes. This coupled with the fact that WNYF ran a full 500 watts (more than many local broadcasting stations in the 1930s) gave the station a wide audience who wanted to listen in on the fire calls coming from the busy NYFD dispatcher. In fact, the NYFD encouraged such monitoring and re-



Weighing only fifteen pounds, the two-way unit used a regenerative circuit and is powered by dry-cell batteries good for seventy hours.



batteries which were good for 70 hours of operation. Earphones were designed to fit under the helmet and a microphone was attached to the shoulder harness, as was the transmit/receive switch. By today's standards, such an arrangement seems beyond clumsy, but in 1940 this system was hailed as a revolutionary advance in two-way emergency service communications.

By the early 1950s, the NYFD modernized their communications system to keep it current with many new developments, including the use of the VHF high band. Today the NYFD has a system which utilizes repeaters and a large number of channels; and instead of bulky backpack radios, the firefighters use hand-held transceivers.

Nevertheless, the NYFD remains one of the most fascinating communications systems to monitor and their powerful repeaters can be heard many miles outside of New York City. The days of WNYF are long past, but the audience is just as interested in hearing New York's busy *smoke eaters!*

A 1930s NYFD fireman wearing backpack radio. Note the microphone and switch cable attached to harness straps.



New York City Fire Department

Callsigns:

KEB523-7, KED962, KYE994

Repeaters:

Manhattan	154.25 MHz
Queens	154.40 MHz
Staten Island	154.19 MHz
Brooklyn	154.37 MHz
Bronx	154.19 MHz
Citywide	154.43 MHz

Investigations Division:

460.575 MHz 460.625 MHz

Hand Held Units:

153.77 MHz	154.01 MHz
153.83 MHz	154.07 MHz
153.95 MHz	154.43 MHz

N.Y.C. Fire Department Radio Codes

- 10-1 Call your quarters (or other unit, if so instructed).
- 10-2 Return to your quarters.
- 10-3 Call the dispatcher by telephone.
- 10-4 Acknowledgement.
- 10-5 Repeat message.
- 10-6 Stand by.
- 10-7 Verify address.
- 10-8 In service by radio.
Without Code
Code 1
Code 2
- 10-9 Off the air.
- 10-10 What is your location?
Ascertain the location of
- 10-11 Request for radio test count.
- 10-12 First arriving unit, give preliminary.
- 10-14 Breakdown of apparatus.
- 10-18 Return all units except engine (squad) and ladder company required at the scene.
- 10-19 Return all units except company required at the scene.
- 10-20 Proceed to box location at reduced speed.

Preliminary Reports – Fires

- 10-21 Brush fire.
- 10-22 Outside rubbish fire.
- 10-23 Abandoned/derelict vehicle fire.
- 10-24 Auto fire.
- 10-25 Manhole or transformer vault fire.
Code 1 a. Manhole fire extended to building(s).
b. Gas main leak.
c. Uncontrollable gas leak in structure.
Code 2 Blown manhole cover(s) or smoke issuing under pressure. Fire department standing by.
Code 3 Smoke seeping from manhole—condition less severe than Code 1 or 2.
Code 4 Building fire extends to main fuse box.
- 10-26 Food on stove.

Preliminary Reports – Emergencies

- 10-31 Clogged incinerator.
- 10-32 Defective oil burner.
- 10-33 Odor of smoke (includes nearby working fires and friendly fires, such as barbecues, salamanders, etc.).
- 10-34 Sprinkler malfunction.
- 10-35 Defective alarm system.

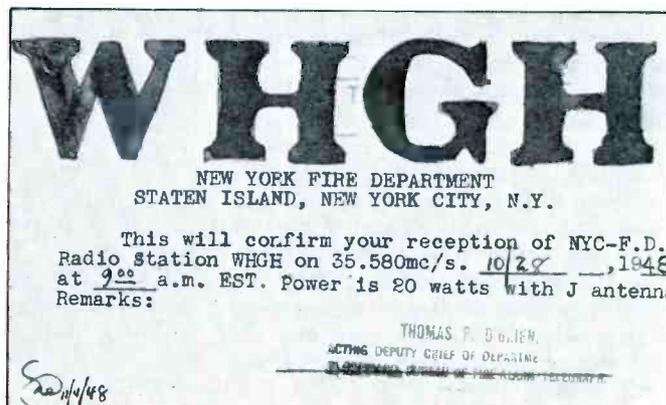
- 10-36 Auto emergency.
Code 1 Accident and/or washdown—gasoline spillage.
Code 2 Accident—no gasoline spillage.
- 10-37 Assist civilian (applies whether or not fire department related).
- 10-38 Steam leak.
- 10-39 Water condition.
Code 1 Water leak in structure.
Code 2 Broken water main in street.
- 10-41 Incendiary of suspicious fire—notify Fire Marshal.
Code 1 Occupied structure. Definite indications of incendiarism. Fire Marshal to respond.
Code 2 Occupied structure. While no definite indications of incendiarism, witness and/or other civilians have information that may be of value. Fire Marshal to respond.
Code 3 Vacant building. Heavy volume of fire indicates definite incendiarism. Fire Marshal to respond as other priorities permit.
Code 4 Vacant building. Obviously incendiary and it appears that there is very little chance for apprehension or obtaining information leading to same. Notification for Fire Marshal's evaluation.
- 10-44 Request for public ambulance.
- 10-45 D.O.A. or possible D.O.A.
Code 1 Victim deceased.
Code 2 Victim possibly deceased.
Code 3 Victim suffering serious injuries which may lead to decease of the person.
- 10-47 Request for Police. Assistance (specify).
- 10-48 Request for Police. Assistance (harassment).

Notifications

- 10-51 Cancellation of all outside activities for this period.
- 10-59 Water pressure alert—Phase I.
- 10-60 Water pressure emergency—Phase II.
- 10-68 Restrict use of telephone, voice alarm, and radio to absolute minimum.
- 10-70 In line pumping.

Miscellaneous

- 10-75 .Request for 3 engines (2 engines and 1 squad) 2 ladders, and a battalion chief response.
- 10-84 Announce arrival at box.
- 10-92 Malicious false alarm.
- 10-99 Units will be operating for at least 30 minutes.



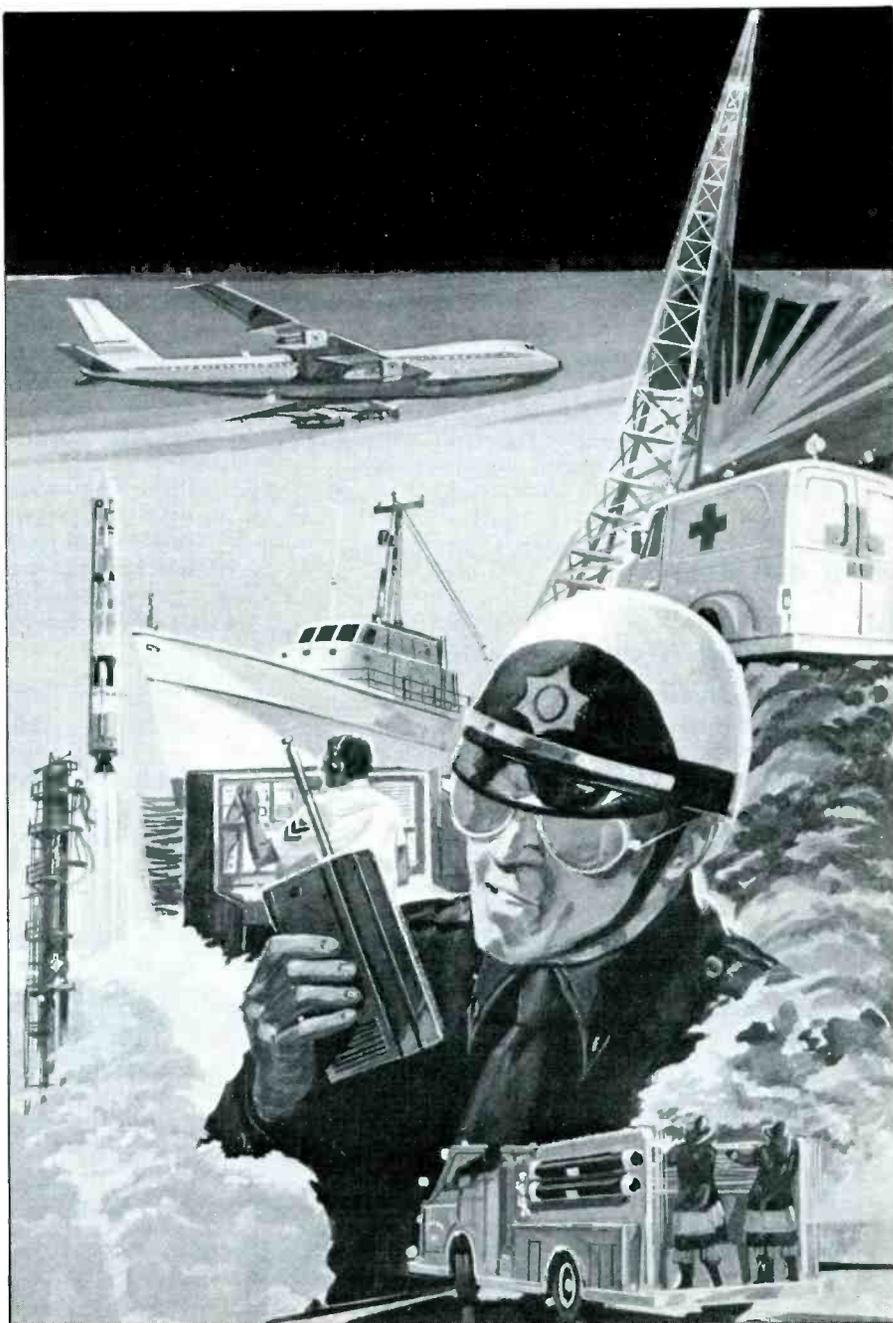
Some Ideas From The Pro's On Getting The Most From Your Scanner – More Range, More Stations!

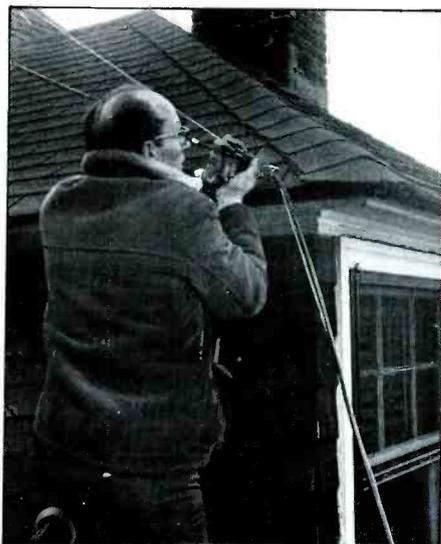
BY HANK SULLIVAN, KTX5MT

You buy a scanner. It's so simple — all you have to do is bring it home, unpack it, connect the little built-in antenna, plug the set into the power outlet, and you're all set to go. Just a few minutes after you walked through the door carrying the carton with its precious cargo you're all set to listen in on the exciting sounds of your local police and fire agencies, the state highway patrol, and area ambulances.

The unfortunate part of it is that after a while you come to realize that the police and fire channels offer a 20-to-1 ratio of very mundane communications to exciting ones. Even in the busiest of metropolitan areas there are far more domestic quarrels and fender benders for the police to busy themselves with than there are major crimes, and more fire calls relating to people stuck in elevators than there are towering infernos. Well, thank goodness for this; the world would be even a more frightening place to exist if things were otherwise. On the other hand, if you spend lots of time listening to your scanner you may eventually start to become — well, not actually bored, but perhaps a little restless; maybe come to feel that there is undoubtedly more to getting the most from the little miracle box called a scanner than what you've been hearing. And you're absolutely right, there's a lot more to it than you've permitted yourself to monitor.

Here are some thoughts on making your scanner the focal point of many things going on in and around your local area and even off into the distance! Basically, these are ideas on making your scanner installation into what you felt it would be when you became excited enough to go out and buy it. Unhappily, not everybody has gotten these messages and consequently they never really do much more with their scanner than the poor chap described in the first paragraph. Let's hope that there aren't many people like that — spent a pretty penny on the major component (the scanner itself) and just don't know how to turn it into something really exciting.





When you're talking about coaxial cable, you're also talking about being careful when installing it. If you crimp a little too hard on a stand off insulator, you're liable to damage the black outer sheath. If that happens, the performance of the cable may rapidly deteriorate and affect the quality of coverage.

The Antenna

The built-in or screw-in antenna which comes with the scanner is the first thing that should be done away with. If you're a band-leader you can use it for a baton, or maybe you can give it to your nephew to make into a pea shooter. As far as being a worthwhile antenna, it's a loser and won't produce much more than local coverage — hardly suitable for the serious listener.

There are no unamplified indoor antennas which will produce the results you'll get from an antenna mounted out of doors, and if your scanner is being used in a steel framed apartment house or office building, the improvement in reception with an outdoor antenna will be most dramatic. The antenna should be mounted out of doors, and the higher it's mounted the better it will pick up distant or weak signals from mobile units.

Lots of companies produce antennas especially for scanner applications. Check your local scanner dealer and ask about those made by Hustler, Antenna Specialists, Winn-Tenna, Antenna Incorporated, Channel Master, Finco, Radio Shack, and Pal Firestik. You can also get excellent results with omnidirectional antennas produced for the VHF Ham bands. The antennas made for the 6 Meter Ham band do just fine on the 30 - 50 MHz "low band," while those made for the 2 Meter Ham band offer good reception between 118 and 174 MHz. For UHF operation, antennas produced for the 420 MHz Ham band are excellent. For all band reception where only one antenna is going to be used, stick with those designed for this type of scanner operation, or use a 2 Meter band omnidirectional Ham type antenna.

A preselector added to your antenna system will undoubtedly be a great help in increasing the signal level of weaker stations

— you might wish to check into one of these devices. Capri Electronics and Hamtronics are companies which produce excellent units, and Capri even offers one with its own built-in antenna for those who (for one reason or another — landlord problems or whatever) just can't put up an outdoor antenna. This device was reviewed in the November issue of POP'COMM, and it's a worthy improvement over the built-in antenna which comes with a scanner.

Getting the antenna up high is a double-edged sword. Yes, the higher your antenna is the better your ability to bring in distant stations; but don't forget that the antenna has to be connected to your scanner. When you're talking about scanners you're talking about coaxial cable, and when you're talking about coaxial cable you're going to have to keep in mind that the more length you use to do the job, the more problems may arise relating to signal loss (attenuation) within the cable itself. With runs of less than 50 feet you won't want to worry about it, but after that the signal losses within the cable do start to accumulate, especially if you are using the "standard" RG-58/U stuff normally found in scanner antenna systems. You can cut these losses by opting for the more expensive "low loss" types of cables or by using RG-8/U cable. Also note that coaxial cable becomes less efficient as time goes on and the best results will be obtained if you replace the cable in your antenna system every few years. If the black outer covering is damaged, it will adversely affect reception.

A few safety thoughts: for lightning protection, all antenna systems should be properly grounded. An easy way to do this is with a simple device made for this purpose, such as produced by Gold Line, Cushcraft, and Radio Shack. Antennas should be located where they are far enough away from power lines so that they can't topple into those lines while being erected or after they are in place. Many persons have been electrocuted while installing antennas because they were too close to high voltage lines; one gust of wind or one torn mount and—*poof!*

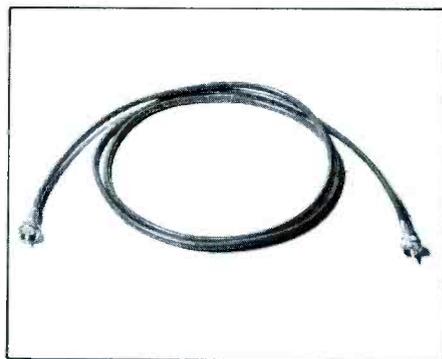
Scanner Considerations

Assuming that you've already got your scanner on hand, there's little point in getting into what to look for when buying one. Right now we are just thinking about giving you the maximum results from what you've got. I would say that the general opinion of long-time scanner users is that the search feature is under-utilized by most scanner owners. Call it lack of the spirit of adventure or perhaps just plain laziness, but too many scanner owners seem content to scan known predetermined channels and not bother with searching out new stations.

If you're guilty of that then why not break the habit and spend some time exploring new horizons? It's easy—just select a relatively small segment of a frequency band and let your scanner's search feature do its thing. Don't try to search more than 500 kHz or 1 MHz at a time, lest you spread your ef-

forts too thin and miss some of the action. Use the *delayed scanning* feature so that when a station does come on you'll not only have a chance to see if another station replies on that same frequency, but you'll also have a few seconds to note which frequency it is. Sometimes transmissions are so short that you don't get a chance to note the frequency before your scanner merrily continues its searching. If your scanner offers you the choice of fast and slow scanning rates, use the faster speed.

Let's say that you're going to explore the idea of searching out new frequencies. Do it systematically and with a bit of planning. Make a chart showing the various frequency segments which you will be exploring, leaving room for the dates and hours those frequencies were searched. Start out at the lowest frequency your scanner covers and work your way upwards in frequency, a band segment at a time, until you've completed the entire frequency range of your scanner. Then, when that's done (and it could take several weeks or months—but what's the hurry?), start all over again, but this time listen on those same band segments at a different time of the day or night than they had been previously searched. In any



You can usually buy coaxial cable with the connectors already installed. Unless you've got some soldering experience, you may not wish to start your learning process with these tricky little devils which are a vital link in your antenna system.



For long cable runs you can opt for heavy and expensive RG-8/U coaxial cable since it offers less signal loss than the usually encountered RG-58 type. RG-8X cable is also low loss, but easier to use than RG-8/U—but (of course, it's also expensive!



Moisture is the enemy of antenna connections. It's wise to seal up all connections to the antenna with something like Coax-Seal, a putty-like substance which won't harden while it keeps out rain and corrosion.



How high the antenna? When it comes to scanner antennas, the higher the better.

event, be prepared to let your scanner spend a *minimum* of an hour or two on each searching adventure for a given band segment. It would be even better if you could investigate that band of frequencies for a full day, or several days!

Keep a log or record of any particular frequencies or band segments which have produced especially interesting listening—you may want to program those in for additional monitoring efforts. Some band segments may well produce little of interest, others may be totally devoid of any communications; don't be discouraged! There will be

plenty of interesting things which will nevertheless be discovered with this system, stations which you never dreamed existed.

Getting Specific

As an aid to your frequency searching we have reproduced a frequency chart showing where you might find specific services operating. You may decide, upon looking over our chart, that rather than systematically searching out every single frequency your scanner can receive, you want to concentrate your efforts upon only certain frequencies used by specific types of stations. That's fine, and a good way to zero in on stations which interest you most. Maybe you're a railroad buff, or a federal frequency freak, or a frustrated sea captain; just pick out the frequency bands set aside for the operations of stations within your major scope(s) of interest and give those frequencies some extra effort. Before you know it, the stations will be rolling in—and you'll be rolling in new stations to hear, ones you never knew existed! That's what owning a scanner is all about!

Some of the new stations you might add to your bag of tricks could include:

Business Radio This would incorporate local delivery dispatching, communications between sales and repair personnel and their offices, and just about anything else which would make communications useful to the business operations in your area.

Industrial Radio These stations are normally operated by factories, construction companies, farmers, and ranchers.

Federal Government That would include military and civilian operations, everything from the EPA to the FCC, the FBI to the Secret Service, and anything else you can name. These are actually fascinating frequencies to monitor. If you're a nature lover, you will certainly enjoy listening to the National Park Service operations. Farmers might like to tune in the Department of Agriculture as well.

Forestry Conservation Used by various state and local agencies for communications relating to the safety and preservation of animal and plant life in and around parks, wildlife sanctuaries, forests, etc. There are plenty of wildlife conservation officers on these frequencies in addition to fire towers watching for forest fires.

Forest Products This includes lumber and paper companies mostly. If you're within listening range of any area where these industries operate, you'll probably find plenty to hear which will interest you.

Petroleum Products These interesting frequencies have offshore oil rigs, oil field operations, refineries, and everything else you might wish to hear relating to the action end of communications in the exciting petroleum energy business.

Broadcast Auxiliary Communications between radio/TV broadcasters and their news crews in the field. These crews cover the stories taking place in your community which make up the lead stories on the 11 o'clock news. You'll hear the crews being

Monitoring the Following Frequencies
 150MHz: 150M2 / 150M3 / 150M4 / 150M5 / 150M6 / 150M7 / 150M8 / 150M9 / 150M10 / 150M11 / 150M12 / 150M13 / 150M14 / 150M15 / 150M16 / 150M17 / 150M18 / 150M19 / 150M20 / 150M21 / 150M22 / 150M23 / 150M24 / 150M25 / 150M26 / 150M27 / 150M28 / 150M29 / 150M30 / 150M31 / 150M32 / 150M33 / 150M34 / 150M35 / 150M36 / 150M37 / 150M38 / 150M39 / 150M40 / 150M41 / 150M42 / 150M43 / 150M44 / 150M45 / 150M46 / 150M47 / 150M48 / 150M49 / 150M50 / 150M51 / 150M52 / 150M53 / 150M54 / 150M55 / 150M56 / 150M57 / 150M58 / 150M59 / 150M60 / 150M61 / 150M62 / 150M63 / 150M64 / 150M65 / 150M66 / 150M67 / 150M68 / 150M69 / 150M70 / 150M71 / 150M72 / 150M73 / 150M74 / 150M75 / 150M76 / 150M77 / 150M78 / 150M79 / 150M80 / 150M81 / 150M82 / 150M83 / 150M84 / 150M85 / 150M86 / 150M87 / 150M88 / 150M89 / 150M90 / 150M91 / 150M92 / 150M93 / 150M94 / 150M95 / 150M96 / 150M97 / 150M98 / 150M99 / 150M100 / 150M101 / 150M102 / 150M103 / 150M104 / 150M105 / 150M106 / 150M107 / 150M108 / 150M109 / 150M110 / 150M111 / 150M112 / 150M113 / 150M114 / 150M115 / 150M116 / 150M117 / 150M118 / 150M119 / 150M120 / 150M121 / 150M122 / 150M123 / 150M124 / 150M125 / 150M126 / 150M127 / 150M128 / 150M129 / 150M130 / 150M131 / 150M132 / 150M133 / 150M134 / 150M135 / 150M136 / 150M137 / 150M138 / 150M139 / 150M140 / 150M141 / 150M142 / 150M143 / 150M144 / 150M145 / 150M146 / 150M147 / 150M148 / 150M149 / 150M150 / 150M151 / 150M152 / 150M153 / 150M154 / 150M155 / 150M156 / 150M157 / 150M158 / 150M159 / 150M160 / 150M161 / 150M162 / 150M163 / 150M164 / 150M165 / 150M166 / 150M167 / 150M168 / 150M169 / 150M170 / 150M171 / 150M172 / 150M173 / 150M174 / 150M175 / 150M176 / 150M177 / 150M178 / 150M179 / 150M180 / 150M181 / 150M182 / 150M183 / 150M184 / 150M185 / 150M186 / 150M187 / 150M188 / 150M189 / 150M190 / 150M191 / 150M192 / 150M193 / 150M194 / 150M195 / 150M196 / 150M197 / 150M198 / 150M199 / 150M200 / 150M201 / 150M202 / 150M203 / 150M204 / 150M205 / 150M206 / 150M207 / 150M208 / 150M209 / 150M210 / 150M211 / 150M212 / 150M213 / 150M214 / 150M215 / 150M216 / 150M217 / 150M218 / 150M219 / 150M220 / 150M221 / 150M222 / 150M223 / 150M224 / 150M225 / 150M226 / 150M227 / 150M228 / 150M229 / 150M230 / 150M231 / 150M232 / 150M233 / 150M234 / 150M235 / 150M236 / 150M237 / 150M238 / 150M239 / 150M240 / 150M241 / 150M242 / 150M243 / 150M244 / 150M245 / 150M246 / 150M247 / 150M248 / 150M249 / 150M250 / 150M251 / 150M252 / 150M253 / 150M254 / 150M255 / 150M256 / 150M257 / 150M258 / 150M259 / 150M260 / 150M261 / 150M262 / 150M263 / 150M264 / 150M265 / 150M266 / 150M267 / 150M268 / 150M269 / 150M270 / 150M271 / 150M272 / 150M273 / 150M274 / 150M275 / 150M276 / 150M277 / 150M278 / 150M279 / 150M280 / 150M281 / 150M282 / 150M283 / 150M284 / 150M285 / 150M286 / 150M287 / 150M288 / 150M289 / 150M290 / 150M291 / 150M292 / 150M293 / 150M294 / 150M295 / 150M296 / 150M297 / 150M298 / 150M299 / 150M300 / 150M301 / 150M302 / 150M303 / 150M304 / 150M305 / 150M306 / 150M307 / 150M308 / 150M309 / 150M310 / 150M311 / 150M312 / 150M313 / 150M314 / 150M315 / 150M316 / 150M317 / 150M318 / 150M319 / 150M320 / 150M321 / 150M322 / 150M323 / 150M324 / 150M325 / 150M326 / 150M327 / 150M328 / 150M329 / 150M330 / 150M331 / 150M332 / 150M333 / 150M334 / 150M335 / 150M336 / 150M337 / 150M338 / 150M339 / 150M340 / 150M341 / 150M342 / 150M343 / 150M344 / 150M345 / 150M346 / 150M347 / 150M348 / 150M349 / 150M350 / 150M351 / 150M352 / 150M353 / 150M354 / 150M355 / 150M356 / 150M357 / 150M358 / 150M359 / 150M360 / 150M361 / 150M362 / 150M363 / 150M364 / 150M365 / 150M366 / 150M367 / 150M368 / 150M369 / 150M370 / 150M371 / 150M372 / 150M373 / 150M374 / 150M375 / 150M376 / 150M377 / 150M378 / 150M379 / 150M380 / 150M381 / 150M382 / 150M383 / 150M384 / 150M385 / 150M386 / 150M387 / 150M388 / 150M389 / 150M390 / 150M391 / 150M392 / 150M393 / 150M394 / 150M395 / 150M396 / 150M397 / 150M398 / 150M399 / 150M400 / 150M401 / 150M402 / 150M403 / 150M404 / 150M405 / 150M406 / 150M407 / 150M408 / 150M409 / 150M410 / 150M411 / 150M412 / 150M413 / 150M414 / 150M415 / 150M416 / 150M417 / 150M418 / 150M419 / 150M420 / 150M421 / 150M422 / 150M423 / 150M424 / 150M425 / 150M426 / 150M427 / 150M428 / 150M429 / 150M430 / 150M431 / 150M432 / 150M433 / 150M434 / 150M435 / 150M436 / 150M437 / 150M438 / 150M439 / 150M440 / 150M441 / 150M442 / 150M443 / 150M444 / 150M445 / 150M446 / 150M447 / 150M448 / 150M449 / 150M450 / 150M451 / 150M452 / 150M453 / 150M454 / 150M455 / 150M456 / 150M457 / 150M458 / 150M459 / 150M460 / 150M461 / 150M462 / 150M463 / 150M464 / 150M465 / 150M466 / 150M467 / 150M468 / 150M469 / 150M470 / 150M471 / 150M472 / 150M473 / 150M474 / 150M475 / 150M476 / 150M477 / 150M478 / 150M479 / 150M480 / 150M481 / 150M482 / 150M483 / 150M484 / 150M485 / 150M486 / 150M487 / 150M488 / 150M489 / 150M490 / 150M491 / 150M492 / 150M493 / 150M494 / 150M495 / 150M496 / 150M497 / 150M498 / 150M499 / 150M500 / 150M501 / 150M502 / 150M503 / 150M504 / 150M505 / 150M506 / 150M507 / 150M508 / 150M509 / 150M510 / 150M511 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/ 150M812 / 150M813 / 150M814 / 150M815 / 150M816 / 150M817 / 150M818 / 150M819 / 150M820 / 150M821 / 150M822 / 150M823 / 150M824 / 150M825 / 150M826 / 150M827 / 150M828 / 150M829 / 150M830 / 150M831 / 150M832 / 150M833 / 150M834 / 150M835 / 150M836 / 150M837 / 150M838 / 150M839 / 150M840 / 150M841 / 150M842 / 150M843 / 150M844 / 150M845 / 150M846 / 150M847 / 150M848 / 150M849 / 150M850 / 150M851 / 150M852 / 150M853 / 150M854 / 150M855 / 150M856 / 150M857 / 150M858 / 150M859 / 150M860 / 150M861 / 150M862 / 150M863 / 150M864 / 150M865 / 150M866 / 150M867 / 150M868 / 150M869 / 150M870 / 150M871 / 150M872 / 150M873 / 150M874 / 150M875 / 150M876 / 150M877 / 150M878 / 150M879 / 150M880 / 150M881 / 150M882 / 150M883 / 150M884 / 150M885 / 150M886 / 150M887 / 150M888 / 150M889 / 150M890 / 150M891 / 150M892 / 150M893 / 150M894 / 150M895 / 150M896 / 150M897 / 150M898 / 150M899 / 150M900 / 150M901 / 150M902 / 150M903 / 150M904 / 150M905 / 150M906 / 150M907 / 150M908 / 150M909 / 150M910 / 150M911 / 150M912 / 150M913 / 150M914 / 150M915 / 150M916 / 150M917 / 150M918 / 150M919 / 150M920 / 150M921 / 150M922 / 150M923 / 150M924 / 150M925 / 150M926 / 150M927 / 150M928 / 150M929 / 150M930 / 150M931 / 150M932 / 150M933 / 150M934 / 150M935 / 150M936 / 150M937 / 150M938 / 150M939 / 150M940 / 150M941 / 150M942 / 150M943 / 150M944 / 150M945 / 150M946 / 150M947 / 150M948 / 150M949 / 150M950 / 150M951 / 150M952 / 150M953 / 150M954 / 150M955 / 150M956 / 150M957 / 150M958 / 150M959 / 150M960 / 150M961 / 150M962 / 150M963 / 150M964 / 150M965 / 150M966 / 150M967 / 150M968 / 150M969 / 150M970 / 150M971 / 150M972 / 150M973 / 150M974 / 150M975 / 150M976 / 150M977 / 150M978 / 150M979 / 150M980 / 150M981 / 150M982 / 150M983 / 150M984 / 150M985 / 150M986 / 150M987 / 150M988 / 150M989 / 150M990 / 150M991 / 150M992 / 150M993 / 150M994 / 150M995 / 150M996 / 150M997 / 150M998 / 150M999 / 150M1000 / 150M1001 / 150M1002 / 150M1003 / 150M1004 / 150M1005 / 150M1006 / 150M1007 / 150M1008 / 150M1009 / 150M1010 / 150M1011 / 150M1012 / 150M1013 / 150M1014 / 150M1015 / 150M1016 / 150M1017 / 150M1018 / 150M1019 / 150M1020 / 150M1021 / 150M1022 / 150M1023 / 150M1024 / 150M1025 / 150M1026 / 150M1027 / 150M1028 / 150M1029 / 150M1030 / 150M1031 / 150M1032 / 150M1033 / 150M1034 / 150M1035 / 150M1036 / 150M1037 / 150M1038 / 150M1039 / 150M1040 / 150M1041 / 150M1042 / 150M1043 / 150M1044 / 150M1045 / 150M1046 / 150M1047 / 150M1048 / 150M1049 / 150M1050 / 150M1051 / 150M1052 / 150M1053 / 150M1054 / 150M1055 / 150M1056 / 150M1057 / 150M1058 / 150M1059 / 150M1060 / 150M1061 / 150M1062 / 150M1063 / 150M1064 / 150M1065 / 150M1066 / 150M1067 / 150M1068 / 150M1069 / 150M1070 / 150M1071 / 150M1072 / 150M1073 / 150M1074 / 150M1075 / 150M1076 / 150M1077 / 150M1078 / 150M1079 / 150M1080 / 150M1081 / 150M1082 / 150M1083 / 150M1084 / 150M1085 / 150M1086 / 150M1087 / 150M1088 / 150M1089 / 150M1090 / 150M1091 / 150M1092 / 150M1093 / 150M1094 / 150M1095 / 150M1096 / 150M1097 / 150M1098 / 150M1099 / 150M1100 / 150M1101 / 150M1102 / 150M1103 / 150M1104 / 150M1105 / 150M1106 / 150M1107 / 150M1108 / 150M1109 / 150M1110 / 150M1111 / 150M1112 / 150M1113 / 150M1114 / 150M1115 / 150M1116 / 150M1117 / 150M1118 / 150M1119 / 150M1120 / 150M1121 / 150M1122 / 150M1123 / 150M1124 / 150M1125 / 150M1126 / 150M1127 / 150M1128 / 150M1129 / 150M1130 / 150M1131 / 150M1132 / 150M1133 / 150M1134 / 150M1135 / 150M1136 / 150M1137 / 150M1138 / 150M1139 / 150M1140 / 150M1141 / 150M1142 / 150M1143 / 150M1144 / 150M1145 / 150M1146 / 150M1147 / 150M1148 / 150M1149 / 150M1150 / 150M1151 / 150M1152 / 150M1153 / 150M1154 / 150M1155 / 150M1156 / 150M1157 / 150M1158 / 150M1159 / 150M1160 / 150M1161 / 150M1162 / 150M1163 / 150M1164 / 150M1165 / 150M1166 / 150M1167 / 150M1168 / 150M1169 / 150M1170 / 150M1171 / 150M1172 / 150M1173 / 150M1174 / 150M1175 / 150M1176 / 150M1177 / 150M1178 / 150M1179 / 150M1180 / 150M1181 / 150M1182 / 150M1183 / 150M1184 / 150M1185 / 150M1186 / 150M1187 / 150M1188 / 150M1189 / 150M1190 / 150M1191 / 150M1192 / 150M1193 / 150M11

Popular Communications' Scanner Frequency Chart

Frequency Bands (MHz)	Services	Frequency Bands (MHz)	Services
30.00-30.51	Federal	154.65-156.03	Police, Local Government, Special Emergency, EMS
30.51-30.64	Special Industrial	156.04-156.24	Highway Maintenance
30.66-30.82	Petroleum Products, Forestry Products, Buses	156.25-157.425	Maritime
30.84-31.14	Business, Forestry, Buses	157.47-157.52	Auto Emergency
31.16-31.98	Business, Forestry, Special Industrial	157.55-157.71	Taxi (mobiles)
32.00-33.00	Federal	157.77-158.07	Mobile Telephone (mobiles)
33.00-33.12	Highway Maintenance, Special Emergency	158.13-158.27	Power Utility
33.14-33.16	Business	158.28-158.44	Forestry/Petroleum Products, some Businesses
33.18-33.38	Petroleum	158.49-158.67	Mobile Telephone (mobiles)
33.42-33.98	Fire	158.73-158.97	Police, Local Government
34.00-35.00	Federal	158.98-159.21	Highway Maintenance, some Police
35.00-35.20	Business (35.16 = Telephone Maintenance)	159.22-159.49	Forestry
35.22-35.68	Mobile Telephone (bases), Special Industrial	159.49-160.20	Trucks
35.70-35.98	Business, Special Industrial	160.20-161.57	Railroads
36.00-37.00	Federal	161.64-161.76	Broadcast Auxiliary
37.02-37.42	Police, Local Government	161.80-162.00	Ship to Shore Telephone (base)
37.44-37.88	Power Utilities	162.02-173.20	Federal
37.90-37.98	Highway Maintenance, Special Emergency	173.20-173.40	Newspapers, Motion Picture
38.00-39.00	Federal	406.00-420.00	Federal
39.00-39.98	Police, some Local Government	420.00-450.00	Amateur
40.00-42.00	Federal	450.00-451.00	Broadcast Auxiliary
42.00-42.94	State Police	451.00-451.15	Power Utility
42.96-43.18	Business, Special Industrial (43.16 = Telephone Maintenance)	451.17-451.75	Telephone Maintenance, Forest/Petroleum, Power Utility
43.22-43.68	Mobile Telephone (mobile units)	451.72-452.30	Special Industrial, Taxi (bases)
43.70-44.60	Buses & Trucks	452.30-452.50	Taxi, Trucks, Railroads (bases)
44.62-45.06	State Police, Forestry	452.52-452.60	Auto Club (bases/mobiles)
45.08-45.66	Police, Local Government	452.60-452.95	Trucks, Railroads (bases)
45.68-45.86	Police, Highway Maintenance	453.00	Newspapers
45.88-46.04	Fire, Police, Special Emergency	453.05-453.95	Police, Fire, Local Gov't., Forestry, Highway Maintenance (bases)
46.08-46.50	Fire	454.02-454.54	Mobile Telephones (bases)
46.52-46.58	Local Government	454.67-455.00	Aeronautical Telephones (bases)
46.60-47.00	Federal	457.00-460.00	Mobile units associated with bases operating 453.00 to 457.00
47.02-47.40	State Highway Maintenance	460.00-460.55	Police (bases)
47.42-47.68	Special Emergency, Special Industrial	460.57-460.63	Fire (bases)
47.70-48.54	Power Utility	460.65-460.88	Airline operations at airports (bases)
48.56-49.58	Forest/Petroleum Products	460.90-461.00	Central Station Alarm companies (bases)
49.66-50.00	Federal (49.83 to 49.89 = Cordless Phones)	461.00-462.45	Business and Manufacturing (bases)
118.00-136.00	Aeronautical	462.47-462.53	Forest/Petroleum Products, Telephone, Power Utilities, Manufacturing (bases)
136.00-144.00	Federal	462.55-462.75	GMRS (bases)
144.00-148.00	Amateur	462.92-463.18	Emergency Medical
148.00-150.80	Federal	463.20-465.00	Business (bases)
150.80-150.97	Auto Emergency	465.00-470.00	Mobile units associated with bases operating 460.00 to 465.00; also some independent walkie talkies
150.99-151.13	Highway Maintenance	470.00-512.00	This is the UHF "T" Band which was instituted in only certain major metropolitan areas to alleviate frequency congestion in practically all radio services. Inasmuch as it is not used for two-way radio communications outside of a limited number of metro areas, we have not listed specific assignments here. However, if you live in a major city, you will undoubtedly hear activity on these frequencies.
151.14-151.48	Forestry		
151.49-151.60	Special Industrial		
151.61-151.99	Business (151.985 = Telephone Maintenance)		
152.00-152.24	Mobile Telephone (bases)		
152.27-152.45	Taxi (bases)		
152.51-152.81	Mobile Telephone (bases)		
152.87-153.02	Motion Picture, Special Industrial		
153.03-153.40	Forestry/Petroleum Products		
153.41-153.73	Power Utility, some Petroleum Products		
153.80-154.46	Fire, Local Government		
154.50-154.63	Business		

This handy frequency chart showing upper and lower frequency limits of nationally used bands should aid scanner owners to root out lots of new stations to monitor. It is meant as a very general guide, however, and is not intended to be an exact representation of each and every service or frequency assignment. But it will give you a good shot at finding out where lots of action is — especially stations you may not be aware of at present.

and most every other type of operation taking place on the gleaming steel rails.

Maritime Frequencies used for every conceivable coastal and inland waterway purpose from simple chit-chat between yachts to harbor operations, safety, navigation, ship-to-shore telephone calls, etc. You'll hear yachts, tugs, tankers, freighters, passenger liners, fishing trawlers, research vessels—even the U.S. Coast Guard!

Aeronautical Aircraft and ground stations, control towers, airliners, and more!

Local Government While police and fire operations very often turn up on these frequencies, they are basically a catch-all for municipal, county, and state operations, which might include public power utilities, civil defense, animal shelters, public transportation, and the general administrative operations of various governmental entities.

Special Emergency Rescue squads, private ambulance services, and similar services abound on these frequencies.

Mobile Telephone The September is-

sue of POP'COMM spotlighted these stations, and they always make fascinating listening. You can actually listen in on phone calls between vehicles and aircraft and telephones in homes and offices. Lots of tacky conversations to be heard, too.

Motor Carrier All sorts of trucks and bus companies on these frequencies; there's always something of interest to hear here.

Taxi Your local taxi companies doing business in your community.

General Mobile Radio Service

Regency Scanners

Designed for the professional

Our radios deliver the kind of performance you need. For rugged day-to-day operations in practically any type of environment. Regency scanners can take it. So they're the first choice of professionals all around the country.

And when you think about it, what else would you expect from the only professional two-way radio manufacturer in the scanner business. We've taken the features you want, and incorporated them into our scanners. . . . base, mobile and hand held.

So listen to your channels on your choice of a wide variety of models and prices from Regency - makers of the worlds first transistor radio.

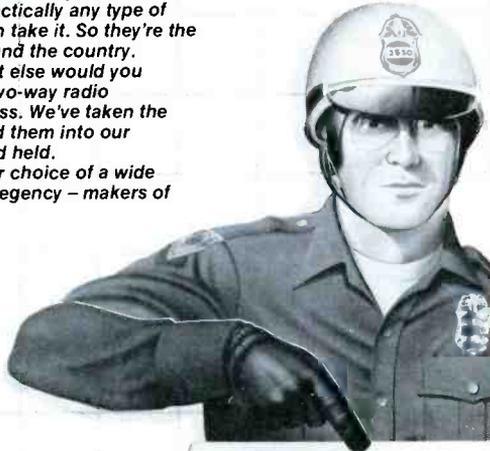


Model R106



Model H604

Regency Electronics, Inc.
7707 Records Street
Indianapolis, Indiana 46226



Model M100

CIRCLE 16 ON READER SERVICE CARD

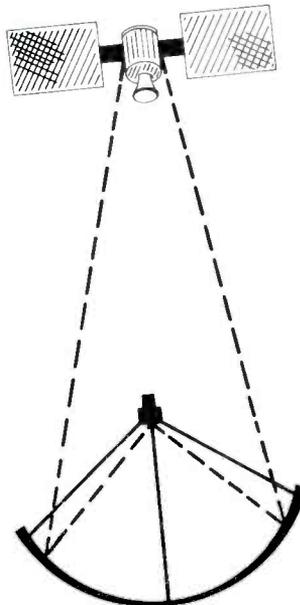
Your own satellite TV system for \$2,586.⁰⁰ 10 FT. PARABOLIC

What the system will do:

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What the system includes:

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(GMRS) This is sort of a "grown up" version of CB Radio, except that most of the licensees are business and industrial users rather than hobbyists.

Using this information you can look through our frequency chart to select those particular radio services which you might like to single out for special attention or concentrated effort. Our frequency chart, by the way, is intended only as a general overview of bands and we have not intended it to be a highly detailed examination of every single spot where each specific service might be found inasmuch as there are isolated frequencies not specified here upon which some of these stations might pop up.

Your scanner may well have room for 50 channels to be programmed into it. Chances are you are not fully utilizing all of this capability by listening to only your area police, fire, and EMS communications. This is how to fill up those other channels with fascinating communications.

Long Haul

Let's mention here that the "low band" (30-50 MHz) has the potential to bring in skip stations—that is, stations from anywhere in the nation or even the world, when ionospheric conditions are "right" for such propagation. With a good skip opening you can hear practically anywhere, so don't be surprised when you bump into communications in various foreign languages.

Open Up

These guidelines should enable you to double your monitoring enjoyment, but also to open up your scanner's potentials to bring you lots of new things to hear. Heck, you might even have to go out and buy another scanner to hear everything you discover! Good listening!

LISTENING POST

BY GERRY L. DEXTER

WHAT'S HAPPENING: INTERNATIONAL SHORTWAVE BROADCASTING BANDS

You know, there are two ways to approach shortwave listening and DXing—with information and without. A listener without information about what's happening on the bands is something like a man in a row boat without oars. He's adrift in a sea of signals.

Although it's fun to just leave the maps behind now and then and go exploring, the listener who doesn't stay up-to-date won't know where to find Radio Lazidazica when the coup happens, or where to find an English language newscast the next time he sits down at the receiver. He'll be lost on what new stations are on the air that can be tried for, or what stations the vagaries of propagation are bringing in now that won't be there in another couple of months.

No one source of information can keep you totally abreast of what's going on, but two or three should keep you nicely in tune with the action. Naturally, we hope this column in *POP'COMM* will be a regular source of information for you. There are some others you should consider, though.

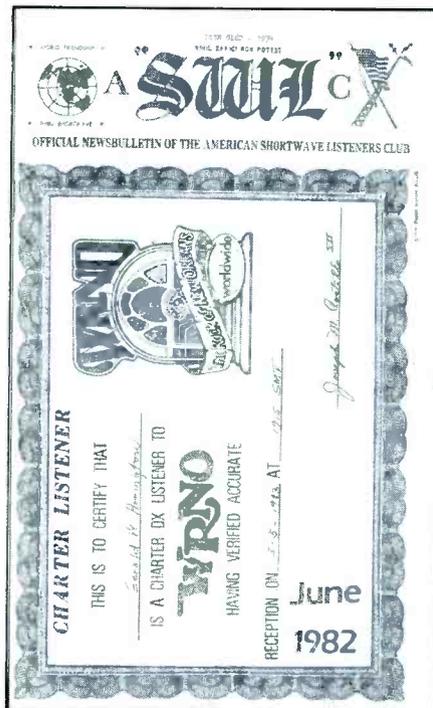
There are a number of very good DX programs on the air—programs designed just for the shortwave listener and DXer which contain the latest DX tips and schedule changes, equipment news, and other information. Among the best are those produced by Radio Canada International, Radio Netherlands, Radio Sweden, and HCJB in Quito, Ecuador. Radio Sweden's program, Sweden Calling DXers, even issues copies of the items used to those who report regularly to the program.

The North American Shortwave Association (NASWA) publishes *Friendx* on a monthly basis and is devoted entirely to shortwave broadcast listening and DXing. It includes feature articles, loggings, QSLs and Listener's Notebook, and a country by country survey of the shortwave world each month. Dues are \$16 per year in North America; a sample copy can be obtained from Bill Oliver, 45 Wildflower Road, Levittown, PA, 19057 for \$1.

SPEEDX, at P.O. Box E, Elsinor, CA 91214, deals with shortwave broadcast also, as well as the utility bands, QSLs, and feature articles. Subscription to this one is \$16 per year. Publication is monthly.

The American Shortwave Listeners Club treats shortwave broadcast, utilities, and the medium wave broadcast band. It is located at 16182 Ballad Lane, Huntington Beach, CA 92649. Again, dues are \$16 per year for the monthly bulletin.

Another source of information, schedules, some DX tips, article reprints, and listener's comments on shortwave programs is the *Review of International Broadcasting*, published by Glenn Hauser. There are periodic reference guides such as *Broadcasts In*



English, which are very handy to have near the radio. RIB is headquartered at Box 6287, Knoxville, TN 37914.

We suggest that, before joining or subscribing to any of these publications, you write first to request a sample copy and enclose \$1 to cover costs. Don't expect a reply if you haven't sent that dollar since, for the most part, these organizations are volunteer, non-profit groups.

It's a good idea to join a DX club. Again, there are several good ones to choose from. Incidentally, joining a club is also an excellent way to develop new friendships in the hobby, possibly even people in your own area. If you do join one or more clubs, please support it with your loggings and in any other way you can.

Okay, let's see what's on.

Australia Radio Australia is currently broadcasting to North America from 0200 to 0400 GMT on 17.795, 0200 to 0330 on 21.470 and 1100 to 1300 on 9.580. (Krist, Pickard II, Yajko/*SPEEDX*)

Canary Islands To hear this country you have to listen to Spain! The Spanish Foreign Radio maintains their Atlantic transmitting station on the Canary Islands, which is used to relay programs from Spanish Radio. It's on to North America from 2300 to 0330 on 11.815, 0230 to 0330 on 15.365; it is also on Sundays from 1400 to 2200. Most or all of it is in Spanish. (QTH Africa via ASWLC)

Taiwan The Voice of Free China is on in English to North America from 0100 to 0200 on 11.825 and 15.345. It can also be found from 0300 to 0350 on the above frequencies, plus 17.800 and 2140 to 2240 on

the same three frequencies. (Joe Sonner III via ASWLC)

Clandestine The anti-Castro station, LaVoz de Alpha 66, was shut down by the FCC. Don't be surprised if it returns to the air.

In the meantime, you can look for La Voz de Cuba Independiente y Democratica on about 5.106 at various times in local evenings. This station is also believed to be located in the Miami, FL area.

A new anti-Nicaraguan station is La Voz del Sandino, observed at Listening Post Headquarters after 0400 GMT on 6.220. It is all in Spanish with male and female announcers and many identifications. Signals were fairly strong. (editor)

Denmark Clear, consistent reception of Radio Denmark has been difficult for a number of years now, but that may change soon, thanks to higher powered transmitters. The Danish Radio broadcasts to North America at 2030 on 11.830, 2200 on 15.165, and 0000 on 11.830 (Köie, via SCDX)

East Germany Radio Berlin International is one of the strongest signals you'll find on the bands. To North America at 0000, 0130, 0230, and 0545—the latter two times to the West Coast. Check 11.970, 11.840, 11.890, and 9.730. (S. MacKenzie/ASWLC, editor)

France Radio France International's very informative English program "Paris Calling Africa" runs from 1600 to 1700 on 6.175, 11.845, 15.300, 15.315, 17.720, 17.850, 21.525, 21.580, 21.620, and 25.820. (*SPEEDX*)

Gabon The easiest way to log this country is via Africa No. 1, a high power station in the town of Moyobi. The station is used

SPEEDX the dx radio magazine for active shortwave listeners

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JUNE 1982 VOL 12 NO 6



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CIRCLE 69 ON READER SERVICE CARD

SWEDEN CALLING DX-ERS

Bulletin nr 1681
Date 1982-05-25

radio SWEDEN

International service of the Swedish Broadcasting Corp.
S-105 10 Stockholm, Sweden

All times GMT
Editor this week: George Wood

SWEDEN There are changes in the Radio Sweden International schedule as of Mar. 26th. In English, the broadcast at 2300 to North America on 15.380 is changed to a new F1 of 15.270. The parallel 11.705 and 1512 remain. The same change from 15.380 to 15.270 is also made for the Columbia broadcast in Swedish. In Russian, at 1330 the broadcast to Europe on 11.705 and 1179 remain in parallel. In Russian, at 1330 the broadcast to Europe on 11.705 is changed to 11.935. Parallel 15.110 to North America, 1530, 15.270 to North Asia is changed to 15.435. The parallel F1 in Europe, 6065, is unchanged. (See two columns, 802)

HUNGARY Radio RYAB in Tihingha has been heard on a P1440 on 615 with English news coming to an end at 1352 with sign-off at 1400. (David Foster in Town Under DE Bur-voy 7)

CUBA Radio Peking broadcasts in French 1830-2230 on 1055 and 11.975 as well as the new F1s of 12.110 and 15.100. (Bruno Cortes, France)

COSTA RICA Radio Ocean in Puerto Limón has not been nationalized, as was suggested in 20-Nul 1507. The station refers the program "Maritime Cultural" from Radio Nacional on Mondays at 0130-0230, and it may have been this relay that was heard. Radio Nacional de Costa Rica uses only its new MW F1 of 590, as well as 3M 6055. (Giovanni Nona Deslandes, Costa Rica)

INTERNATIONAL GUINEA Radio Ecuatorial in Bata has changed the name and now identifies as "Radio Nacional," regular stations for its Red de emisoras Océano Ecuatorial," as reported in 20-Nul 1461--as "La Estación Continental de Radio Nacional." The station is heard on 4925 or 5004 and sign-off is at 2130. (WPTX Newsletter and Paul Karadzic, England)

FRANCE The English language program from Radio France International, Paris Calling Africa is broadcast now at 1600-1700 on 6175, 11.845, 15.300, 15.315, 17.720, 17.850, 21.580, 21.620 and 21.675; 17.260 and 25.800 have been dropped. Radio France International broadcasts in Spanish 2100-2200 on 945 and 5995. The German and Portuguese programs are now broadcast one hour earlier. German 1900-2000 on 1070, 6010 and 6105 as well as 18; Portuguese 2015-2115 on 6175, 1155 and 9605. French to the Americas is broadcast 1045-1045 on 17.775 and 21.645; 1045-1045 on 15.135; and 1900-1045 on 17.860. At 1700-1900 is used instead of 15.135; at 1300-17.00 is used instead of 17.100. (Hector Ojala, Sweden; WPTX Newsletter; Paul Turner, France)

LUXEMBOURG English programs from Radio Luxembourg are now carried at 1800-2000 daily on 1840. The final two hours are relayed on 6090, and are devoted to a new program called "Radio Luxembourg," which is produced especially with the international shortwave audience in mind. The program is the idea of director Henry Dreyer, and is hosted in turn by all the station's English-speaking DJs. (WPTX Newsletter)

ITALY No one is assigned to QSL reception reports at Radio Rapol, so is it my wonder that it offers a reasonable chance of a reply. Don't bother writing to the Chief Editor or Director-General. Only the 100 kW transmitters at Esmeltar are used at present, with the 5 kW unit at Javelabbal as a standby. However, since the King of Rapol has the occasional bowl of wackertart, you may just be lucky enough to hear Javelabbal.

heavily as a Radio France International relay. Try 4.811 from 0500 to 0800 and 1700 to 2400, 7.200 from 0800 to 1700, and 11.755 from 0500 to 2400. (QTH Africa via ASWLC)

Hungary Radio Budapest is on the air to North America from 0100 to 0130, 0200 to 0230, and 0300 to 0315 on 6.000, 9.585, 9.835, 11.910, 15.220, and 17.710. (T. Smith/SPEEDX)

Indonesia One of the overseas service outlets of the Voice of Indonesia can be heard on 11.790. Stewart MacKenzie in California heard it around 1600 in Arabic. East Coasters should try earlier, around 1200 GMT.

Japan Radio Japan (NHK) is on to North America from 0130 to 0230 on 15.195, 17.825, 21.610, and 21.640. It can also be heard from 2345 to 0045 on 17.825 and 21.610. (Harrell, W. Pickard II, Wong/SPEEDX)

New Zealand Radio New Zealand clings tenaciously to life. The shortwave service is under threat of a permanent closedown due to lack of funds available from the government. Listener protest has stayed the execution for a time at least. If the Radio New Zealand service does vacate the shortwave bands there's a chance one or more private New Zealand broadcasters may try to operate it. Incidentally, at last report, support from U.S. listeners had amounted only to a handful of letters. Is that a hint? Yes!

Roumania Radio Bucharest beams it's programming to North America from 0200 to 0300, and 0400 to 0430 on 5.990, 6.155, 9.510, 9.570, 11.810, 11.940, 15.255, and 15.390. (C. Lobdell/SPEEDX)

Saipan (Northern Marianas) Activity from this country may be a reality by now. KYOI was due to begin broadcasting in September with a schedule of mostly music programs. The tentative schedule is 11.900 from 0700 to 1800 and 17.795 from 2100 to 0700. (Radio Nederland via NASWA Listener's Notebook)

The Far East Broadcasting Company also has plans to operate from Saipan with two 100 kilowatt transmitters, although no target date has been announced. (Kander/ASWLC)

Sweden Look for Radio Sweden's North American service programming from 0230 to 0300 on 11.705 and 15.420, 1400 to 1430 on 17.790 and 21700, and from 2300 to 2330 on 11.705 and 15.380. (C. George, W. Pickard II/SPEEDX)

Vatican State Vatican Radio's North American service is like passing through a very small town—it's gone before you really know you've arrived. Just 15 minutes in length, 0100 to 0115 on 6.015, 9.605, and 11.845. (Hesch, W. Pickard II, Taylor, Yajko/SPEEDX)

Tahiti A longtime favorite, Radio Tahiti was heard by Stewart MacKenzie in California on 15.170 around 0430 with a church service. This station often features lively Tahitian music.

Vanuatu Camping out on 3.945 in the wee hours of the morning may turn up this toughie for you. Expect a lot of interference from Amateur operators and a fairly weak signal. (P. Bunn, RADX via NASWA Listener's Notebook)

Venezuela Recent loggings of stations heard in the Midwest U.S. include:

La Voz del El Tigre to 0404 sign off on 3.256, with identification and Venezuelan National Anthem; 4.770 Radio Mundial Bolivar at 0311 with a romantic music program; 4.780, the nearly impossible to QSL, La Voz de Carabobo at 0327; 4.960 Radio Sucre at 0353 and 4.980 Ecos del Torbes to sign off at 0401. (Glicksman, Mikel, Picard, Chicago Area DX Club)

The Venezuelan government station, Radio Nacional, is now using 9.640 from 1000 GMT sign on. (SCDX via NASWA LN)

Uganda Radio Uganda has been trying to get its overseas service back into operation following the war there some time ago. The station was noted by Stewart MacKenzie on the West Coast on 15.375 around 0400 with popular music.

USSR A number of USSR transmitting sites have been logged by Stewart MacKenzie. Radio Moscow World Service on 12.060 at 2030 via Simferopol; 11.990 Vladivostok at 2035 with home service; 11.770 Khabarovsk at 2045 to China; 15.424 Petropavlovsk at 0320 with the World Service; 17.770 Petropavlovsk again at 1450 with Radio Moscow in English. At 2330 on 15.550, Tblisi is carrying Radio Moscow; 15.500 at 2335 had Radio Moscow in Spanish via Yerevan, and Radio Moscow at 2350 via Moscow on 15.460.

Zambia Radio Zambia offers up English and local language programming from 1600 to 2100 on 9.580. (Colin Miller, Miki Vcellar, QTH Africa via NASWA LN)

Again, a reminder that times, frequencies, and programs are extremely changeable on shortwave. In addition to the schedule revisions four times yearly, daily changes are more the rule than the exception.



Library Available

Things for free aren't all that common these days, but Radio Netherlands continues its interest and involvement with the shortwave listener through a series of free pamphlets to assist you in getting more enjoyment out of your receiver. The Radio Nederland free library of listening and DX-ing pamphlets includes the following:

Radio Activity Booklist is a guide to clubs, books, and other publications of use to the shortwave listener and DXer.

Receiver Shopping List is a summary of what's currently available in receivers and associated equipment for the SWL, including prices and where to buy them.

Writing Useful Reception Reports is a six page guide to help you turn out reception reports to be proud of.

Latin American DXing mostly encompasses Spanish and Portuguese sample report letters and phrases to use when sending reports south of the border.

DXing Indonesia is an excellent beginner's guide to this fascinating, but difficult, area of the DX game.

For the medium wave or broadcast band listener, there is **Medium Wave - What Now?**, which includes plans for a medium wave loop antenna, amplifier, clubs, and a section on identifying interference.

Any one or all of these pamphlets can be had simply by writing to Radio Netherlands Media Network, Radio Netherlands, P.O. Box 222, 1200 JG Hilversum, Holland. Tell them you read it in *POP'COMM!*

A Column For All

Here's another reminder that we look forward to your input into Listening Post. Tell us what you are hearing. We'll be happy to consider printing a photo of your shack or copy of your more interesting QSLs, and we'll try to answer your questions. It's your column! Letters can be sent to *POP'COMM* or to me at Listening Post headquarters. Unfortunately, we cannot answer letters other than here in the column.

REVIEW OF INTERNATIONAL BROADCASTING

COLUMBIA BROADCASTING SYSTEM
COLUMBIA SQUARE PLAYHOUSE
1511 SUNSET BOULEVARD HOLLYWOOD, CALIF. 90028

Thursday
7:00 P.M.
15
1945
7:00-8:00 P.M.
Diana Clark
447028 p.m.

STUDIO
A
CBS

The Armed Forces Radio Service
"COMMARAD PERFORMANCE U.S.A."
LOWARD ARNOLD
JIMMY DURANIE
THE BONS OF THE PIONEERS
CHILDREN UNDER THREE WILL NOT BE ADMITTED

NATIONAL BROADCASTING CO., INC.
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THE ARMED FORCES RADIO SERVICE
"MAIL CALL"
OZZIE NELSON & HARRIET HILLIARD
JUNE ALLYSON
HARRY VON ZELL
THE RIDERS OF THE PURPLE SAGE
CHILDREN UNDER 6 WILL NOT BE ADMITTED

Studio
D
NBC
WEDNESDAY
JANUARY
31
1945
9:30-10:10 P.M.
Diana Clark
447028 p.m.

AFRIS is back in Los Angeles--but don't expect to see programs like these on shortwave (via B. Horvitz)

Edited and published by
Glenn Hauser \$1 1/4
Issue Fifty-One May '81

In future issues, we'll be talking about reception report writing, zeroing in on specific countries, giving you a rundown on new shortwave bands, "out of band" operating, and, in general, surveying the entire shortwave broadcasting scene every month. We'll also run down the list of current DX programs for you, and perhaps take a close up look at some of them.

We hope you'll join us in the Listening Post each and every month, part of the exciting world of *POPULAR COMMUNICATIONS*. See you soon!

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WASHINGTON PULSE

FCC ACTIONS AFFECTING COMMUNICATIONS

Unlicensed Municipal Station Pays Fine!

Municipio de Carolina of Carolina, Puerto Rico, has paid a \$750 fine for unlicensed operation of a Public Safety Radio Station. The Virgin Islands' Civil Defense complained to the Field Operations Bureau's San Juan District Office of interference to their communications system. The source of the interference, an unidentified paging service, was located and identified by investigation and inspection. Although both operating personnel and management of the offending station admitted to knowing FCC licensing requirements, this local government station was determined to be unlicensed. A Warning and subsequently a Notice of Apparent Liability for \$750 was issued for violation of Section 301 of the Communications Act.

Another Unlicensed Station!

L&C Management, Inc., of Dallas, TX, paid a \$750 fine for unlicensed operation of a paging system which resulted in *disruption to FBI communications!* The Dallas FCC Office received a complaint from the FBI in Dallas of severe interference to their primary radio channel in the form of paging transmissions. Through monitoring, an FCC technician located the transmitter used for the paging and shut it down. When interference resumed the following day, the station was officially inspected. A Notice of Apparent Liability for \$750 was subsequently issued to L&C Management, Inc. for operation of an unlicensed paging station.

Amateur Sentenced To Jail For Obscene And Illegal Transmissions

Richard A. Burton, Reseda, CA, has been sentenced to serve six months in jail and five years on probation for transmitting obscene, indecent, and profane language on an Amateur Radio service frequency and operating an Amateur station without a license. A Los Angeles federal district judge sentenced Burton to eight years imprisonment but suspended all but six months of the term. Burton will be required to perform 1,500 hours of community service work during his probation period.

Burton's Amateur station license was revoked and the previous suspension of his General Class Amateur operator license was affirmed by the FCC Private Radio Bureau for obscene transmissions and interference with the transmissions of other Amateurs. Burton made further illegal transmissions over his station after the revocation and sus-

pension, and the FCC requested criminal action against him.

The earlier transmissions leading to the suspension and revocation were the subject of 60 complaints to the FCC Long Beach, CA, district office. Other complaints were made later to FCC headquarters in Washington, DC. The transmissions, which were on the popular 144-148 MHz (two-meter) Amateur band, were monitored by engineers from the district office.

"Federal Licensing, J.V." Not A Commission Office

The FCC's Private Radio Bureau warns licensees in the Private Land Mobile Radio Services that official-looking notices they may receive from "Federal Licensing, J.V." about the expiration of their license are not sent by the Commission. The Commission has received numerous complaints as well as a Congressional inquiry about Federal Licensing, J.V., 6802 Poplar Place, Suite 302, McLean, VA.

The firm apparently sends a form letter to Commission licensees in the Land Mobile Radio Services offering to file the licensee's renewal application if the licensee will sign an enclosed blank FCC Form and send it with \$35 to "Federal Licensing" in the envelope provided. Many of the complainants believed that the offer was sent to them by the Commission. Federal Licensing, J.V. is not a part of or affiliated with the Federal Communications Commission. There is no fee for submitting an application or renewal application in the Land Mobile Radio Services. The Commission and U.S. Postal Inspectors are investigating the complaints.

Reports And Records Requirements Reduced For Aviation Services

The Commission proposed to eliminate certain reporting, record-keeping, and record-retention requirements from its rules governing the Aviation Services (Part 87) which impose unnecessary burdens on the aviation community.

The FCC said signed entries which are required to be made in station records at specified times, indicating that frequency measurements are within tolerance or that an automatic frequency monitor is in service, are seldom if ever used. Although measurements will be required when a transmitter is originally installed and when adjustments are made, it said the record-keeping requirement is unnecessary and should be eliminated.

Required notification to the FCC in writing of the precise offset from an authorized

frequency used by interconnected aeronautical enroute stations is not necessary and should be deleted, the FCC said, since the stations in enroute networks are licensed to a single entity, and the offset parameters are prescribed in the rules. The enroute service provides air-ground communications for flight management of aircraft by operating companies.

The FCC also proposed to eliminate notification and reporting requirements for licensees sharing their facilities with other eligible licensees in authorized cooperative uses. No problems have been noted with sharing arrangements, and no use is made of the reports.

The required maintenance of a file of all record (written) communications by aircraft stations is obsolete, the Commission said, since there are no longer aeronautical public service stations providing record service. A requirement that ground stations maintain records of radiotelephone contacts is redundant since they are also public coast stations licensed in the Maritime Mobile Service and subject to other record-keeping rules. It said Maritime Mobile Service requirements will be taken up in a separate rulemaking.

In a previous rulemaking, the Commission proposed the elimination of station log requirements in the Aviation services.

Rulemaking On No-Code Amateur Operator Class

The FCC instructed its staff to prepare a Notice of Proposed Rulemaking looking towards implementing a no-code Amateur operator class. Two options are to be pursued: eliminating the slow-speed telegraphy test requirement of the existing Technician operator class and creating a new operator class patterned after the Canadian Digital Radio Operator class.

Every Amateur Radio operator license issued by the Commission requires the applicant to have some level of proficiency in Morse code. For many Amateur Radio operators, the Morse code stands as the absolute cornerstone of the service.

International Telecommunication Union Radio Regulations preclude the Commission from dispensing with Amateur Radio operator telegraphy requirements for operation below 144 MHz. At the 1979 World Administrative Radio Conference, the U.S. position of completely deleting the Amateur radiotelegraphy requirement was soundly defeated, but the Commission was successful in lowering the option frequency from 144 to 30 MHz.

According to the FCC's Private Radio Bureau, there is no justification in the oper-

ating requirements to continue the telegraphy barrier above 30 MHz. However, because below 30 MHz, telegraphy probably will continue to be a major communication mode for the foreseeable future, the Bureau had recommended that a no-code operator license for general operation below 30 MHz not be considered.

Temporary Licensing In Business Radio Service Not Available With Interservice Sharing

The Private Radio Bureau's Licensing Division has received some applications in the Business Radio Service that reflect a possible misunderstanding of FCC rules for either temporary licensing (Section 90.159) or interservice sharing (Section 90.176). This notice clarifies requirements for Business Radio Service applicants who want to operate a shared base station or community repeater on a non-Business frequency.

Normally, applicants for shared facilities that are already licensed in the Business Radio Service are eligible for temporary, or "instant," licensing. But when a shared station is licensed on a non-Business frequency, as permitted by rules for interservice sharing, temporary licensing is not available.

For example, if a community repeater in the Business Radio Service has been authorized to use a Forest Products Radio Service frequency because no Business frequencies were available, each user of that repeater would have to apply separately, meet all conditions for the use of the Forest Products frequency (in the Business Radio Service), and wait for the license before operating. Rules for interservice sharing do not provide for temporary licensing.

Applicants for interservice frequencies (in the 150-170 and 450-470 MHz bands) must:

- (1) verify by means of frequency coordination or field study that no satisfactory frequencies are available in their own radio service in the area of desired operation;

- (2) choose a frequency from another service that is not being used in that service in the area of desired operation;

- (3) obtain written concurrence from the frequency coordinator responsible for the requested frequency that its assignment outside its intended radio service will not result in harmful interference to existing or planned systems within its own service;

- (4) show that desired operation will not violate any technical standards in the requested frequency's own service.

Four Military Areas Given Additional Protection From Amateur Radio Interference

In response to a request by the National Telecommunications and Information Administration, the Commission has extended a 50 watt transmitter power limitation on Amateur Radio stations in the 420-450 MHz band to two additional military areas

and enlarged the restricted areas around two other bases.

It amended Parts 2 (Table of Frequency Allocations) and 97 (Amateur Radio Service Rules) to add circles with a 100 mile radius around Elmendorf Air Force Base, AK, and Grand Forks Air Force Base, ND. It also proposed to extend the radius at Otis Air Force Base, MA, from 50 to 100 miles and the radius at Beale Air Force Base, CA, from 50 to 150 miles.

Amateur Radio stations in those areas are limited to 50 watts transmitter power to minimize interference to government operations, which are the primary users of the 420-450 MHz band. Requests for higher-powered Amateur stations in restricted areas are considered individually.

FCC Maintains Rules For Interservice Sharing In PLMRS Below 470 MHz

The Commission denied petitions by the Association of American Railroads, the Manufacturers Radio Frequency Advisory Committee, Inc., and Forest Industries Telecommunications for reconsideration of the FCC's action providing for interservice sharing of frequencies in the Private Land Mobile Radio Services below 470 MHz.

Last November, the Commission amended Subpart H of Part 90 of its rules to allow interservice sharing of frequencies without the need for rule waiver in the 150-174 and 450-470 MHz bands, provided certain criteria are met. Two categories of users were established and sharing within a category was permitted, but sharing between categories was not, without a waiver.

The first category included government eligibles in the Public Safety and Special Emergency Radio Services. The second category included nongovernment eligibles in the Special Emergency Radio Service and all other eligibles in the Industrial and Land Transportation Radio Services (except the Radiolocation Service, which has no frequencies in either band).

AAR and MRFAC proposed that Part 90 be amended by adding a "master frequency plan." This plan would include eliminating the two service categories and lumping both public safety and industrial commercial users together; excluding the Railroad Radio Service from interfrequency sharing; imposing the more restrictive technical standards if they differed between two services; and extending sharing generally to the 25-50 MHz band.

The Commission declined to make the changes, some of which had been proposed before, saying the rules as adopted maximize efficient spectrum use and provide for orderly growth.

FCC To Accept Applications For Daytime-Only AM Radio Stations On Clear Channels

The FCC decided to accept applications for new daytime-only radio stations to be operated on the 25 Class I-A clear channel

frequencies. Each station would be located within the nighttime interference-protected service area of the clear channel station whose frequency it would share.

The Commission also said it would accept applications for power increases by daytime-only stations in the same circumstances. The FCC said the move would meet at least in part the demand for new daytime stations and for power increases for existing "daytimers" without jeopardizing its objectives for the clear channels.

The Commission in 1980 changed its longstanding rules governing the clear channels to permit full time stations to broadcast on all the clear channels, while maintaining the Class I-A stations' reliable nighttime service areas of approximately 1,500 miles diameter. It estimated that 125 new full time stations could be established on the clear channels, and about 300 applications have been received since then.

At the time it deferred action on daytime-only stations, since it intended to consider separately the question of daytime protection to the clear channel stations and wanted to leave open the question of possible unlimited-time operation by existing daytime stations on the clear channels.

The Commission said daytime stations can operate in the sizeable zone between the daytime and nighttime Class I-A service areas without significantly precluding potential full time operations. The daytime operations also will not compromise considerations in clear channel negotiations with Canada, it said.

More Spectrum Provided For Marine And Air Radionavigation & Safety Communications

The Commission amended Parts 2, 83, and 87 of its rules to provide additional spectrum for aeronautical radio navigation (radiobeacons) and designated the frequency 518 kHz for urgent telegraphic warnings to ships at sea.

Commenters in this proceeding strongly endorsed the need for additional spectrum for radiobeacons in the aeronautical service. Accordingly, the Commission added aeronautical radionavigation as a primary service sharing equally with maritime mobile in the 415-435 kHz band, assigned government aeronautical radiobeacons in the 435-490 kHz band on a secondary basis and added maritime mobile to the 510-525 kHz band as a primary service shared equally with aeronautical radionavigation.

There was no opposition to the deletion of maritime radionavigation as a secondary service and the designation of 518 kHz as the single frequency in the MF band for the broadcast of urgent navigational and meteorological information. The 1979 World Administrative Radio Conference recommended use of one frequency worldwide for such warning transmissions, and several other countries have designated 518 kHz for that purpose.



Here's the station operated by Denis E. Wilson, KNY2JS, of Gloversville, NY. Note the well organized layout. It's a simple task to run a grounding strap between all the pieces of equipment of a station such as this.

Equipment Grounding For Performance

BY BILL CHEEK

In the September issue we showed how to ground an antenna for safety. Now, we'll ground the metal chassis of all of the equipment used in the radio station. This includes transmitting stations as well as scanner or monitor stations and SWL stations. This is not only a performance improving step, but a step for safety as well.

It is important to first organize the radio station with regard to physical location and component layout. In general, the main components of the station must be physically as close to True Earth Ground as possible, preferably less than eight feet. A wire running to ground does not necessarily act as a short circuit at RF frequencies, especially at VHF and UHF frequencies.

The correct procedure for station grounding follows:

A. Organize the equipment according to their permanent operating locations, preferably close together (a desk or series of shelves is ideal).

B. Obtain a length of #6 single strand copper wire or heavy-duty battery strapping. In a pinch, remove the shield from a length of RG-8 coax cable. A length of four to eight feet of this heavy conductor should be enough, depending on the size of the station and number of components.

C. Route this heavy conductor (uninsulated) behind and out of sight, in close proximity to the rear of the station equipment.

Nail or tack this conductor in several spots to prevent free movement. We will call this heavy conductor the *ground bus bar*.

D. Examine the rear chassis of each piece of equipment used in the station. Locate and loosen an available screw on each chassis. By means of a solder lug, or by wrapping around the loosened screw, connect a #14 stranded copper wire to the chassis of each and every piece of equipment. This includes transmitter, receiver, wattmeter, coax or antenna switcher, frequency counter, tape recorder, monitor scope, code and teletype readers, preamp, antenna tuner, antenna rotor or control box, scanner radio, and communications and stereo receiver. Connect one #14 copper wire to the chassis of each of these and any other equipment used in the station. Tighten all loosened chassis screws firmly.

E. Route each chassis ground wire to the previously prepared ground bus bar. Route each wire in a straight path if possible and clip off any excess over 2"-3" beyond what is needed to connect to the ground bus bar.

F. Connect each chassis ground wire to the ground bus bar either by soldering or by means of an alligator clip soldered to the end of the chassis ground wire. The alligator clip may then be clipped to the ground bus bar.

G. Referring back to the ground rods driven into the ground, connect a heavy conductor of #12 gauge or larger (two or

more #14 copper wires will suffice) to one of the ground rods.

H. Route this grounded conductor into the building and up to the rear area of the station. Connect it to the ground bus bar either by soldering or by means of a heavy-duty alligator clip.

This completes grounding of the station equipment. Note that each chassis of each equipment piece has its own ground wire routed and connected to the single ground bus bar and that the ground bus bar is then connected to True Earth Ground at or near the antenna tower or supporting structure. Refer to Figure 1 for a pictorial representation of how equipment grounding should be done.

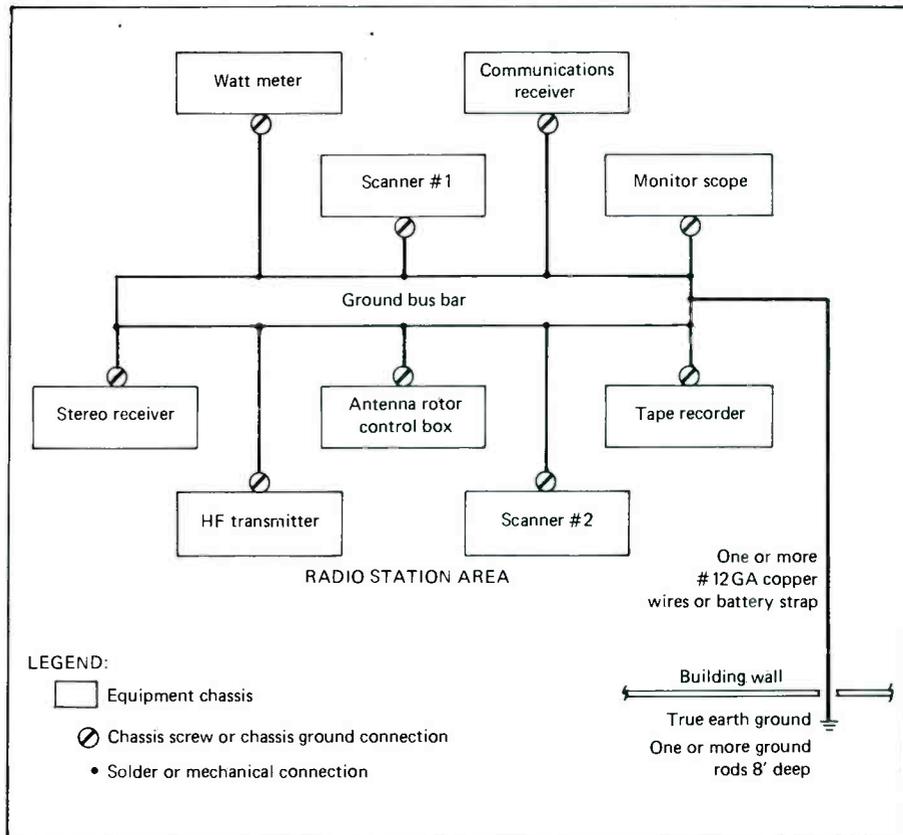
A Grounding Counterpoise

For those serious radio enthusiasts who want to go the extra mile, the entire grounding system can be dramatically improved by the addition of a counterpoise laid or buried a few inches in the ground around the ground rods and tower. Vaguely resembling a spider web, the counterpoise consists of a number of "spokes" of wire running underground outward from the base of the tower or nearby ground rods. If the ground rods are physically separated from the base of the tower by more than 15 feet, the counterpoise will have to be connected to both the



Another neat station layout is seen in John Pittman's station in Texas, and it's right near a window for easy access to the antennas.

Harry Abery Jr., of Connecticut has his gear installed on a metal desk and located directly adjacent to a radiator. An installation such as this would call for these various things to be grounded to one another.

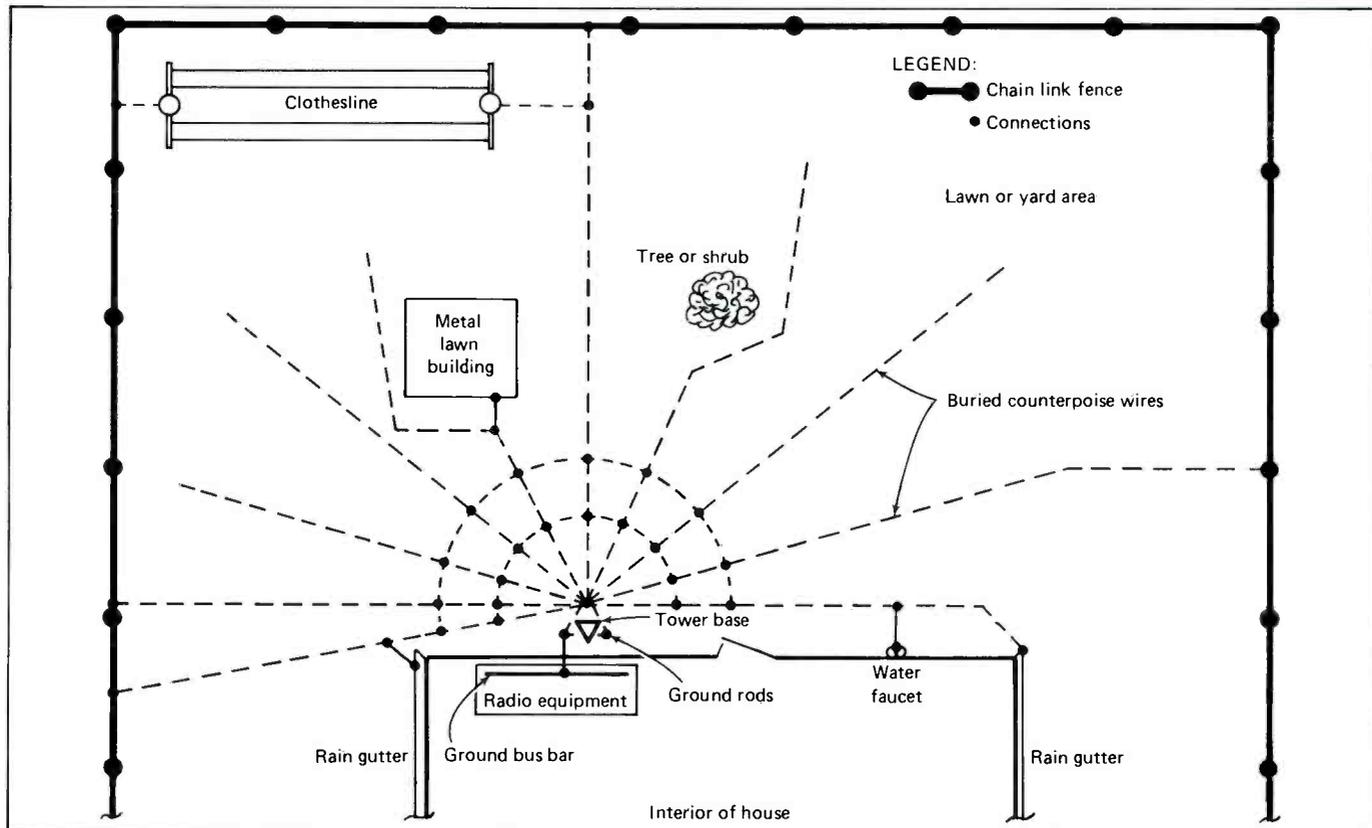


ground rods and to the base of the tower. The remainder of this discussion will assume that the ground rods are within five feet of the base of the tower and that they are connected to the base of the tower by means of a heavy conductor.

Almost anything made of metal can be used in the construction of a ground counterpoise: baling wire, wire rope or cable, wire-

mesh, wire fence, chicken wire, etc. The idea is to form a ground plane of metal around the tower and ground rods. The steps of the procedure for constructing a simple counterpoise follow:

A. Using a power edger with a sturdy metal blade or by means of a spade, cut a series of narrow trenches in the soil about 2 to 4 inches deep. The trenches should begin



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at or near one of the ground rods and run outward from the ground rod-like spokes on a bicycle wheel. A minimum number of "spokes" should be eight, but 16, 24, or even 30 is much better. The trenches need be no wider than 1/8" but must be deep enough to be below the root level of any grass or sod. The trenches should be at least 15 to 18 feet long, but there is no maximum length. The longer, the better.

B. Lay an uninsulated metallic conductor of baling wire size or larger into each trench along its entire length. Use a stick or rod to poke the wire into the bottom of the trench. Leave at least 12 inches of the wire protruding above ground level at the ground rod.

C. Once all wires and conductors are tamped into the bottom of the trenches, stomp along the length of each trench to close them up. Water thoroughly for a few days afterwards.

D. Attach all protruding wires to the ground rod by soldering or by clamping with the ground clamp that is usually supplied with the ground rod. Stainless steel hose clamps may also be used, but use two or more of these when making this type of mechanical connection. The idea is to permanently and firmly connect all counterpoise wires to the ground rod. In this manner, the ground connection provided by the rod is enhanced by the counterpoise wires surrounding the rod in all directions. Figure 2 depicts a simple counterpoise system.

Conclusion

The counterpoise effect can be improved by interconnecting all the "spokes" together every few feet outward from the ground rod. This would look like a series of concentric circles interconnecting each spoke.

The counterpoise can be improved further still by laying chicken wire or other wire mesh fencing or screen material all over the nearby area. If done early in the spring, grass will soon grow through it and a permanent system can be made. If this approach is selected, it is important that a radius of 12 to 50 feet be covered around the ground rod.

Obviously, 360° coverage around the ground rod will be difficult in most cases because of the presence of buildings, shrubs, or trees. This is no real problem as long as a significant area of counterpoise is constructed in what directions are available.

Lastly, all nearby metal structures should be connected to the grounding system. This includes chain link fences, metal lawn buildings, rain gutters, clotheslines and poles, and external cold water pipes. In all these cases, connect a wire of #14 or larger size to the metallic structure and route it to some point of the grounding system: ground rod, tower base, or the counterpoise. Make solid connections in each instance. In the case of chain link fences and rain gutters, a ground connection may have to be made every few feet along the length of the structure because positive electrical connections are not assured due to slip joints and possible corroded coupling joints.

REMEMBER: No grounding system is perfect. It can only be made better.

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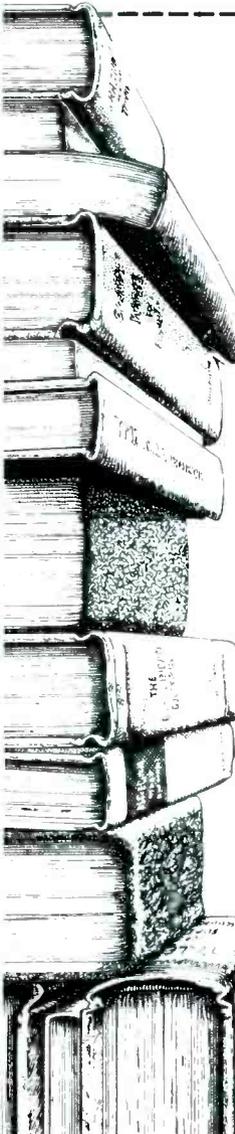
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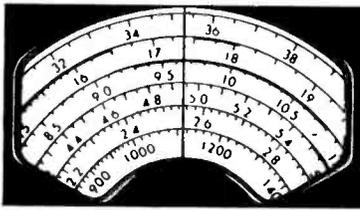
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COMMUNICATIONS CONFIDENTIAL

BY HARRY L. HELMS

YOUR GUIDE TO SHORTWAVE "UTILITY" STATIONS

Welcome to this, my first installment of Communications Confidential! As the name of this column implies, our topic each month will be stations operating outside the usual broadcasting and Amateur bands. We'll follow the military communication networks of the world, aeronautical and coastal stations, those baffling "numbers" stations, unexplained and unidentified signals—in short, almost anything!

An important part of this column each month will be contributions from readers like yourself. Chasing down these elusive stations is not a matter of equipment or even listening skill. The key is *patience*—being in the right place at the right time! Slow, careful tuning of the bands is how you run across the types of stations we'll discuss here. The bulk of the activity covered will be found on shortwave, although we'll look at unusual things you can hear on longwave and into the UHF range as well.

That's enough of an introduction. It's good to be aboard and to be able to greet you each month through this column. On with the show!

One thing you'll notice is the many stations found outside the broadcasting and Amateur bands which operate only in Morse code (CW). If you want to keep tabs on much fascinating activity—particularly military and coastal stations—you'll need to be able to copy and decode CW stations. This might seem like a tall order if you don't know Morse code. Fortunately, there are ways out. You can either use a marker transmission or you can purchase a CW reading unit.

Markers are simple messages, such as VVV DE WCC or CQ CQ CQ DE JOR, repeated continuously on a frequency. Markers have several purposes. They are used by the transmitting station to adjust their equipment and to "hold" a frequency between messages. Receiving stations use them to properly tune in the transmitting station.

Even if you don't know the code, you can quickly recognize a marker by its slower speed as compared to other CW stations and the repeating pattern of its dits and dahs. Listen carefully for VVV (didididah didididah didididah) or CQ (dahdidahdit dahdidahdit) followed by DE (dahdidit dit). The next letters following DE will be the call letters of the transmitting station. We've included a sound chart of the Morse code this month for your reference.

Suppose the first sound you hear after DE

is "didahdah." Looking at our chart, you'll see that "didahdah" corresponds to the letter W. That would be the first letter of the station's call. You can then proceed to decode the rest of the call in the same way.

Of course, this procedure is greatly simplified if you have a tape recorder available to record the marker so you can decode it at your leisure. You can also help familiarize yourself with the code by whistling it to yourself (just remember that a dah is three times as long as a dit).

This procedure may seem awkward at first, but with practice, you'll soon become a pro at it. You'll be able to identify and follow many more stations, and you'll learn some code as well!

Listening Reports

Here are the listening reports for this month. Your reports, along with your comments and suggestions for this column, are also welcome. Send them to: Communications Confidential, Popular Communications, 76 North Broadway, Hicksville, NY 11801. When reporting, please give the frequency (in kHz), time (in GMT—that's EST plus five hours), and a description of what you heard. If you'd like a reply to any questions, please include an SASE.

You really *don't* need elaborate equipment or a terrific location to hear interesting things. I heard all the following from an apartment house in New York City using a Sony ICF-2001.

1716: Continuously transmitting a single "dah," sometimes sending "WWWAAA" in CW, noted many evenings around 0200.

4307: Five digit number groups in Spanish read by woman; heard at 0320. Very powerful signals. Transmission ends 0325, followed by rapid "burst"—100 words per minute or faster! CW transmissions on an irregular basis for next several minutes.

6401: PCH, Scheveningen Radio, IJmuiden, Holland, CW marker at 0315.

6750: ANE8, U.S. Air Force, MacDill Air Force Base, Florida, working aircraft aloft in SSB around 0015.

6925: KKN50 is a station officially licensed to the U.S. Department of State Intelligence Service. Other sources (including myself) believe this station to be a CIA operation. It was heard on this frequency in CW at 0110 calling YRA—a call allocated to Yugoslavia (perhaps an embassy).

6994: Several SSB stations can be heard around this frequency from approximately 0315. Most are in Spanish, a few in English, all conducting casual, conversational transmissions like Amateur Radio operations.

7430: Here's a switch—a "numbers" station on CW! This one was caught at 0330 ending a transmission which consisted of groups of random letters and numbers. There are two distinctive things about CW "numbers" transmissions—they begin and end with a series of three "dahs" (TTT, TTT, TTT) and are actually transmissions with audio-tone keying. In fact, you can hear the same background him noticeable on many Spanish numbers transmissions (cf. the 4307 kHz item). After the end of the transmission, several Spanish SSB transmissions involving rapid, cryptic exchanges were heard around the frequency.

8078: Another "numbers" station, this time five digit groups in English read by a woman until 0300 sign off. Fading pattern indicates this one probably originated from a European location.

8883: Shannon VOLMET, Shannon Airport, Ireland; man giving aeronautical weather information for various European cities at 0410 in SSB.

13008: JOR, Nagasaki Radio, Nagasaki, Japan, "CQ CQ CQ DE JOR JOR JOR" marker at 1020.

14460: Similar to the 6994 kHz item, several Spanish language SSB stations noted around this frequency at 0300 using sound effects—whistles, electronic "beeps," etc.

15021: "Charlie Tango" calling "Charlie Sierra" on SSB at 0012. This frequency has been used in the past by the Strategic Air Command.

16002: IDR, Italian Navy, Rome, "VVV DE IDR" marker at 0000.

That's all for now.

Morse Code Sound Chart

A Didah	N Dahdit
B Dahdidahdit	O Dahdahdah
C Dahdidahdit	P Didahdahdit
D Dahdidahdit	Q Dahdahdidah
E Dit	R Dadahdit
F Dididahdit	S Dididit
G Dahdidahdit	T Dah
H Didididit	U Dididah
I Didit	V Didididah
J Didahdahdah	W Didahdah
K Dahdidah	X Dahdididah
L Didahdidit	Y Dahdidahdah
M Dahdah	Z Dahdahdidit

PRODUCTS

REVIEW OF NEW AND INTERESTING PRODUCTS



Front And Rear Radar Detection

The Radar Intercept™ is compact and lightweight. It mounts unobtrusively on the vehicle's sun visor, and is activated by simply turning the unit to a vertical position. Wiring for the Radar Intercept™ can be hidden behind the windshield molding for a semi-permanent installation. The unit is designed to connect directly to the vehicle's fuse box instead of the cigarette lighter receptacle. To date, it is by far the most compact radar available.

Front and Rear detection of X and K band radars are simultaneous with Radar Intercept™. Independent test results show the product to be on a par with, or superior to, other superheterodyne radar receivers, and to have 3 to 5 times the range of conventional radar detectors.

The manufacturer's suggested retail price for the radar intercept is \$279.95 with a 90-day warranty, F.O.B., New York. For more information, contact Leisure Time Development Corp., 1931 Mott Ave., Far Rockaway, NY 11691 or circle number 105 on the reader service card.



Communications Battery Packs

Kapco introduces the KO8 Powerpouch™ 8 amp/hour battery pack, the LP3 AC Power Module™, the M30 Deluxe Light Bracket, the M40 Shoe Adaptor, and the LB1 Dual Light Bracket.

The KO8 Powerpouch™ is the latest innovation in battery packs from Kapco. The KO8 provides 8 amp/hours and comes fully equipped with case, charger, and in-line fused connector.

The LP3 AC Power Module enables users of the L20 K-Beam™ Quartz Light to use a conventional AC outlet as a power source (the L20 is a 100 watt, 12 volt lamp). This makes it possible to use one light indoors and out, on battery or AC. Not only is this less expensive than having two or more lights, it's safer since the line cord from the L20 K-Beam carries 12 volts—not potentially dangerous 120 volts AC. The LP3 Power Module is specially designed to operate the L20 K-Beam at optimum voltage and color temperature. The LP3 is also equipped with a built-in circuit breaker, which protects against overload.

The M30 Deluxe Light Bracket is precision engineered of metal and weighs less than 8 ounces. It can be disassembled into 3 parts for easy, compact storage. The bracket will hold video still, and move cameras on the base and Kapco shooting lights or strobes on the 3/8" post. It can also be attached to any tripod.

The LB1 Dual Light Bracket enables the user to attach 2 lights (or additional accessories) to a 3/8" post. The M40 Shoe Adaptor has a standard shoe mount on top and fits a 3/8" post.

An illustrated brochure is available from Kapco that includes all new products. Contact Kapco Communications, 1270 Jarvis Ave., Elk Grove Village, IL 60007, or circle number 106 on the reader service card.



ICOM's General Coverage Receiver – The IC-R70

ICOM is proud and excited to announce its new professional general coverage receiver, the IC-R70. It is a full generation later and features more functions than other less sophisticated general coverage receivers on the market; features that the serious short-wave listener or Ham operator would want, such as squelch on sideband, adjustable width noise blanker, adjustable speed AGC, passband tuning as standard, and adjustable notch filter as standard.

Other convenient features are high stability, synthesized tuning and 3 tuning speeds, optional AM/FM mode, variable CW filter widths, dial lock, two VFO's with data transfer, plus many others. Also, the IC-R70 will operate transceiver with the IC-720A, making an ideal combination for the serious DX'er or CW buff.

The R70 is available now. Retail price is set at \$749.00 Ham net. For more information, contact ICOM America Inc., 2112 116th Ave. N.E., Bellevue, WA 98004 or circle 120 on the reader service card.

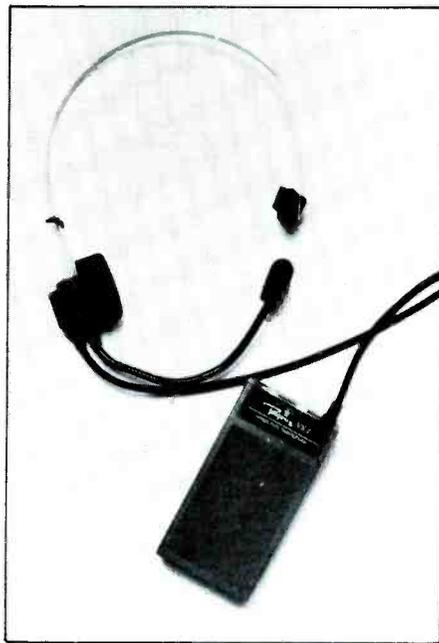


Prototype Of Wrist Watch Radio

The latest example of miniaturization made possible by Sony's one chip radio technology is the company's prototype Wrist Watch Radio. The unit combines an LCD watch that offers alarm and sleep settings with a frequency synthesized AM radio featuring four station presets. There is a one inch built-in loudspeaker. The four-function LCD displays time, sleep time, alarm time, and AM radio frequency. For more information, circle number 101 on the reader service card.

Hands-Free FM Transceiver

Regency Electronics announced the introduction of a hands-free FM transceiver. The item, being called the VX-7, consists of a microphone headset with a single ear cushion/speaker, flexible boom microphone, and antenna, all attached to a pager-sized unit with a built-in belt clip. Operating on a standard 9 volt battery, the unit has a range of 1/4 mile. The VX-7 transmits and receives in the 49 MHz FM range, designated for license-free operation by the FCC.



A unique feature of the VX-7 is the miniature electret boom microphone which has an automatic voice activated transmit-receive switchover mechanism. This feature enables the user to operate the VX-7 "hands-free." It has many hobby, industrial, and security uses.

The retail price is \$99.95 per unit. For more information, contact Regency Electronics, Inc., 7707 Records Street, Indianapolis, IN 46226, or circle number 104 on the reader service card.

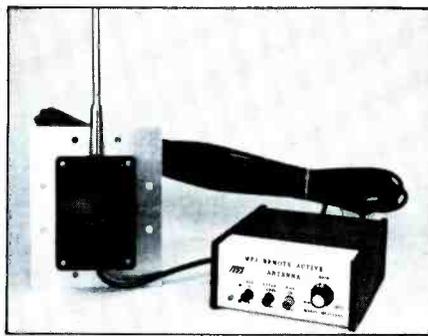


Active Antenna

Yaesu Electronics Corporation has announced the introduction of the FRA-7700 Active Antenna for use with the FRG-7700 Deluxe HF Receiver.

The FRA-7700 utilizes a four foot (1.2 meter) whip in conjunction with a low-distortion MOSFET preamplifier, providing shortwave reception for receiver owners unable to erect an outdoor antenna. The FRA-7700 includes front panel gain control, tuned circuit peaking, and a preamplifier on/off switch for maximum versatility.

For details on the FRA-7700 and other shortwave products from Yaesu, contact Yaesu Electronics Corp., P.O. Box 49, Paramount, CA 90723, or circle number 102 on the reader service card.



Outdoor Active Receiving Antenna

MFJ introduces its Active Outdoor Receiving Antenna with outdoor whip that gives excellent reception of 50 KHz—30 MHz signals. At lower frequencies, it is equivalent to an outside wire antenna several hundreds of meters long. At high frequencies, it has high gain amplifying action. It can be used with any shortwave or Ham radio receiver.

A high dynamic range RF amplifier is mounted at the antenna for maximum signal to noise ratio. A 20 dB attenuator switch on the control unit prevents receiver overload. The unit also has an auxiliary antenna switch to let you use an auxiliary antenna when the unit is off, a receiver switch (to select between two receivers), a gain control, and a "power on" LED indicator.

The control unit measures 6" x 2½" x 5" and the remote unit, 3" x 2" x 4". The telescoping whip is 4½ feet long when extended. It operates on 12VDC or 110VAC with optional adapter, MFJ-1312, \$9.95.

The new Active Outdoor Antenna comes complete with a 50 foot coax cable with connector—ready to use. It is made in the USA.

MFJ provides a 30 day trial period. If you are not satisfied, you may return it within 30 days for a full refund (less shipping). MFJ also provides a one year unconditional guarantee.

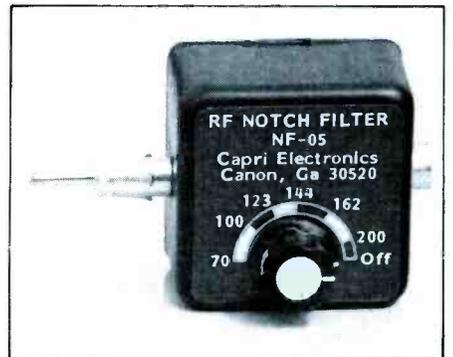
The MFJ-1024 Active Outdoor Antenna is available from MFJ Enterprises, Inc. for \$129.95 plus \$4.00 for shipping and handling. For more information about any of these products, contact MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762, or circle number 108 on the reader service card.

Monitor Match™

Now you can operate your scanner/monitor receiver directly from your conventional windshield or rod antenna for mobile listening. The LY-5 Monitor-Match with your car antenna accomplishes the functions of four separate antennas. Optimized performance through electronic isolation and impedance matching is provided in individual leads for your entertainment AM/FM radio, Lo/Hi VHF and UHF monitor receivers. The Monitor-Match will function with any monitor combination. Installation is easy, requiring only connectors to be plugged in, and is supplied with all cables, ready to operate.



For more information on the LY-5 Monitor-Match or other Hustler antennas and accessories for Scanner, CB, Amateur, or Professional use, see your dealer or write: Hustler, Inc., 3275 North B Avenue, Kissimmee, FL 32741, or circle number 107 on the reader service card.



New Scanner Filter

The Capri Electronics NF-05 RF Notch Filter is designed to attenuate strong interfering signals such as mobile phone, aircraft, FM, Amateur Radio, or weather band broadcasts that can cause intermodulation, images, or front end overload in scanners. It can be used with any scanner that has a Motorola type external antenna jack. No modifications to the scanner are necessary; it works with outside antenna systems as well as with the built-in whip that comes with the scanner.

The notch can be moved to any interfering signal from 70 MHz to 200 MHz using the easy tune, calibrated dial. The notch depth is 40 dB @ 162 MHz and the insertion loss is less than 1 dB (0.5 dB typical). The NF-05 RF Notch Filter is available from stock for \$19.50. For more information, contact Capri Electronics, Route 1, Canon, GA 30520, or circle number 114 on the reader service card.

SCANNER SCENE

BY RICHARD BARNETT

MONITORING THE 30 TO 512 MHz "ACTION" BANDS

As this is my first column for *POP' COMM*, I'd like to start off by telling you something about myself. My name is Richard Barnett and I've been involved with scanners for some seven years now, initially as an avid listener and later as an editor and publisher of many New England area frequency guides. In the months ahead I'll be discussing the latest scanner-related action from the FCC, informing you of the new products while outlining modifications on the older equipment, passing tips on monitoring the unusual, and offering general ideas on how to get more out of your scanner. I will need your help, though, so it would be greatly appreciated if you could send along any questions, comments, or tips that you may have in to me at P.O. Box 428, Newton Highlands, MA 02161.

800-900 MHz Federal Band Proposed

It has recently been proposed at the FCC that a range of frequencies in the 800-900 MHz area be allocated for joint use by both private businesses and by federal agencies. The frequencies would be 899-902 MHz paired with 938-941 MHz for two fixed station or multiple fixed station use. The FCC is accepting comments on the proposal and a decision will be announced soon. Ken Nichols, of the Spectrum Management division of the FCC, informed me that at the present time no authorizations have been made or proposed for federal mobile use in the new 800-900 MHz range.

Currently, a number of businesses (most notably trucking companies with large fleets such as Federal Express) and a few public safety agencies have switched to this new "Super-Ultra-High" range. Crystal scanners and converters are available to receive this band. You can spot a user by his incredibly small 3" whip antenna for mobile use, although you may have to be quite close to the transmitter site to receive the user. I'll let you know more as soon as I hear, but for now the federal boys we love to listen to generally between 162-174 MHz and 406-420 MHz will be around for quite a while.

It has been noticed recently, however, that agencies such as the FBI and Treasury Department have sharply declined their radio activity. Personally, I believe that they're just becoming a little more careful about what they talk about over the air. In the New York City area it has been reported that the FBI has been using a sophisticated location code and a little "digital voice protection" scrambling on some frequencies (more on that in an upcoming column), but DVP is not

used at all, as far as I know, in Washington, D.C. and fear that use of the sophisticated scrambling device would become quickly widespread has subsided somewhat.

New Scanner From Fox Marketing

At the 1981 Summer Consumer Electronics Show (CES) in Chicago, Fox, manufacturer of police radar detectors, introduced their new BMP 10/60 scanner. The device was novel in its capability to provide either base, mobile, or portable use weighing only 1.5 pounds.

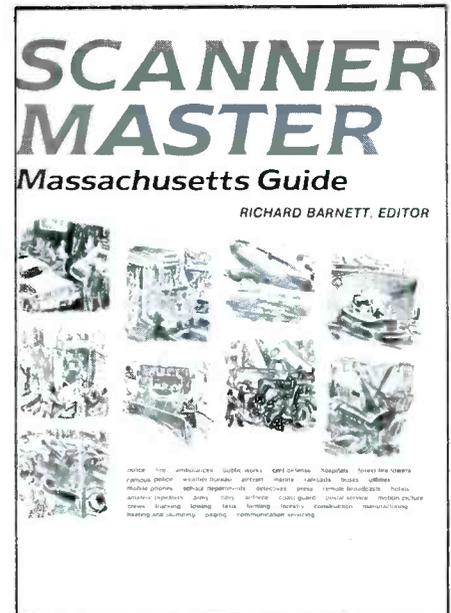
At this year's CES, Fox, obviously experiencing success with their first scanner, introduced the Fox-Pac 100, a unit with a totally new design concept for the industry. The new radio, still capable of base, mobile, or portable use, has no numerical keyboard; instead of direct programming, users have 100 or 50 channel Fox-Pac cartridges that plug into the front of the set. These small devices contain user-chosen groups of favorite frequencies which can be programmed by a computer-printer housed at the store where the scanner is purchased. Thus, you could have a cartridge of 100 active police and fire frequencies, another with mobile phone and marine and another with railroad and Ham channels—any combination you like with as many cartridges as you need. The Fox-Pac 100 covers all bands except aircraft, but Fox does expect to have a unit out soon which will include the aircraft range.



The new Fox-Pac 100 scanner.

Scanner Reference Material

From time to time this column will mention specialized or otherwise especially interesting scanner related publications listing frequency and other similar information of value to the scanner user. Here are some to get the ball rolling—you may wish to bring to my attention any locally published registries which aren't listed here.



Scanner Master Guides are now available in three volumes—Massachusetts, New Hampshire, and a combined edition covering Connecticut and Rhode Island. As I edited these myself I can, with some pride, point to the fact that they are about as complete a reference source for public safety and other scanner frequencies as one could hope to compile for their respective areas. Each volume contains a great deal of explanatory text plus information on local codes and numbering systems, as well as listings arranged by location, frequency, and service. Publications covering Maine and Vermont may be available soon and after that—well, time will tell. For more information on Scanner Master Guides, you can drop a note to: Scanner Master, P.O. Box 428, Newton Highlands, MA 02161.

Top Secret Registry of U.S. Government Frequencies by POP'COMMs Editor, Tom Kneitel, has become the definitive reference source for military and civilian scanner frequencies. The current edition has about 50,000 listings, showing all sorts of fascinating federal stations and agencies. Included is excellent explanatory text on how to better monitor these stations. Of high interest is the information on stations operating in the UHF Military Aero band (225-400 MHz) which has gotten so much interest of late. This book is published by CRB Research, P.O. Box 56, Commack, NY 11725.

Air-Scan, the registry of VHF aeronautical stations, is really pretty much of a "must have" for those having scanners equipped

SECURITY - EMERGENCY CREWS - GENERAL OPERATIONS

ENERGY-SCAN

DIRECTORY OF
SCANNER FREQUENCIES

BY TOM KNEITEL, K2AES

**NUCLEAR
PETROLEUM
NATURAL GAS
ELECTRIC POWER
ENVIRONMENTAL**

to pick up the 118-136 MHz band. It covers the U.S.A. (all 50 states), Canada, Mexico—showing frequencies used by control towers, approach and departure operations, Unicoms, Multicoms, ground control, flight test, radar GCA, weather, FAA Flight Service and Air Route Traffic Control, and lots more. A special section lists the frequencies used by airlines for their behind the scenes “company” operations. Airport listings include commercial and private as well as military. All in all, a lot of information is packed into this interesting book which, by the way, has lots of good explanatory text to help the listener get the most from monitoring this exciting band. It’s published by CRB Research, address given above.

Energy-Scan is a directory listing 20,000 stations connected with the energy industries (nuclear, petroleum, natural gas, electric) and also stations concerned with environmental protection. What with energy (costs, supplies, threats to the environment, etc.) this unique scanner frequency registry opens the doors to stations operating in more than a dozen different radio services and lets you hear wildcat oil drillers, nukes, and even your own hometown electric power utility company. Published by CRB Research, address shown above.

New York City Metro Frequency Guide, a fine and highly detailed publication compiled by Michael Esposito. Listing police, fire, transit, EMS, and many other vital services, Esposito’s publication is quite authoritative and well researched and is invaluable to anyone attempting to unravel the complexities of the maze of frequencies used in the “Big Apple.” It’s published by Firecom Communications, P.O. Box 61, New York, NY 10011.

Police & Fire Frequency Listing is the name several persons report seeing atop an apparently good compilation of stations located in the states of Oregon and Washington and quite possibly other areas. Perhaps these are being sold at area scanner dealers,

or maybe some readers of this column could advise me of its source and contents so that I can mention it in more detail here.

The Scanner Frequency List is a publication offering more than 900 listings of various services in South Carolina, including public safety, forestry, maritime, etc. All in all it’s a very handy registry. It’s published by Radio Research, 10 Elf Lane, Greenville, SC 29611.

For further information on any of the foregoing, contact the respective publishers directly. In future columns, we will be looking at other data sources which are of use to the scanner enthusiast.

Attention Scanner Owners!

1982 SCANNER
FREQUENCY LIST
S.C. UPSTATE EDITION
OVER 900 TOTAL LISTINGS



AIRCRAFT - GSP, ATLANTA, USAF, CAP, UHF, DOWNTOWN ANTENNAS - AZIMUTH PATTERNS, FORMULAS, BASE, MORSE BUSINESS - OVER 400 LOCAL FREQUENCIES AND NAMES CASINOS - ALL LAS VEGAS AND NEW JERSEY CHANNELS "COPS" - COMPLETE LIST OF SQUAD CHANNELS FOR "COPS" DEPT. OF CORRECTIONS - NEW CO. UPSTATE REPEATER DISNEYWORLD - FIVE CHANNELS LISTED IN FLORIDA SECTION FCC - NEW VHF NATIONWIDE FREQUENCY FIRE - 78 LOCAL DEPARTMENTS PLUS HANGERS AND OTHERS FLORIDA - ALL PATROL, TUNNABLE, NASCAR, NASA, DISNEY GOVERNMENT - FBI, SECRET SERVICE, WHITE HOUSE STAFF HAM RADIO - 30 LOCAL CHANNELS RECEIVED IN UP-STATE HIGHWAY PATROL, BUADU AND RADAR FOR 13 STATES MARINE - US COAST GUARD, SHIP TO SHORE PHONE MICHELIN TIRE - 13 RADIO SYSTEMS WITH CALL LETTERS NASA - 15 CHANNELS USED AT KENNEDY SPACE CENTER NASCAR - DAYTONA, MO. AND TWO UN-RECORDED CHANNELS NORTH CAROLINA - NEW VHF, UHF, MOBILE REPEATERS NYFD - 30 POPULAR CHANNELS FOR YOUR NEW YORK TRIP POLICE - ALL SOUTH CAROLINA FREQUENCIES LISTED RAILROAD - STANFORD, SOUTHERN, G AND N, PICKENS SCRAMBLERS - MODIFY YOUR SCANNER TO UNCHANGABLE SEARCH - PROGRAM LIMITS FOR ALL FREQUENCIES SECURITY - LOCAL DEPARTMENT STORE CHANNELS SHIP - LOTS AND LOTS OF NATIONWIDE FREQUENCIES "T" BAND - FREQUENCY CONVERSION AND NATIONWIDE USAGE TEN CODES - LOCAL DEPARTMENTS LISTED TRACKING - 76 LOCAL DISPATCHER FREQUENCIES WRITERS - 40 AUTOMOTIVE RELATED CHANNELS

ALL THIS FOR THE PRICE OF ONE CRYSTAL \$4.95

Some Thoughts On Aircraft Monitoring

A couple of years ago while on a family trip to Florida, I brought my portable scanner along on the plane equipped with the more popular police frequency crystals. Throughout the flight I had the unit on, but I heard nothing and came to the conclusion that somehow radio signals just couldn't penetrate an aircraft's fuselage.

The other day I took a flight down to Washington and was lucky enough to have a window seat on a beautifully clear, cloudless day. The flight plan took us on a route that hugged the northeast coast and thus we flew over all the major cities from Boston to D.C. I knew that going to the capitol would be quite a thrill if only for the incredible government monitoring that can be had there (I spent three days researching and writing a 40 page notebook on what I could listen to in the District).

Anyway, while flying over New York City, the captain announced that we were cruising at 35,000 feet and I imagined how fantastic it would be to have a scanner antenna at that height. Dreaming about the im-



If you're listening from the ground, airport towers don't offer very good DX range; if you're in an aircraft, however, that's another story!

possible, I pulled my programmable portable out of my carry-on bag (I had it there ready for immediate use upon arrival at National Airport) and pressed “scan.” Lo and behold I had activity on the unit. I frightened the passengers around me with some squelch, but I was elated.

I decided to try some New York City Police frequencies—by this time we were halfway through New Jersey—so I set search limits on the radio for between 470 and 480; to my amazement, I heard everything. To check for distance, I programmed in the weather on 162.400; all I could receive, however, was a jumble of what sounded like four or five stations. I then entered some popular Marine-Coast Guard channels such as 156.800, 157.100, 157.050, 157.075, and 157.150. I received a lot of activity but unfortunately no IDs. I tried 160.800, Conrail's main northeast channel, and heard trains, it seemed, from Washington to New York. I searched between 154 and 156 MHz and received police and fire departments throughout the range, but I could not get an accurate fix on what my greatest distance from a base might have been. Actually, I'm not sure if conditions just happened to be perfect for this occurrence, but I hope to find out more soon.

As the plane began descending, I lost a lot of signals. I noticed, though, that I couldn't receive anything in the 30-50 MHz low band, while Hi-band VHF and Ultra-high “bombed-in.” It was too bad the scanner I had didn't have the aircraft band; otherwise, I would have monitored the pilot and heard those awful low-power airport tower transmitters that have bothered me for so long. Unless you're practically on top of those airport antennas or live by an airport that doesn't have skyscrapers nearby, it can be very difficult to pick up what an airplane can.

On the return trip, a stewardess informed me that, although it was only a receiver, I absolutely could not use a radio on board. I guess it must be against airline regulations. I snuck in a few minutes with the unit, but I really didn't get a chance to find out much more. Someday soon I'll have to take a flight cross-country.

NEW AND EXCITING TELEPHONE TECHNOLOGY

Selling The Privacy Of Telephone Users

It wasn't long after Miss Susan Vossler was employed by the collections department of a major California bank in 1977 that she was taught, by co-workers, an interesting way to hunt down customers who had defaulted on loans and skipped town.

"It was to get the list of telephone numbers customers had dialed from their own private phones," she recalls.

So Vossler joined others at the bank in routinely purchasing, from a clandestine network outside the bank, this and other confidential information obtained illegally from the phone company. The list of numbers was then used by the bank to find other persons who had been contacted by the missing customer and thus provide a trail to the debtor.

"I was the best in the whole department," remarked the 27-year-old mother of two who left the bank last year, "and I'm not proud of that."

Vossler and other "skip tracers" at the bank were taking part in what law enforcers say is a multimillion-dollar-a-year nationwide black market. It makes available privileged information on virtually any individual in the nation with a telephone.

For a fee—usually between \$17 and \$30—brokers in this illicit market make it possible to pry into an individual's private life by providing a list of the telephone numbers that show up on the customer's latest monthly phone bill. That would include any toll call. They can also help match the number with names and addresses, even if the numbers are unlisted.

In bill collectors' parlance, these services are commonly known as "phone breaks." Authorities say that major buyers of such information include banks, finance companies, and detective, collection, and repossession agencies that use the data to help locate people who owe money. But these authorities note that phone breaks may allow creditors and others to violate the right to privacy of innocent people whose telephone numbers happen to turn up on someone else's phone bill simply because they receive a call.

Law enforcement authorities say the black-market brokers are frequently supplied by secret sources inside the phone company. This happens even though phone company employees are prohibited by California Public Utilities Commission regulations from releasing customer records, except in emergency cases to law enforcers and hospitals.



Phone users were shocked to learn that it was common practice for phone company employees to pass along their private records to banks, private detectives, and all sorts of others who slipped them a few dollars.

While authorities acknowledge that the traffic in illicit phone information has been flourishing nationwide for years, they concede that there has been no concerted effort to curtail it. "It's done all the time," says John Hoos, spokesman for the FBI. "But it's a matter of priorities. If you prosecuted every case, it would back up the court system even more."

Now, however, there are signs this attitude may be changing. In the first action of its kind, the California Department of Consumer Affairs has launched an investigation aimed at cracking down on phone breaks. It has targeted as many as one-third of the estimated 150 collection agencies and private detective firms in the state suspected of routinely soliciting illicit phone information and passing it on to others for a price.

One obstacle facing state investigators is that they currently have few details about "mystery figures" in the phone company who glean records. Pacific Telephone Co. officials say they have had isolated incidents of private information leaking out but expressed surprise over assertions that it escapes on a regular basis.

"If someone out there has access to these

[private phone] numbers," said Gary Sanderson, manager of media relations for the utility, "we damn well want to know about it." But he admitted that while the phone company tries to monitor the activities of its 115,000 employees, it would be easy for some confidential information to fall through the cracks.

Most legal experts agree that it is illegal to leak an individual's phone records. They are divided, however, about whether banks and others who buy these records are guilty of violating federal privacy laws. Even so, most agree that the sale of private phone information could be a ground for civil litigation against those who use phone breaks as well as against the phone company.

Officials of the Los Angeles-based bank, acknowledge that during the past several years, several employees have initiated phone breaks out of "an abundance of zeal . . . to do a very, very good job." Bank officials stressed that such practices are against bank policy and are morally questionable, but they would not say whether these actions are illegal.

A bank spokesman said that five employees were fired in connection with the gathering of unlisted numbers and other protected phone records in the course of locating debtors. He said, "the problem has stopped." But sources asserted that phone breaks are still made, though not as frequently as before the mass firing.

Former bank officer Vossler and others currently working at the bank provided this account of how they used phone breaks at their jobs:

If they were having trouble locating a customer, they were instructed to contact certain independent collection agencies and individuals which, they were told, had ways to get an individual's personal phone records. With a phone call, these contacts would provide a list of toll calls on the bank customer's last monthly phone bill. Bank employees say they were told to label payments for phone breaks as "for services rendered" to cover their actions.

New Phones

U.S. Tron is introducing two models to its new Phonanza line. The Phonanza line represents U.S. Tron's latest product developments in the world of one-piece telephones. Both models contain a variety of features and carry unbeatable low prices.



Phonanza PH-1 has last number redial and mute button to let you speak privately to someone else in the room.

Model PH-1 features last number redial, mute switch, and carries a price of \$19.95. Model PH-10 features 10 number memory which is powered from the phone line and carries a price tag of \$29.95.

U.S. Tron also has a new wall holster for the Phonanza line. The holster, model WH-1, is designed to enhance the convenience of the Phonanza Series by enabling them to be easily and conveniently used as wall telephones. The holster can be installed anywhere in the home.

Model WH-1 features a directory of frequently-called numbers which is conveniently located on the front. It is also designed for cosmetic appeal since it can be installed over a telephone wall plate, eliminating unsightly wall phone plates. The holster also eliminates the need to either cut off or have visible unsightly access wire. It does this by permitting access wire to be wound and hung out of sight behind the holster on a special hook that is part of the holster itself. Available in either beige or brown, the WH-1 has a suggested retail price of \$6.95.

U.S. Tron says that now everyone may be able to own one of its telephones. Carol Maccarone, U.S. Tron's national sales manager, explains, "Renting a standard telephone in New York without any special features from Ma Bell costs a minimum of \$22.20 a year. U.S. Tron is giving the customer more features for less money. It is definitely in the consumer's best interest to buy a Phonanza, because when you compare what you are getting to what Ma Bell offers, the Phonanza pays for itself."

In addition to being more affordable, U.S. Tron feels that the Phonanza will make the telephone market split wide open. Up until now, most telephones were bought from a department store or specialty shop. The low cost will entice drug stores and supermarkets to stock them. As Maccarone stated, "By making telephones easily affordable, it will not be uncommon in the future for people to simply throw one in their basket while browsing down an aisle."

U.S. Tron is located at 125 Wilbur Place, Bohemia, NY 11716. For more information, circle number 117 on the reader service card.

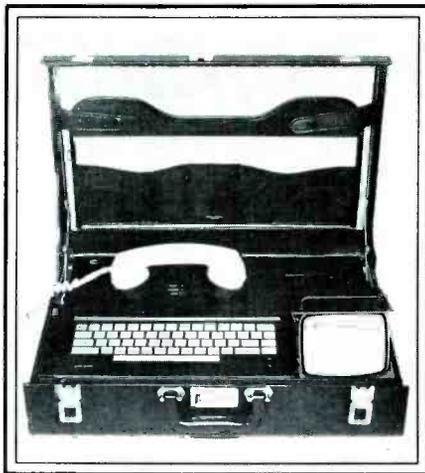
The Computer Scrambler SX7

Introducing the telephone scrambler that talks!

The Computer Scrambler works on any phone line in the world to keep conversations free from wiretappers and tape recorders. Simply stated, the SX 7 jumbles the conversation so that it is indecipherable to eavesdroppers. And instead of speaking, conversation is transmitted by a computerized keyboard, so nothing can be heard by room bugs or tape recorders.

As the conversation is transmitted to the receiver, it is unscrambled and displayed on a CRT monitor. Simultaneously, the system translates the message into computerized speech. The SX 7, therefore, is a scrambler that actually speaks.

The sophistication of the SX 7 means that no one can tap into the line or descramble the message. For extra protection, it has an infinite number of codes that can be changed even during a conversation.

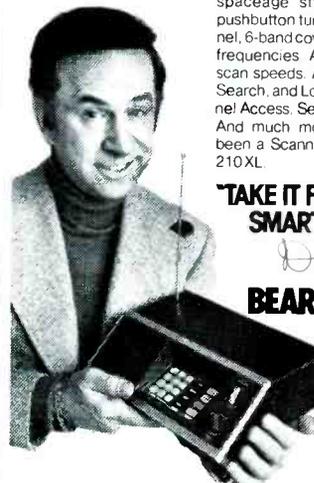


The SX-7 computerized scrambler for use with all types of telephones. An excellent anti-tap device.

The SX 7, contained in a luxurious leather attache case, is the ultimate portable scrambler for private telephone conversations anywhere in the world. For more information, contact CCS Communication Control, Inc., 633 Third Ave., New York, NY 10017, or circle number 118 on the reader service card.

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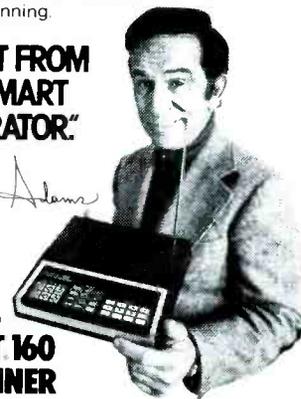
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CIRCLE 13 ON READER SERVICE CARD

The Purolator Security & Armored Car Network

BY RICK MASLAU, KNY2GL

It wasn't all that long ago that most persons hearing the name Purolator automatically thought it was a company producing oil filters for vehicles. No responses like that any longer! The growing and aggressive company has branched out into other areas, not the least of which relates to security and armored vehicle services, as well as a highly efficient courier and parcel delivery company. Within the security and armored vehicle service area, Purolator has gained a national reputation for reliability and efficiency and its vehicles are a familiar sight practically everywhere you go.

Here's a roster of the dispatching network Purolator uses for its security and armored vehicles.

Location	Call	Frequency (MHz)	Location	Call	Frequency (MHz)
AL Birmingham	KVT851	452.625	MN Minneapolis	KSU481	452.625
AZ Phoenix	KOK595	44.22	MS Jackson	KZI364	452.625
	KYU572	159.84	MO Clayton	KU2746	452.625
AZ Tucson	KQK797	44.22	MO Kansas City	KTE637	452.625
	KAW397	452.675	NJ Greenbrook	KXA972	462.00
AZ Yuma	KCI570	44.22	NJ Milmay	KYB841	452.625
AR Little Rock	KZI361	452.625	NJ Pennsauken	WBC883	501.9625
CA Burbank	KUI272	452.675	NJ Rahway	WAL927	462.00
CA Chatsworth	KCI249	464.075	NJ Waterford	KYI546	501.9625
CA Monterey	WJF85	464.075	NJ West Orange	WXT850	452.375
CA Mount Wilson rptr.	KTM205	464.075	NM Albuquerque	KAL897	461.825
CA Oakland	KUI741	452.675	NY Brentwood	KRY229	463.875
CA Santiago Pk. rptr.	KCI247	464.075	NY New York	KSL214	452.375
CO Denver	WBL822	461.125		KRY228	463.875
CO Morrison	KZI947	461.125	NY North Greenburgh	KZI358	452.625
CO Northglenn	KUH320	159.81		KZI358	452.675
CT Glastonbury	KUN566	159.75	NY Rochester	WYR698	452.675
FL Ft. Lauderdale	KWV506	452.675	NC Charlotte	KVT910	452.625
FL Jacksonville	KED292	452.675	NC Raleigh	KGI916	452.625
FL Tampa	KRS375	43.92	OH Cincinnati	KTE636	452.625
	KXJ207	452.675	OH Dayton	KCQ896	452.675
IL Chicago	KSP551	463.50	OH Louisville	KYN834	461.80
IL Rock Island	WDM497	461.15	OH Toledo	KYN835	461.80
IL Schiller Park	KJB242	452.625	OK Oklahoma City	KQS663	159.69
IN Indianapolis	KGR735	159.75		KBG392	452.625
	KZZ487	452.625	OK Tulsa	KTI623	159.69
	KQP727	463.575	OR Portland	KTM970	159.90
IA Council Bluffs	KAG683	452.675	PA hand-held units	KA49920	159.765
IA Pleasant Valley	KRR889	461.15	PA Allentown	KGF700	43.96
KY Fairdale	KEY333	461.775	PA Monroeville	KUO357	43.96
KY Louisville	WCJ393	461.775	PA Pittsburgh	KUS579	452.675
LA New Orleans	WQN477	159.99	PA Wyndmoor	KGF701	43.95
MD Baltimore	KGG245	160.14	PA York	KGF707	463.96
MD Oxon Hill	KIU589	160.14	TN Memphis	KUH321	159.945
MI Detroit	WCN274	463.45	TN Nashville	KVN349	452.625
MI Holly	KNAD968	463.275	TX hand-held units	KA68385	466.0375
MI Novi	KUU586	452.625	TX Austin	WYR697	452.675
MI Southfield	KDU625	463.45	TX Dallas	KYJ372	159.84
				KCL351	452.675
			TX El Paso	WSW811	464.45
			TX Fort Worth	KVG785	159.63
				KCL352	159.84
			TX Houston	KVG786	159.63
				KJJ774	452.475
			TX San Antonio	KCO629	159.84
			TX Waco	WST402	159.84
			UT W. Jordan	KCQ917	452.675
			WA Issaquah	KAY692	159.66
			WI DePere	KTS993	461.15
			WI Green Bay	WFK55	461.15
			U.S. all areas. hand-helds	KD6553	463.96

Catch short waves.



Receiver of the month: Drake R7A.

What can you say about a \$1650 0-30Mhz. General Coverage receiver from one of America's true electronic legends? That it's worth the money for one thing. Well worth it, with full passband tuning, a special low noise, 10dB RF amplifier, and 2.3KHZ SSB, 500Hz CW, 1.8 KHZ RTTY, and 4.0 and 6.0 KHZ AM filters as broadband options for improved selectivity. The 4.0 KHZ filter, used with the R7A's Synchrophase AM Detector provides AM reception with vastly improved frequency response—a must for excellent SWL work. Retail is \$1650. Call for quote.

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HAL CWR 6700 RTTY/ASCII/CW Reader	\$495.00
YAESU FRG 7700 Gen. Cov. Receiver	\$549.00
Kenwood R1000	\$499.00
McKay Dymek DA100 Loop Antenna	\$159.00
Plus: SWL Books, Antenna Wire, Palomar Pre-Amps, and much, much more.	

Don's Corner

Short Wave listening is back—with a vengeance. It's now the fastest growing segment of the radio industry, even surpassing amateur radio sales. Why? The combination of the age-old desire to find out more about the world and its people through electronic communication, combined with a new level of receiver performance—at low prices—never before attainable. Things to be aware of today in Short Wave activity—the new trend to 0-30Mhz solid state general coverage receivers, with digital readout, excellent audio response, and exceptional stability and performance at very reasonable prices. At the other end of the scale, listen to the Rockwell Collins 451S1 at \$5995 or the McKay Dymek DR44 at \$2195, and the Drake R7A. Also: Check out the action in electronic RTTY reception using compact microprocessor controlled readers. Best bets are the AEA Teletype reader, Kantronics Mini-Reader, Hal CWR 6700 Teereader. Always popular: Long wire antennas (We've got the wire if you've got the room) and the McKay Dymek DA100 Antenna system. Plus: the new "insider" SWL books like *World Radio Handbook* and *World Press Frequencies* for RTTY SWLing. The season is almost upon us. Trade up. Fine tune your system and antennas. And always, always, call Madison for a quote on your needs.

best,

Don

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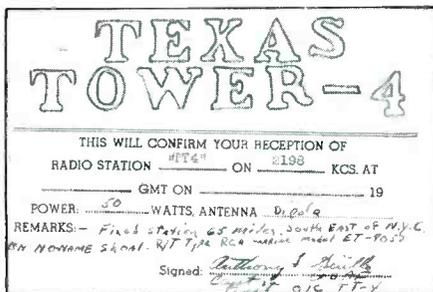
LETTERS TO THE EDITOR

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.

The Texas Tower Story

I've found your "Top Secret" Registry of U.S. Government Radio Frequencies book to be both useful and interesting, and I especially liked the explanatory text and illustrations showing QSLs from Federal stations. One QSL in particular intrigued me. I'd like to know if you could tell me something about the QSL you show from a station with the ID of "TEXAS TOWER-4" since you show no information on that station in any of your frequency listings. I live in Texas and have never heard the station, or even heard of it!

Burton Coles
Plano, TX



The Texas Towers were a part of a 1950's military project in defense of the United States. The idea was to place five offshore radar towers along the northeastern coastline; they were named Texas Towers because they resembled oil drilling towers used in the Gulf of Mexico. Towers #1 and #5 were never built, but Texas Tower 2 was 110 miles off Cape Cod, #3 was 65 miles off Nantucket Island, and #4 was 65 miles south of Sandy Hook (NJ). These stations went into operation in 1956 and 1957. The radar platforms, which weighed between 6,000 and 8,000 tons, were supported by three giant legs sunk deep into the ocean floor. They were designed as self-contained military installations with quarters for the crews (who worked in 30-day shifts) and landing facilities for helicopters and small aircraft. The radar equipment was contained in three ball-shaped domes, each of which was as large as a two-story house.

In January, 1956, a Navy ship attempting to unload supplies slammed into Texas Tower 2; although the accident tore a hole in the ship, there were no casualties. In November, 1959, four men who were being transferred to that tower from a ship fell

overboard in choppy water when a cable snapped; two of the four were drowned. Also, that same month, 52 men were evacuated from the same tower during a hurricane—they were lowered in a basket to the deck of a tug.

The worst disaster occurred in January of 1961 when Texas Tower 4 collapsed during a violent storm with a loss of all 28 men aboard. A USAF colonel was accused of negligence leading to charges of involuntary manslaughter. Texas Tower 4, which had cost more than \$10 million to build, was said to have been on wobbly stilts right from the very beginning. The men assigned to it (the crew usually consisted of 80 men) had all been afraid of the tower's collapsing, and a few hours before it actually crashed, many of the crew had called home via commercial marine radiotelephone facilities to advise their families of the imminent danger. The QSL card I received, although the date of receiving the signals was not marked on the card's info section, is postmarked December, 1960—about a month before the tower collapsed. It was monitored while transmitting on a frequency used for the crew to place phone calls to their families.

By 1963, the remaining two towers, along with the entire ill-fated project, had been abandoned. The legs of Texas Towers 2 and 3 were dynamited off, and the platforms (which had been filled with buoyant plastic to keep them from sinking) were scheduled to be towed to shipyards to be turned into scrap. As a final incident of the ill luck which plagued the Texas Tower program, Texas Tower 2 never reached its destination—it tipped over and sank in the depths of the ocean while being towed. —Editor.

Speakin' Beacon?

While tuning below the standard broadcast band on my communications receiver I noticed some interesting signals. I'm especially interested in identifying a station on 525 kHz which keeps repeating the callsign UZF very slowly in CW. I called the FCC and they told me they knew nothing of the station and that the callsign would place it in the Soviet Union. I should point out that I've also heard another similar station with the callsign UUU on this same frequency, and that's a Russian callsign too. Is it possible that I'm picking up signals from thousands of miles away on these frequencies?

Bill Yarmy
Wrentham, MA

It's certainly possible to hear 'round the world on frequencies in the broadcast band range. However, the stations you've picked up are a little closer to home—in Vermont to

be more specific. Right below the low frequency edge of the AM broadcasting band there are many frequencies which are host to various types of radio beacons operating for aeronautical navigational purposes. Rather than identifying themselves with actual FCC-type callsigns, they utilize identifications consisting of 2 or 3 letters which seldom conform to international callsign blocks—hence the FCC man's advice to you that the station was probably in the USSR. Station UZF is actually in Winooski, VT, while UUU is in Swanton, VT.

If you listen around a little more on the frequencies below 535 kHz you'll hear plenty of other beacons with a varied assortment of identifications. A good time to listen is after 2 AM local time; however, 2 or 3 hours after sunset there exist propagation conditions which bring in stations over considerable distances. Since the stations transmit their identifications very slowly and keep repeating them continually you don't even actually have to be able to be especially proficient in copying CW in order to catch their IDs.

Some listeners have logged many hundreds of these interesting beacons—listen for them between 505 and 535 kHz. Other beacons (aero and maritime) can also be logged between 200 and 415 kHz. What with most modern communications receivers covering these frequencies, here's your chance to angle in on an aspect of monitoring which has been given far too little interest by hobbyists. A really good club catering to those interested in activities below 540 kHz is the Longwave Club of America, 45 Wildflower Rd., Levittown, PA 19057—their monthly publication has lots of listings of these beacons. Membership is \$10 per year. —Editor.

Spy Aircraft

In your September issue you ran a story about the Grumman Hawkeye E-2C spy aircraft which the Customs Service has borrowed from the Navy to track down drug smugglers in the Caribbean. How does the Hawkeye work, how many of them are there, and can you offer any additional information on the spy plane?

Joseph Rogers
Tenille, FL

The E-2C Hawkeye is a prop driven aircraft which (unlike its larger E-3A AWACS land-based cousin) can be flown from the deck of an aircraft carrier. It has rotating radar and IFF (identification friend or foe) antennas in a dome atop its fuselage. It also contains a "passive detection system," a feature which even the E-3A lacks. This passive system enables it to monitor surface-to-air missiles and targets that have their own ra-

dar. The Hawkeye is capable of tracking up to 250 aircraft and more than 300 other radar emitting objects simultaneously at a distance of more than 300 miles, and its powerful computer can sort out and evaluate that information swiftly enough to direct drug chase planes or (in a battle) fighters on missions in a changing airborne battlefield. It's also resistant to electronic jamming.

By the end of 1982 there will have been 74 Hawkeyes built, of which the Israelis and Japanese will receive four. The Japanese have contracted to buy eight of the spy planes and have expressed an interest in buying up to twelve more. The U.S. Navy will probably have 140 of the planes by the end of the 1990s, and another 40 or 50 of them will go to foreign nations.

The Hawkeye has been very effectively used by Customs agents in their search for drug smugglers, and has also been placed into use in conjunction with the Space Shuttle program. The combat value of the Hawkeye was proven by the Israelis in dogfights over Lebanon, where it gave the Israeli Air Force virtually total dominance. Our own Navy uses the aircraft in carrier air groups and for a variety of reconnaissance missions, including flights near Cuba and along the edges of the Soviet Union. — Editor.

Hidden Frequency

The Illinois Department of Transportation Emergency Patrol Service operates on 151.10 MHz on the Chicago expressways. These are the emergency crews who are notified first about accidents and other emergency situations on the expressway system and are also responsible for traffic control. The problem is that they have another frequency—apparently it is considered secret by the agency. It's used when the supervisors want to converse privately between one another. At times I suspect that it is used to set up and employee for a "write up." I know that it's called the "FE" channel, but nobody seems to know what it is, and the agency itself won't say. I'd like very much to know this frequency if anyone can find out where it's located.

Elton Cooper
Chicago, IL

My sources inform me that the frequency you're looking for is 453.70 MHz, and the callsign of the transmitter is KQO359. — Editor.

Having A Blast

A while back one of the major events hereabouts was the spectacular demolition of the old Cornhusker Hotel. A company (I don't know its name) came to town and spent some time creatively placing explosive charges throughout the abandoned skyscraper and in one mind-boggling shot they blew the place up so that it literally collapsed within itself. Now I hear that they are being asked to come back to demolish another an-

cient skyscraper and I was hoping to find out the frequencies these people use for their hand-held transceivers as they were much in evidence during the last blast. They even gave a blast "countdown" over them (as seen on local TV news).

A. D. van Pelt
Lincoln, NE

While it wasn't done as a form of entertainment, I must admit that it never fails to

attract a crowd. Actually, there is one major company which does this specialized type of work on a national basis. They've done several hundred old buildings including the Cornhusker Hotel. They are Controlled Demolition Inc. of Phoenix, MD, and they use hand-held transceivers operating on 469.50 and 469.55 MHz. These are relatively short range units and it's doubtful if you'd be able to pick up any signals unless you were in the immediate area of the blast—but don't get too close! — Editor.

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FREE RADIO FOCUS

BY AL MUICK

ACTIVITIES OF UNDERGROUND BROADCASTERS

I must unfortunately report that Free Radio has been in the midst of a recent, major-scale FCC crackdown. Bit by bit, pieces of information have been trickling in concerning the crackdown. Even licensed Ham operators all over the USA have been barraged with the famous FCC "pink slips."

The Voice of the Voyager, just recently returned to the airwaves, was closed down again. The VoV were up at an unscheduled time to make a test transmission, and within 30 minutes they were busted by FCC agents. Both operators were fined \$2,000 each (their third offense) and they stand the chance of losing their amateur licenses. They are going to court to get the fines lowered, and we wish them the best of luck. Freedom of the airwaves, just like freedom of speech, religion, etc. can be a very expensive process.

The following is some basic information on WRFI, a pirate station that operated out of Ithaca, NY. I'll let Q, the Night Doktor, tell WRFI's story.

"A short history of WRFI is in order. The whole thing really got started many years ago when the local college stations went from more or less progressive to an intense Top-40 format, the excuse being the 'underground' radio was on the way out and they were training people for the real world of competitive broadcasting. Needless to say, it's the standard line when the business type schools take over. That all happened about six years ago, and the downhill slide has continued locally ever since.

"About a year ago, I bought a vintage 1949 ten watt transmitter (for \$50) from the chief engineer of one of these stations, saying that I intended to use it for plasma studies at Cornell. Amazingly enough, he believed it, although he could have really cared less at the time! I think he had second thoughts when it was fired up on a regular basis.

"The group erected a 60 foot tower and constructed a vertically polarized Yagi style array mounted at 40 feet. By that time, the new crystal for 88.5 MHz had arrived. Although the studio hadn't been finished, we hit the air a few times that November, at first using a stereo receiver with a mic input and switching back and forth from the tape to a single turntable (in mono only), real rude and crude. But people started listening, and word spread fast. The next step was getting the organization together so we could get things right technically, and in addition, assemble a decent library and a roster of people needed for broadcasting every evening.

"Over a few weeks time, we had 20 folks working on various parts of the station. They were performing tasks like phasing and fine-

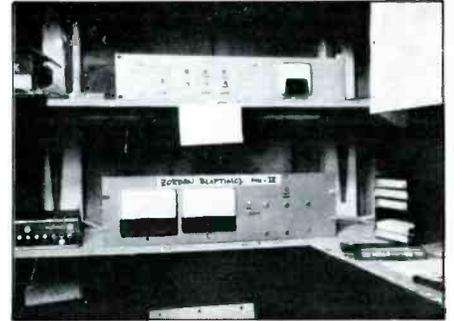


Actual unretouched exposure of Dr. Whoopee in a sober state. The scene is West Germany's Radio Quadro International.

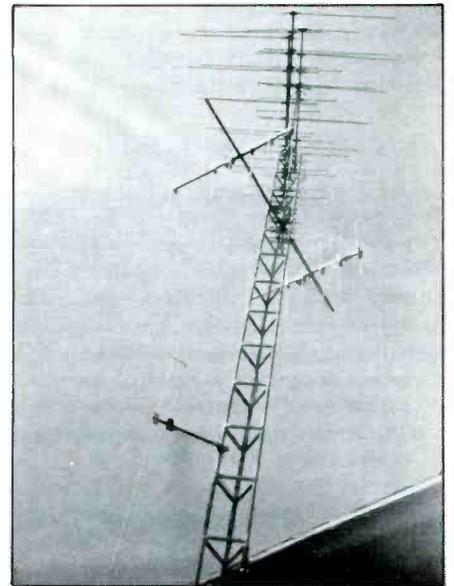
tuning the antenna array, modifying the Stone Age transmitter, jacking the power output, constructing strip-line filters for the transmission line (to avoid any chance of getting nailed for harmonics), cataloguing every record and tape for a library (800 albums alone, some donated by college stations outside this area), and of course, designing and building the studio equipment: a five channel mixer, a compressor/limiter, monitor amps, muting circuits for the monitor speakers, and a lot of other minor details.

All set for fullbore stereo, we started running full tilt around the first of March, 1981. Within a few weeks, we were receiving reception reports from out to 45 miles in the main beam, which isn't too bad for a 10 watt setup. People were encouraged to send in 'homegrown' tapes (sometimes real 'homegrown' too), and a lot of interesting things appeared in the mailbox. For security reasons, we didn't have an announced telephone number, but a lot of people knew it anyway. The colleges were even sending in promos for coming school events, so we read 'em. The station format was 'free-form,' and mostly depended upon the state of whoever happened to be on the air. Things like really raunchy comedy were reserved for after the disclaimer ('Jerks go away') at about 10 p.m. after the BBC news."

This month's tech tip comes from The Scorpion of WFRG. He designed it to use



WRFI-FM's remote control for transmitter and stereo generator, and infamous killer Zorban Bloptimod processor/limiter.

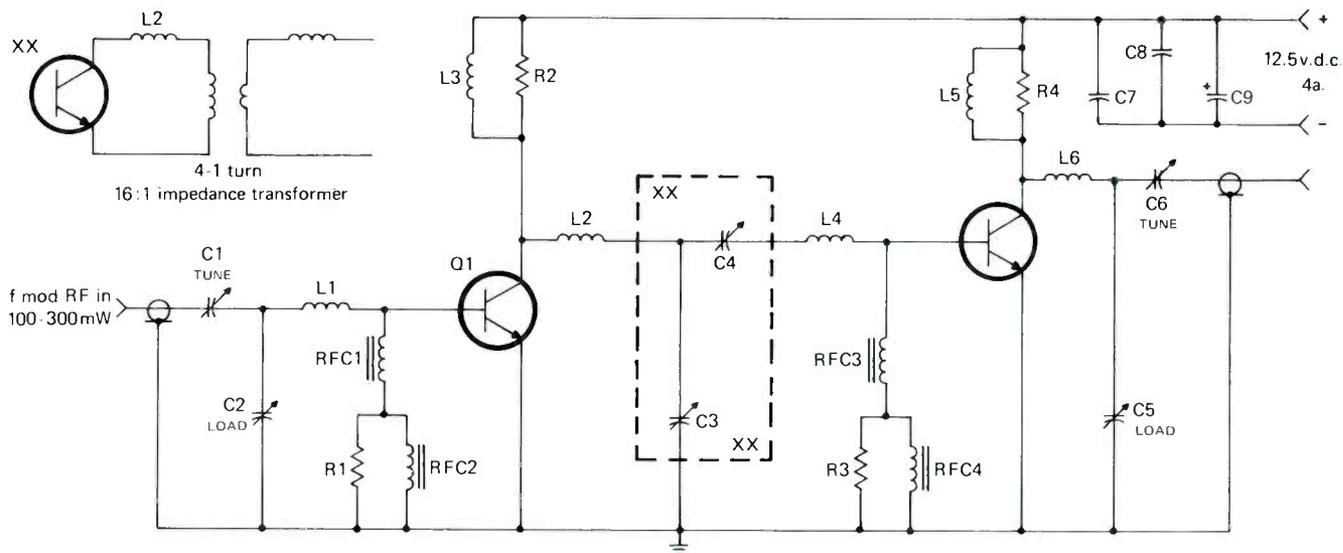


The WRFI-FM's launching apparatus.

with a cheapie wireless microphone kit to yield excellent results. The power input requirement is really low—between 100 and 300 milliwatts (as might be obtained from the typical wireless mike), while the output is 25 watts into a 50 to 75 ohm transmission line.

Scorpion says that it can be breadboarded or made with your own printed circuit board. All component leads were kept short and soldering pencils of less than 40 watts were used for soldering. Transistors were all heat sunk. He adds that since several part substitutions were tried without success that his parts selection probably is going to insure the best operation possible.

The tuning and operation, Scorpion reports, was not difficult. An auto's mono tape player can be used for program material; a switch in-line with the microphone and a transistor output transformer connected



Parts List And Coil Winding Data For 25 Watt Amplifier

- *C1—9/180 pf trimmer
- *C2,3,4,5—25/280 pf trimmer
- *C6—5/80 pf trimmer
- C7—1000 pf UNELCO
- C8—.047 μ F ERIE disc
- C9—10 μ F @ 15 VDC tantalum
- RFC1,4—22 μ H #9230-52 Miller molded choke
- RFC2—1.5 μ H #9230-24 Miller molded choke
- RFC3—22 μ H #9230-04 Miller molded choke
- R1,3—15 ohm 1/2w carbon 10%
- R2—220 ohm lw carbon 10%
- R4—47 ohm lw carbon 10%
- Q1—Motorola MRF231
- Q2—Motorola MRF234
- L1—2 turns #18 AWG 3/8" dia., 1/2" long
- L2—3 turns #18 AWG 3/8" dia., 1/2" long
- L3—10 turns #18 AWG wound on R2
- L4—1 turn #16 AWG 3/8" dia., 1/8" long
- L5—10 turns #18 AWG wound on R4
- L6—2 turns #14 AWG, 3/8" dia., 1/4" long

*—trimmer or variable capacitors (ARCO 460 line). In/out connectors are BNC. C3-C4 may be eliminated if you use a 16:1 RF xfmr (4:1) turn ratio, available from: Communication Power, Inc., 2407 Charleston Rd., Mountainview, CA 94043. All transistors are 100% tested for a VSWR of 30:1 mismatch.



Cathy Deely-Deelz at the wheel at WRFI-FM.

backwards to the car speaker did the trick. With the transformer connected in reverse, the high impedance goes to the microphone input.

He said it worked well using an all-directional FM receiving antenna with a matching unit. That gave him an excellent mobile transmitting antenna. The wireless microphone was tuned to the desired frequency with the transmitter input and output capacitors tuned for the best output. The interstage capacitors were then tuned for the strongest output and then the final output capacitors were retuned. If he wanted to stay on one frequency, the variable capacitors could have been eliminated and changed to fixed value capacitors by using a capacitance meter.

Those Who've Recently Felt The FCC's Wrath

In response to a complaint from the Inter-

Tune in to our international
free radio station

QSL

To: **Duplikat**

Thank you very much for your correct reception report.

DATE:

TIME:

QRG:

power: WATTS

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GERMAN
MUSIC RADIO

national Frequency Registration Board and complaints from Amateur Radio operators, the Commission issued notices of apparent liability for unlicensed radio operations. The transmissions, identified as "the Voice of Alpha 66," were broadcasting anti-communist and anti-Castro information in the 7-MHz Amateur Radio band.

The transmissions, broadcast in Spanish on 7040 kHz, were traced by the FCC's Miami Field Office and Fort Lauderdale Monitoring Station to the Miami area. FCC investigators from the FCC Field Operations Bureau inspected three locations and determined that the unlicensed transmissions were coming from a fixed station in a house and from a mobile station operated at two other houses.

Anthony Walker of Laurelton, NY, paid a \$750 fine for "willful and repeated unlicensed operation of an FM Broadcast Station on 108.5 MHz, a frequency assigned to the Aviation Radio Service. His transmissions were a potential source of harmful interfer-



Vermont, Whoops, and Guido, the WRFI-FM gang.

ence to aircraft in flight in the New York area," said the FCC.

On March 20, 1982, the New York FCC Office received a complaint from the FAA of interference to the beacon of JFK Airport. The source of the unauthorized signal, a station identifying itself as "WLAU" operating above the FM Broadcast band on a frequency reserved for aviation transmissions, was located and identified by investigation and inspection on March 21, 1982. Walker admitted operating on an intermittent basis for a period of nine years. He estimated the value of his equipment to be at least \$1,000. A Warning, and subsequently on March 24, 1982, a Notice of Apparent Liability for \$750 was issued for violation of Section 301 of the Communications Act.

Let us know if you've got any tech tips, station skeds, QSLs, or whatever! See ya' next month.

planet which could endanger food supplies or even life itself.

Whatever the result, such contact would certainly and inevitably have a profound effect on our philosophies, religious beliefs, and lifestyle in general. No matter. We are all still mesmerized by the whole idea of "making contact," and despite the difficulties in getting approval of NASA funds to really dig into the quest, the fascination continues and has produced some interesting developments of late.

In 1978, for instance, a group calling itself *The Committee For Extended Lifespan* announced that something they called "Star Band Radio" had "finally arrived." They issued a press release inviting all interested to "Be the first human being to receive a signal from extra terrestrial intelligence. What an experience!" They further stated "it is now possible for a home hobbyist to listen for galaxies from trillions of miles away . . . like a beep . . . up to now all that is received is cosmic static." Thusfar, none of their members had reported any interesting beeps coming through their headphones or loudspeakers.

On the scientific side of things, the communications efforts have long been centered around 1420.4 MHz, which is the neutral hydrogen line. The frequency was not selected by looking it up in a scanner registry but by applied psychology, the concept being that the possibilities of other civilizations "knowing it" would be increased by the fact that atomic hydrogen seems to be plentiful throughout the universe. Actually, an entire band in this region of the electromagnetic spectrum may be equally worthy of similar consideration under this school of thought. The band runs from 1420.4 MHz to 1662 MHz (the hydroxyl transition line) and has been nicknamed "the water hole" by radio astronomers.

Another line of research has been suggested by the Tokyo Astronomical Observatory, that being 4.8297 GHz (the formaldehyde line) since it isn't as noisy as water hole frequencies. "Nyet!" shouts Russian radio astronomer N.S. Kardashev, of the Soviet Space Research Institute. Forging into new frontiers, the Soviet scientist claims the best frequency to monitor is exactly 203.3489 GHz (for you MHz fans, that's 203,384,900 MHz, a wavelength of 1.47 mm—about 6/100ths of an inch—equal to the thickness of 1½ dimes). That far-out cosmic frequency relates to the splitting of an atomic particle called a positronium.

As scientific interest continues it does seem that it is keeping pace with efforts to further explore the higher frequency edges of the electromagnetic spectrum. This is not forgetting that telecommunications uses of the spectrum are also expanding higher in frequency and creating more noise and interference which hinder radio astronomy efforts. While the old 1420.4 MHz neutral hydrogen line channel is somewhat protected by the FCC having set aside 1400-1427

MHz for radio astronomy purposes (between 1427 and 1660 MHz, which constitutes the remainder of the water hole band), there are a number of communications licenses in the land mobile, police, fire, forestry, and railway services, as well as military and telemetry signals, and radar signals—even maritime mobile navigational aids aboard satellites. Surrounding the hydroxyl transition line at 1662 MHz there is a small protected oasis from 1660 to 1670 MHz and is set aside for radio astronomy.

Any radio astronomer in the United States attempting to move to the higher suggested frequency (4.8297 MHz) would be hindered by operations of military users who operate between 4400 and 4990 MHz. It would seem that maybe that foxy Russian, Prof. Kardashev, may be heading in the right direction along the spectrum, for there is little in the way of terrestrial use of frequencies around 203 GHz at this point.

A dissenting opinion has now been registered! According to a Stanford University radio astronomer, Ronald Bracewell, the first messages from extra terrestrials will most likely occur at a frequency around 100 MHz. According to *Science Digest* (July '82 issue), he predicts that such signals will be picked up by a "private Ham radio operator" since the "world's Amateur operators vastly outnumber the professional scientists to monitor the airwaves for long distance messages . . ."

Bracewell reportedly explains that 100 MHz "has little of the background noise found over much of the radio range, the source of which is the continuous stream of signals emitted from inanimate objects in our galaxy." He said, "Let's say a signal was coming down from an alien space probe near Pluto. If one Ham operator reported making a contact, others would hear the signal too. One operator could tape record the electromagnetic message and a second could verify that there was in fact a signal. Another could confirm that it came from the same distance as Pluto; and still another that it came from the direction of Pluto."

He warned that people shouldn't discount Hams, pointing out that many are scientists and engineers who should be able to sort out extra terrestrial signals from the ordinary signals of mankind. He stated, "Experience will help the operator sort out the familiar sounds." Bracewell added that, "since there doesn't seem to be any other intelligent life in our solar system, the first message will probably be sent from distant stars."

Science Digest did not report if Bracewell explained how these Ham operators were supposed to confirm the distance or directions of extra terrestrial signals. It was also not explained how any of their Ham experiences would give them any advantages over non-Hams in sorting out familiar sounds from unfamiliar ones.

Well, being a licensed Ham, I figured that I would pick up on his challenge and the return to my readers seeking glory and adulation. I checked out all of my Ham equipment to make certain that it was plugged in and

well dusted, and then set about seeking intelligent life in outer space.

Hey, wait a minute — 100 MHz isn't covered in equipment made for Hams. In fact, it isn't covered in any communications equipment at all! Now that I think about it, 100 MHz is covered only on FM broadcast receivers — and more people who are non-Hams have those than licensed Amateur operators. No problem. I've got one myself, and I could *still* get the prize!

Climbing up on the roof, I dutifully bent the mast of my FM antenna towards the general direction of Pluto. As soon as I fired up the stereo receiver around 100 MHz, I was astonished at what I monitored pouring out of the Wharfedales — *both* of them in fact. What were these sounds and where were they coming from? Being a Ham, I immediately discerned that they were obviously extra terrestrial since, by no means, were they the ordinary signals of mankind. Odd shrieks and thumping sounds they were. Unearthly howls of unimaginable ferocity were rattling the window panes in bizarre pulsed modulation. Their direction I was quickly (due to my expertise) able to calculate was from the northeast. I then called another Ham and asked him to tune it in to make a tape to confirm my discovery. Then I waited for his verification.

Here it comes. He says he's *not* going to make a tape since he already has that group on tape. Group? Andromeda, NGC-3504, NGC-7217 — *which* group? Well, it wasn't any of those. The group was *Led Zeppelin*, and he doubted if I was the first ever to hear that group or any of the other groups which are normally heard there.

Fact is that around 100 MHz there are more than 160 FM broadcasting stations in North America, many pumping out 100,000 watts of stereo music ranging from rock to Rachmaninoff. Scientists ought to call the 99.9 to 100.1 MHz band the *music hole*! It's difficult to think that a Ham or anybody else hereabouts could hear anything there from extra terrestrials, although the sounds may be no less unusual. Frankly, I'm really not so worried that we'll probably never be able to hear alien civilizations on about 100 MHz, but I'm seriously concerned that *they* might get their first impression of us there.

Oh well, so much for the noble Stanford University radio astronomy boondoggle. Now I'm wondering about how to build a 203 GHz receiver for Dr. Kardashev's cosmic channel; or maybe I just ought to figure on joining up with the crowd monitoring "Star Band Radio" for intergalactic beeps. I'm also wondering if I should break the news to the Stanford astronomers that those strange sounds they're hearing around 100 MHz are probably from the little FM translator station on 100.1 MHz, located about 15 miles down the road from them in Saratoga, CA. Guess they're not Hams at Stanford and just can't sort out the sounds properly.

In the meantime, if you hear anything on your scanner, communications receiver, TVRO, or cordless telephone which seems to be extra terrestrial, be sure to let me know.

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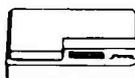
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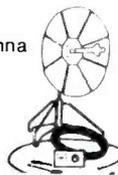
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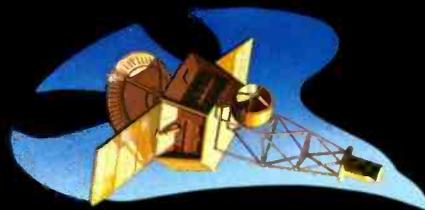
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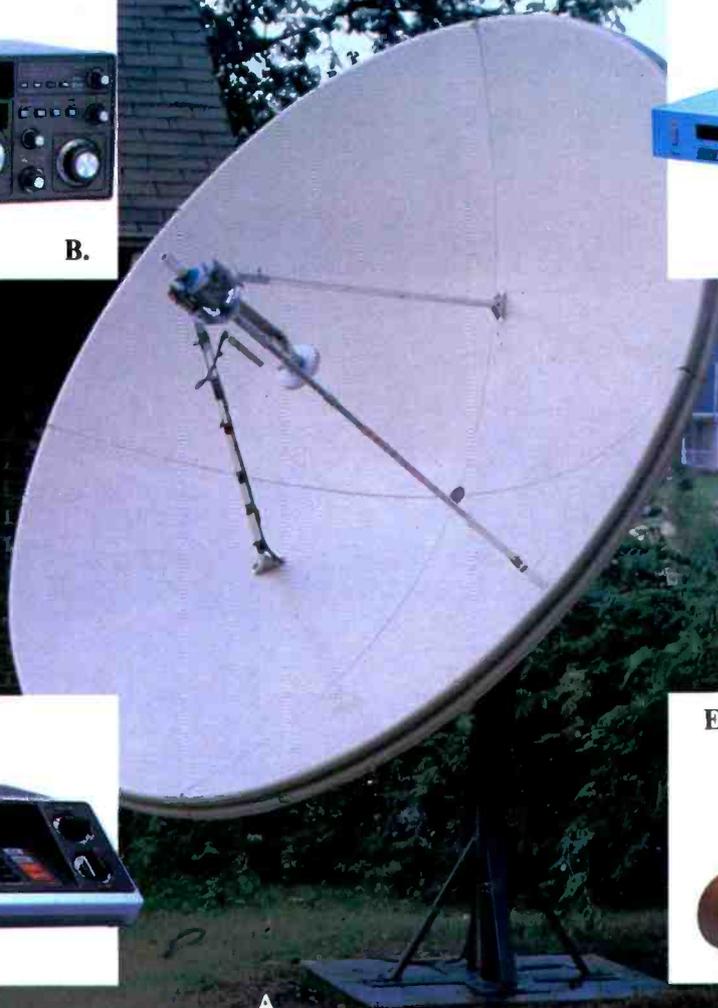
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