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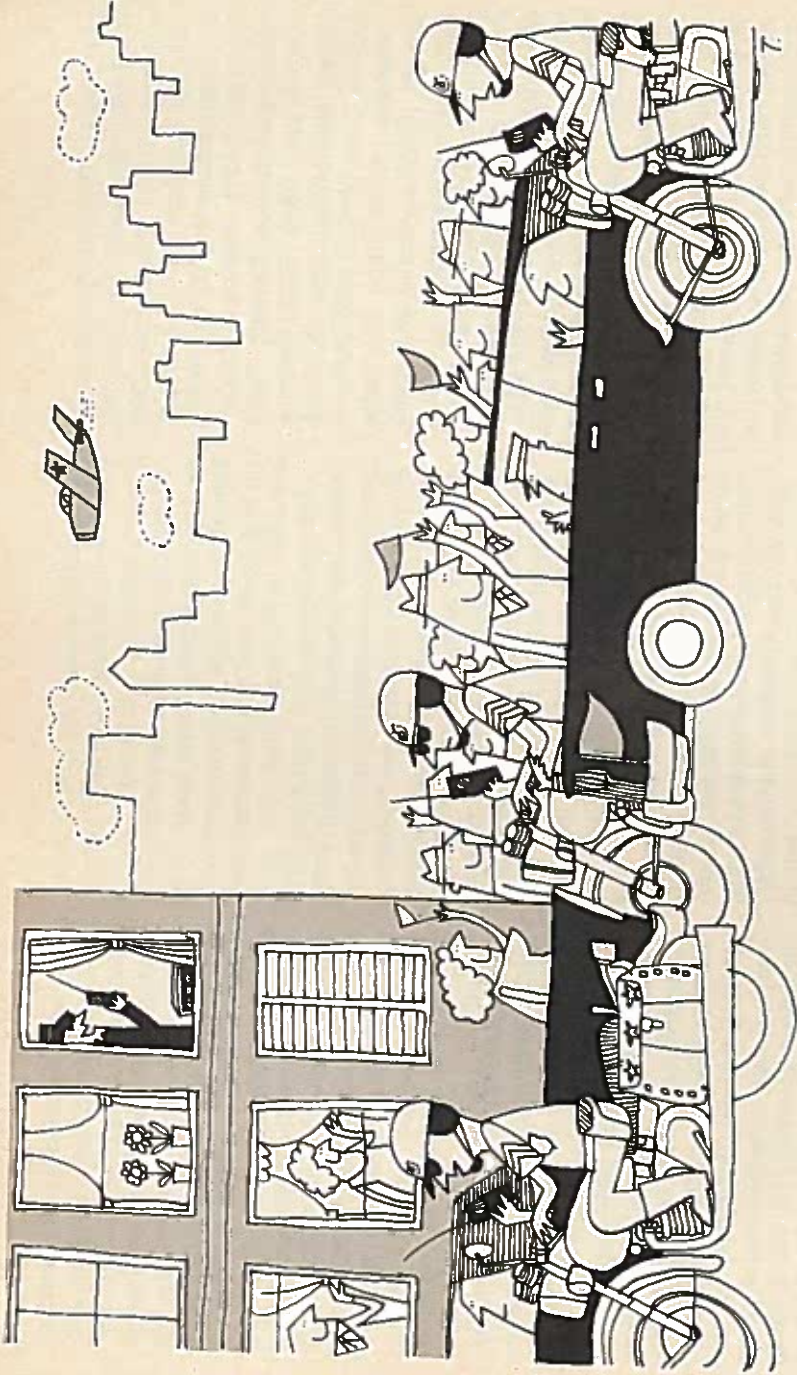
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Unscrambling the Shortwave Utilities

THERE'S FASCINATING LISTENING ON THE "OTHER"

SW FREQUENCIES—FROM SPIES PRACTICING THEIR CODES TO SOVIET-PILOT COMMUNICATIONS WHEN APPROACHING CUBA

BY GLENN HAUSER

UTILITY is a catch-all term covering all types of radio transmission that are neither broadcast nor amateur. The stations are spread all over the radio spectrum, from 10 kHz to 30 GHz. These transmissions are not intended for the general public, but like police/fire transmissions, have captured the interest of many people. Utilities cover maritime and aeronautical communications, among others. A general-coverage-type communications receiver to 30 MHz is needed to tune in these widely spread, largely low-power stations. As with the Public Service Band, one can intercept the private communications, but must not divulge their contents.

Most utility radio is aboveboard. There are no great obstacles to listening in—if you can copy CW and SSB, or even radioteletypewriter. The days of normal AM on the utility bands are just above over, as ship and shore stations convert to SSB.

Also declining are the opportunities to DX international radiotelephone stations. Just a few years ago, one could specialize in these stations, with their repetitive and easy-to-copy identification markers. But satellites and proliferating ground stations, with their higher quality and reliability, are taking over more and more point-to-point (PTP) circuits—both civilian and military.

Most of the remaining PTP circuits involve backups for satellites or cables; or if one end or the other has no

satellite or cable connection, both ends must use shortwave. If you are a country chaser, some of the best ones remain. Except for the remote possibility of harmonics from medium wave, you'll never hear Guantanamo or Jamaica on shortwave broadcast! Here are some PTP stations the author monitored over the past year, running marker identifications at the times given (usually in English or French): International Telecommunication Corp., Abidjan, Ivory Coast (4594, 5260 kHz, 0615 GMT); Jamaica International Telecommunications, Ltd., Kingston, Jamaica (5255 kHz, 0140 GMT; 9396 kHz, 1340 GMT); Cable & Wireless, Ascension Island (9805 kHz, 0305 GMT); French Telecommunica-

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113



(A) (B) (C) (D) (E)

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Here's the ideal solution to the problem of keeping all your records and tapes stored neatly, safely, conveniently and attractively. A complete set of matched storage cases, designed by the editors of STEREO REVIEW magazine, for your records and all your tapes: cassette, cartridge and 7" reel. Now you can keep them side-by-side on your bookshelf or cabinet, easily to identify and readily available.

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Units A, B and C have tilted compartments to prevent spillage and include pressure sensitive labels for titling.

(D) 6-unit 7" reel case, 8" high x 7½" deep x 5" wide. Holds reels in original boxes, \$6.95 each; 3 for \$18.50.

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CHARGE: Your American Express, BankAmericard, Master Charge or Diners Club account. Mail your order, name, address, credit card number and expiration date (Master Charge customers include four-digit interbank #). Be sure your signature is on your order. You will be billed in the amounts indicated above.

Identify the type of case ordered and indicate your color choice for the back of the case—black, green or brown (sides in black only).

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tions Service, Djibouti, Afars & Issas (12025 kHz, 2000 GMT); Embratel, Rio de Janeiro, Brasil (14605 kHz, 2318 GMT); All American Cables & Radio, Inc., Guantanamo Bay (Cuba) (15470 kHz, 1230 GMT); French Telecommunications Service, Papeete, Tahiti (15497.5 kHz, 1855 GMT); International Radiotelephone Service, Habana, Cuba (21500, 1900 GMT).

Although some ships are large enough (both physically and financially) to support a satellite terminal, a great many are not, and hardly any airplane can contact satellites—so shortwave seems secure for aeronautical and maritime mobile communications. However, in both cases, it's being reserved for longer distances where VHF/UHF won't reach. As noted elsewhere in the Handbook, 1976 will be the final year for AM ship/shore communications on the 2-MHz band. African and Asian nations want to take over the 2-MHz frequencies for broadcasting.

A random twirl across a SWBC band will likely turn up the major western languages, but the maritime bands offer a distinctly different tone. Chances are you'll hear Greek or Japanese before you hear English. Ships on transoceanic routes can be

heard mainly around 12.4, 16.5, and 22.0 MHz in voice contact with shore stations some 700 kHz higher.

One can easily specialize in monitoring shipping traffic alone, like retired mariner Les Fultz, who travels up and down the Ohio River from his armchair in Pomeroy, Ohio.

The decline in PTP traffic on SW makes the presently allocated PTP bands very desirable for expansion by amateurs and broadcasters. The hams already have plans to add several new bands and expand present ones.

As for broadcasters, a *de facto* situation exists already, expanding most of the official SWBC bands 50-100 kHz on one or both sides. But national policies vary widely. Some countries, like Israel and Egypt, prefer these "side" bands, where their signals stand out from the crowd and interference is less severe. Others assiduously stay within the allocated bands. The Vatican straddles the boundary line, announcing 11705 kHz, but in fact using 11700 kHz, as does Monaco with 7105 and 7100 kHz. China and North Korea have never paid any attention to band limits, operating wherever it pleases them. Many otherwise law-abiding countries maintain a few out-of-band frequen-

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In turn, some utility stations invade the broadcast bands. This may be fair play, but it's hardly necessary because of the much wider spaces available in existing utility bands. The U.S. military is the main invader: regular tuning of the 6, 9, 11, and 15-MHz SWBC bands will turn up tactical voice and Teletype transmissions interfering with broadcasts. For example, we've heard their heterodynes against 11720 and 15190 kHz.

However, the FCC does authorize some 2-way stations on the 13-m broadcast band. About a year ago we were hearing, on 21715 kHz, SSB contacts around 2030 GMT between KS2XSG, at the Lamont-Doherty Geological Observatory, Palisades, N.Y., and KS2XSI, aboard its research vessel *Robert D. Conrad*, somewhere between Taiwan and Fiji. The Algerian broadcaster on 21715 could hardly register an interference complaint, since it jumped all over the band itself!

Most international air traffic communications are in voice modes, but Soviet Aeroflot flights between Moscow and Habana doggedly stick to CW—perhaps to discourage casual monitoring. But the planes and ground stations make no attempt to disguise their contacts, using internationally allocated call signs, and referring to points along the way.

You don't have to understand Russian to copy these contacts but you must be able to read CW. Learning the code is beyond the scope of this article, but there are lots of books and records to help. Since Russian uses a different alphabet, most code symbols match corresponding *sounds*, rather than visible letters, although several adaptations had to be made. The key to the Russian code is illustrated. Note that the same additional symbols are used for other letters in other languages.

Ohio radioman Bob Burton spends his spare time logging lengthy lists of utility stations, including these Soviet flights. Bob would like to hear from other Aeroflot DXers, at 609 Hotel Norwich, 4th & State Sts., Columbus, Ohio 43215. The main frequencies are 6748 and 11312 kHz, but 5710, 8976, 11348, 13220, 13248, 15024, 17936 and 19904 kHz have been used occasionally. All frequencies are "announced." Bob often hears COL, Habana, and RFNV, Moscow on these frequencies,

RUSSIAN CW CODE

RUS.	ROM.	SYMBOLS	RUS.	ROM.	SYMBOLS
А	А	..---	Р	Р
Б	В	---...	С	С	...
В	В	..---	Т	Т	---
Г	Г	---...	У	У	..---
Д	Д	..---	Ф	Ф	..---
Е	Е	..---	Х	Х
Ж	В	...---	Ц	С
З	З	---...	Ч	МN	..---
И	И	..---	Ш	МM	..---
Й	Й	..---	Щ	Q	..---
К	К	..---	Ъ	Y	..---
Л	Л	..---	Ю	IM	..---
М	М	..---	Я	AA	..---
Н	Н	..---	Э	X	..---
О	О	..---	Ё	UI	..---
П	Р	..---			

"INTERNATIONAL" MORSE

Ä	Ger.	..---	Ñ	Sp.	..---
Å or Ø	Scand.	..---	Ö	Ger.	..---
CH	Ger./Sp.	..---	Û	Ger.	..---
É	Fr.	..---			

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craft: All Baba, Bee Honey, Dago 24, Eagle Beak, Eggplant, Fox 25, Frisco Rose, Hypno 74, Ike 22, Job 25, Kleenex, Lombardo, Macaroni, Milk-bucket, Nite 19, Oversize, Pot Holder, Profess, Sirloin, Snuffy, Tass 21, Truckman, Victim, and Worth 21 are just a few examples.

Another SAC frequency is 4725 kHz. If you hear "Fangoon" there, don't confuse it with the Burmese broadcaster on the same frequency! Only if the operators slip will you get an idea of where these stations are located. But that's not the point of DXing them. Calls are changed regularly to keep the "enemy" busy. By now you may not hear many of these, but instead an entirely new mélange of compound words and trademarks.

Spying on the spies is the most engrossing thing you can do as a utility DXer. Look what Michael Chabak of Boulder, Colorado, uncovered. For years, DXers have been logging, haphazardly, 5-digit Spanish number transmissions, by a woman's voice, on AM. Mike, however, was determined to monitor as many of these mysterious transmissions as possible. To do this, he stayed up almost every night for two and a half months, as late as 5 a.m., listening to the Spanish numbers stations.

If you haven't yet heard them, transmissions contain a varying number of 5-digit cipher groups (the groupings of 5 are just for convenience), introduced by "Atención" plus two other groups of numbers. The first is the code key applying to that message, and the second is the number of cipher groups to follow. When all have been read off, the lady says "Final, final."

"Read off" isn't really the way it happens. From the single intonation used on each number, regardless of its position in the group, and from clicks between numbers, it's clear the reproduction is by a mechanical/electronic device, like the phone company uses for number changes. The one voice Chabak heard on all 633 transmissions, involving thousands and thousands of digits, only had to record about a dozen words!

Mike's diligence was rewarded by a number of new revelations. Most startling was his finding that entire transmissions are taped, and played time and again, weeks apart. This is hardly an efficient procedure to contact spies in the field (why not just read the code key and group count instead

of the entire message?) leading us to believe this is primarily for training purposes, rather than contacting spies.

Also, there is a close correlation between identifiers and frequencies. Exact frequencies vary, but stay within a certain block. For instance, code key 044 always appeared on Saturdays between 0500 and 0600 GMT, and between 9.4 and 9.5 MHz. It has 77 groups; the first is 68785, the last 27077. You may still be able to hear this message; give it a try. But deciphering the messages themselves is virtually impossible without the key to the code.

Another thing, which apparently nobody noticed before Chabak's study, is that all transmissions are run twice in the same time block, usually in the same frequency block. The first run begins near the hour, with starts varying between plus and minus three minutes of the hour; some others start between 7 and 14 minutes after. The repeat transmission comes 3 to 9 minutes after the first one ends. None ever started later than 40 minutes past the hour.

Of the different messages, only one ran every night: "Atencion, 160-102", at 0900 GMT (1000 Thursdays) in the 9.4-9.5 MHz frequency block.

Other transmissions appear only one, two, three, or four days per week, in a schedule too complex to give here. But here are the most productive frequency blocks (kHz) inhabited by the mysterious numbers lady: 3090-3140, 3390-3450, 4550-4775, 5050-5200, 6770-6850, 7320-7380, 7505-7600, 7700-7900, 7900-8150, 8825-8980, 9400-9500, 9950-9999, and 11500-11700.

Generally, strong signals and antenna bearings indicate that these transmissions originate within the USA. Almost all frequencies used are either in or adjacent to PTP allocated frequencies. This could suggest that our own PTP transmitters of AT&T, ITT, or RCA Global are being utilized. What is needed here is for DXers scattered across the USA to send in data on strength, antenna bearings, etc.; then we will get a general idea of the actual location of these transmitters. If you'd like to participate in this research, contact Michael T. Chabak, 3055 1/2 Arapahoe, Boulder, Colorado 80302.

See what you can get into, once you leave the amateur, CB, and broadcast bands? ◆

RUSSIAN CW CODE		RUS.	ROM.	SYMBOLS	RUS.	ROM.	SYMBOLS
А	•	А	•	•	Р	•	•
Б	••	В	••	••	С	••	••
В	•••	Г	•••	•••	Т	•••	•••
Г	••••	Д	••••	••••	У	••••	••••
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How To DX The FM Band

YOU CAN ENJOY "LOCAL" FM-STATION FARE TRANSMITTED MANY HUNDREDS OF MILES AWAY.

BY GLENN HAUSER

DAILY FM reception out to 400 km away? Occasional reception to 2500 km, or more? Impossible, you say, because FM is limited to line-of-sight.

Well, it's true, as so many FM DXers know. It's still valid that the higher the frequency band the less signals are bent back to earth. But FM, way down on the very-high-frequency band is not fully subject to this phenomenon.

The limits of your FM reception are determined as much by the geographical density of stations (blocking others on the same or adjacent frequencies) as by propagation. At this writing, Andy Bolin holds the record of

1407 different FM stations received at one time or another in Charleston, Illinois. We racked up a total of 900 over a 28-month stretch in San Antonio. Such statistics, month-by-month news of FM station changes, and DX reports from members appear in the "VHF-UHF Digest," published by a club that specializes in DX over 30 MHz, the Worldwide TV-FM DX Association (see club listings elsewhere in the Handbook).

We're relying on our experiences mostly in the central U.S.A. Here, there are lots of FM stations, but the bands aren't as saturated as they are in dense population areas. Tuning from Enid,

Oklahoma on a normal day, we're able to listen to certain FM stations in Kansas City and Dallas, both just over 400 km away.

Antennas. We don't have any extra-special equipment. The main requirement is a good high-gain directional antenna, like our 10-element yagi designed for the FM band *only*. (Using a combination TV/FM antenna will not ordinarily suffice.)

An antenna amplifier is the other main item needed. There are two basic types: one boosts all signals equally, across the band; the other is tunable, to "peak" on one particular channel. We prefer the latter, since this helps to reduce mixing products from strong local stations.

Naturally, a rotator is imperative with a highly directional antenna—unless you're interested in picking up stations from only one direction! You'll find that on some crowded frequencies, you can choose two, three, sometimes even four different FM stations by selecting the appropriate direction. It's all a matter of relative signal strength into the antenna.

Adding a second antenna in the vertical plane is a good way to open up new FM listening possibilities. It just requires a little ingenuity to mount at a right angle to the usual custom. More and more FM stations broadcast with so-called "circular" polarization. This means that signals go out at full strength in both the horizontal and vertical planes. If a nearby interfering station is horizontal only (none on this

LATIN-AMERICAN FM STATIONS ON "OFF" FREQUENCIES

MHz	Call	Location, Name, Earlier Frequencies
88.335	XERED	Mexico, D.F., 88.32
88.365		Guatemala, Fabuestereo, 88.36, 88.1
88.47	XHOM	Cuernavaca, Mor.
88.715	HRLP	Tegucigalpa, Honduras, R. America, 88.69, 88.665
88.785	TGRT	Guatemala, La Fabulosa, 88.800
88.95	YSR	San Salvador, El Salvador, 88.94
89.40	TGD	Quezaltenango, Guatemala
89.58	TGDX	Guatemala
89.985	YSU	San Salvador, El Salvador, 89.96
91.075	XETRA	Tijuana, B.C., 91.30
91.8		Habana, Radio Habana Cuba, 6th harmonic of 15.3 MHz
93.2	XHQQ	Monterrey, N.L., R. Actualidades
93.95		Guatemala, Radio Sonora
94.785		Guatemala, Radio Centroamericana
95.30	XHOX	Tampico, Tams., Stereorey, 95.38, 95.385, 95.429, 95.36
96.09		Guatemala, Radio Centro
98.60	TGHR	Guatemala, Radio Mundial
99.7	XHSP	Monterrey, N.L., 100.2
100.49	XHMG	Monterrey, N.L.

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88.715	TGRT	Tegucigalpa, Honduras, R. America, 88.69, 88.665
88.785	YSR	Guatemala, La Fabulosa, 88.800
88.95	TGD	San Salvador, El Salvador, 88.94
89.40	TGDX	Quezaltenango, Guatemala
89.58	YSU	Guatemala
89.985	YSDU	San Salvador, El Salvador, 89.96
91.075	XETRA	Tijuana, B.C., 91.90
91.8	XHQQ	Habana, Radio Habana Cuba, 6th harmonic of 15.3 MHz
93.2	XHOQ	Monterrey, N.L., R. Actualidades
93.95		Guatemala, Radio Sonora
94.785		Guatemala, Radio Centroamericana
95.30	XHOX	Tampico, Tams., Stereorey, 95.38, 95.385, 95.439, 95.36
96.09	TGHR	Guatemala, Radio Centro
98.60	XHSP	Guatemala, Radio Mundial
99.7	XHMG	Monterrey, N.L., 100.2
100.48		Monterrey, N.L.

WHICH PROPAGATION IS IT?

Characteristic	Sporadic-E	Tropo	Meteor Scatter	Auroral Skip
Distance	650-2500 km, may double	0-1500+ km	600-2500 km	0-3000? km
FM Frequencies	Low end first and last; may not reach high end	All	All	All
Time of Year	Mainly summer, but minor winter peak; Feb. worst; June best	Spring-summer-fall, exc. Gulf Coast; fall-winter-spring	Every day, but showers peak same dates every year; Aug.-Dec. best	Whenever K-index (WWV at :14) is 3 or more; may repeat in 27-28 day cycles
Time of Day	Any, but seldom 0000-0600; evenings best, off-season	0600-0900 and after sunset best; ducting whenever some ionis pass	Diurnal peak when 0600 LMT at midpoint; skewed by shower encounters	Any; depends on magnetic disturbances reaching earth from sun
Duration	Varies greatly, minutes to hours	Varies greatly, hours to days	Split second to few minutes	minutes to hours
Best Time to Try	June mornings, evenings	Oct. mornings, evenings	Mid-August mornings	Monitor WWV for warnings at :14 and :18
Strength	Can be extremely strong	Usually weak to moderate	Usually weak	Usually weak
Distance vs Intensity	The closer, the stronger, and the higher the freq.	Transmitter power correlates better than distance	Best around 1300 km	?
Fading	Little to moderate	Little to gradual	Choppy	Choppy
Doppler Effect	Some	None	Some	Some
Polarization when Received	Random	Random (Ground-wave is horizontal-only, or circular, as transmitted)	Random	Random
Stereo Quality	Excellent	Excellent	Don't bother	Poor
Antenna Heading	True, except rare backscatter	True	True, except backscatter	May be up to 90° off, or toward north
Geographical Variations	Usually moves along an arc, south to north, or east to west	Except with ducts from swiftly moving ionis, can be stable for long periods	Peak region depends on direction of radiant point as it crosses sky	The further north, the more likely; seldom south of 35° north latitude
Station Power	Any, down to 10 watts	Down to 10 watts, but depends more on distance, receiver, and antenna gain	Down to 1000 watts	Down to 100 watts
Correlation with Television	Ch. 2-6 always open first; very rarely Ch. 7-13 follow FM opening, as long as FM stays open	TV from same area on all VHF, UHF channels, not just 2-6	All VHF but only stronger bursts, show on Ch. 7-13, and for shorter duration	All VHF, but video extremely garbled
Correlation with short-, medium-wave	"Short skip" on CB, 10-m, 30-50 MHz is same, but may not reach FM band	None	Can be heard disrupting 21, 25 MHz broadcasts	SW & MW: high-latitude paths blacked out; southern paths enhanced
Correlation with VHF Ham bands	6-m always opens first; sometimes 2-m after FM is open	DX from same areas, on 2-m, 220, 432 MHz	Same type of bursts on 6-m, 2-m	Same as on 6-m, 2-m
Correlation with Weather	Low pressure areas; tornadic activity	High pressure areas; stagnant air masses; inversions; rapid temperature changes	None	None
Do not confuse with:	Tropo	Sporadic-E	Lightning scatter	Meteor scatter
Worst for:	Distances under 800-km, listening to a complete program	Extremely long distances	The nerves; psychological unbalance following large doses of white noise	Latin-American and southern DX
Best for:	Majority of DX over 1000 km; DX from arid, mountainous, and Latin American areas	"Quality" reception; areas too close for sporadic-E; along coastal paths	Filling in gaps in hard-to-hear areas	Sheer excitement; stations also receivable by other modes in northern areas

continent are vertical only), you can often pull in a station that's farther away simply by switching to a vertically polarized antenna. This minimizes the signal captured from the unwanted horizontally polarized station when received by ground-wave. It's best to mount the two antennas on separate masts, at least 15 meters apart, to eliminate interaction between them. If one antenna is enough

for you, we suggest you try mounting it vertically. The closer horizontal stations are so strong you'll get them anyway, and you can still benefit from distant stations' vertical outsendings. **Receivers.** Look for a receiver with maximum alternate-channel rejection. This term can be misleading; in the U.S. and Canada, there are FM channels every 0.2 MHz. In any one

city, stations are normally spaced no closer than 0.8 MHz, which means that a 0.4-MHz spacing is the "alternate." While DXing, stereo reception is quite possible. It's best, however, to switch to mono position, which has a better signal-to-noise ratio. Also, switch off "muting," which is undesirable when you're trying to split a weak station from a strong one on the next channel.

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126

When DXing weak stations, you might have to tune slightly off-channel to escape interference. Furthermore, many foreign countries, including Cuba and Mexico, assign some stations to "even" channels, such as 90.0 MHz. Transmitter frequency drift also puts stations on "split" channels, even in the U.S. We caught KTXN-98.7, Victoria, Texas on 98.38 before the FCC did; and KVRO-105.5, Stillwater, Oklahoma, on 104.95 MHz.

No tuner is calibrated precisely enough to read off-frequencies down to 10 kHz or less. Some additional gear is necessary. You may want to use a frequency counter that operates above the FM band, say, to 110 MHz.

A list of Latin American stations we've measured on other than standard FM channels is shown in the box. Note that frequency variations far exceed our FCC's ± 0.002 MHz. (The most recent frequency is given first.)

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Propagation. Everywhere in North America, you'll notice some diurnal and seasonal variation in FM reception, depending on the humidity, barometric pressure, and the positions of frontal systems. But certain parts of the continent benefit from much more intense and frequent "tropo" DX than others. The Rocky Mountain area, because of aridity, terrain, and altitude, can't manage much via tropo. West coastal areas can do quite well, but only within their own region, since the mountains effectively block tropo contact to the east. But east of the mountains tropo can work wonders! Along the Gulf Coast, FM reception out to 1800 km is not too unusual, although a rare overland opening of 2000 km brought Houston FM stations into western New York.

FM DX is not achieved by tropo alone. It's only one of four major and mutually exclusive modes of propagation. Determining modes will make you a more successful DXer. So the biggest problem facing newcomers to FM DXing is learning about different propagations. The accompanying propagation table will make the process easier.

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very good catch indeed! Any station received by auroral scatter is first-rate DX in our book. (I've never had any this far south.) Brief bursts of FM reception, including an ID if you're lucky, result from scatter off meteor trails. Sometimes a swarm of meteors suddenly permits DX reception for a minute or more.

DXing the FM band alone, you're looking at a narrow piece of the VHF spectrum that is only 20-MHz wide. This means that there are times when you can't easily decide whether the DX is coming in via tropo or sporadic-E. So it pays to be aware of television openings, which provide the answer, even if you're not interested in TV DXing for its own sake.

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A good, steady tropo opening preserves the relative power relation between stations in the area being received. The weakest come in weakest; the strongest, strongest. With sporadic-E, you can't really tell the relative transmitting powers, unless there's an extreme difference like 10 watts versus 100,000 watts.

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ANTARCTICA CALLING

AFTER a long, hot summer, how about an armchair trip to Antarctica? Just a year ago, North American DX'ers began picking up the American Forces Antarctic Network on 6.012 MHz (not to be confused with a spur from AFRTS, Ohio on 6.018 MHz or a spur from HCJB, Ecuador, on 6.012 MHz). Reception of AFAN peaked in October and November, especially on the West Coast around 1100 GMT. Then, last April, from his ideally situated monitoring post at the southern tip of New Zealand, Arthur Cushen flashed news of a change for AFAN to 7.050 MHz. It is possible that AFAN may have returned to 6.012 MHz, by now.

DX'ers speculate that other nations with Antarctic bases may initiate their own broadcasts since radio news and entertainment help diminish the sense of isolation. Meanwhile, North American DX'ers can hear, with some effort, a handful of programs beamed on shortwave from the home country toward Antarctica.

For instance, Radio RSA has a program for the South African National Antarctic Expedition, Sundays at 0956-1045 GMT on 15.220 (alternate: 15.155) and 11.970 MHz. Radio New Zealand also broadcasts weekly toward Antarctica, Sundays GMT at 0015-0045 (that's Saturday evening here) on 15.280 MHz.

Radio Australia calls its men in Antarctica on Fridays GMT at 0300-0330 on 15.290; 0400-0430 on 15.240, and 0915-0945 on 6.005 MHz. Radio Moscow transmits (in Russian) twice a week toward Antarctica—Mondays and Thursdays at 1530-1600. Frequencies often change, but try 12.000, 11.630, 9.510, 9.490 or 7.135 MHz. Now for the easy ones: BBC designates 7.130 MHz exclusively for Atlantic Islands and Antarctica, at 2245-0430 GMT daily, with the same World Service programs heard elsewhere. But on Sundays "Calling the Falkland Islands" approaches an Antarctic service, at 2200-2245 on 9.915 and 12.040 MHz.

Antarctica happens to be in the same direction as the Caribbean, viewed from Bethany, Ohio, so AFRTS transmissions from there serve both regions, 24 hours a day, on 6.030, 9.755 or 15.330 MHz.

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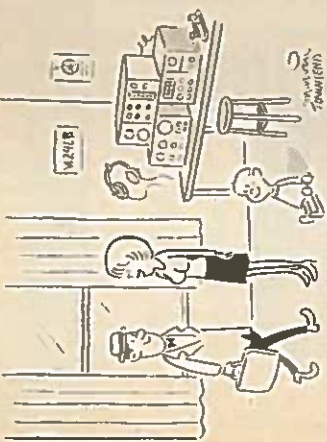
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CIRCLE NO. 24 ON FREE INFORMATION CARD

1976 Edition

MEDIUM-WAVE DX'ING

By GLENN HAUSER

New Twists in Capturing Long-Distance Broadcast-Band Stations

North America can, happily, be heard with its haunting music around 1800-2215 when conditions are good. All in English.

9540 Radio New Zealand, Wellington.

Back on the air after a reprieve from permanent shut-down, this one changes frequencies each season like most international broadcasters, but is one of its most permanent channels. Look for it, in English, around 0500-0800.

9585 Radio Mogadishu. You may not understand much of this, as it's mostly in Somali, but for the music buff it is a delight as the melodies are a subtle blend of Arab and African traditions. A powerful signal until regular 2100 sign-off, later during political crises.

9620 Saigon/Ho Chi Minh City. This station was not destroyed during the capture of the city, and is still on its traditional frequency, which dates back to French colonial times. All in Vietnamese, a difficult catch around 1300-1600.

9645 Faro del Caribe, San José. With its meager 500 watts, the "Lighthouse of the Caribbean" shows that all the megawatts are not really necessary. It often beats the biggies during its English religious programs 0300-0400, the rest of the day in Spanish.

9730 Voice of Uganda, Kampala. The Voice of Idi Amin is heard only on Monday, Wednesday, Friday and Sunday in English 2000-2100.

25 meters (11700-11975 kHz)
Another prime international band, open days and evenings, but often fades out at night except for a few straggling signals from southerly or westerly directions.

11700 Radio Clarin Internacional, Santo Domingo. Tropical rhythms, baseball games with commentaries in Spanish, tourist talks in English, live reports on the visit of the King and Queen of Spain. This is one of the finest and most audible stations on the whole dial. On the air 1900-0100 weekdays, somewhat less on weekends.

11755 Radio Finland, Helsinki. Has put its new 250-kilowatt transmitter on here, with English to North America 1330-1400 and repeat 1430-1500. Not a very good choice because of splash from Havana 11760. 15110 kHz in parallel, although using "only" 100 kW, is often better. However, it, too, has to cope with another Latin American powerhouse, HCJB on 15115.

11789 Voice of Indonesia, Jakarta. Supposed to be on 11790, but the 1000-

16 meters (17700-17900 kHz)
Almost no small stations operate here. The selection is pretty well confined to high-powered, long-haul broadcasters; it's a narrow band, too.

17685 IBA, Jerusalem. Just outside the official band, Israel carries the same English newscast which is heard by local listeners within the country, at 1215-1230. Many parallels then include good 15100.

17795 Radio Australia, Melbourne. The North American service of this old favorite is heard, as it has been here for years, at 0100-0300 GMT.

13 meters (21450-21750 kHz)
A good band when it's open since there is little crowding or jamming, this is a daylight-only band in much of North America most of the year. Not used at all for broadcasting to North America at present. Since it's above the m.u.f. (maximum usable frequency), it still provides fine, undisturbed listening when propagation allows.

21535 Radio RSA, Johannesburg. Down in the Tropics, the highest frequencies are open much longer than at high latitudes. So South Africa uses this band for broadcasts to the rest of Africa. It is best at 1300-1650 GMT, mostly in English with some Swahili.

21590 Broadcasting Service of the Kingdom of Saudi Arabia, Riyadh. A newly lavishly equipped conservative Arab voice is heard mostly in Arabic around 1200-1600.

11 meters (25600-26100)
It's a broad band, but, at present, an empty one. There's one exception, though. The only station which believes it can get through to a target audience on this, the topmost of the ISWBC bands, is Israel. So let's list it: **25605 IBA, Jerusalem.** Your one and only chance of a logging on 11 meters is limited to one hour a week—Saturdays and Sundays 1000-1030 in Russian (to the U.S.S.R.). Reception in North America is just possible on certain mornings, though a later transmission time, around 1200-1300 GMT, would have been better. ◇

hertz heterodyne tells us that Jakarta is really here. In English 1400-1500, this may be a little easier in the East in Indonesian (1000-1100) or French (1300-1400).

11880 Voice of Turkey, Ankara. A popular station due to the duration and variety of its English programming, this one is heard 2200-0030 with DX-ing features, views on the Aegean Sea waters dispute with Greece, and more Western pop music than Turkish styles.

19 meters (15100-15450 kHz)
For daytime reception of Europe; afternoons especially of Africa, Australia and the Pacific best in the evening; and the Far East evenings, especially in summer, this long-haul band is popular everywhere.

15105 Radio Grenada. It's good to know that a small Caribbean island can produce and operate its own international broadcast service, year in and year out, while others only host relays of European high-powered stations. Radio Grenada's international service isn't listed in the 1976 *World Radio TV Handbook*, but it is on the air with 5 kilowatts around 2000-2200, mainly for Grenadian emigrants in Great Britain.

15170 France-Régions 3, Papétié, Tahiti. Low-powered, exotic, full of local color, and beautifully audible most evenings in most parts of North America, especially in summer, all SWL's seem to love this station. It's actually intended for listeners in the Tuamotu archipelago and other outlying districts of French Polynesia. The best part is the Tahitian, 0300-0500, often extended during song festivals, elections, etc.

15349.5 Radio Luxembourg. It's rare for stations in the advanced nations of Northwest Europe to drift, but this commercial one does. Radio Luxembourg is noted here at present rather than on its nominal 15350 kHz. All in French. Times of best reception vary. In summer, it can be heard well into darkness, but look for it around 1200-2100. Tour de France bicycle race reports are a prominent feature.

The great majority of American DXers who become interested in MW (also known as AM or BCB) regard it as primarily a domestic-listening pursuit. This way, there is no language problem. Goals, such as hearing all 50 states, can be strived for and there is an inexhaustible supply of stations to be heard. A relatively small number of DXers, with more sophisticated equipment or a greater interest in the rest of the world, go after foreign DXing on MW.

Often, Americans DXing foreign MW are not attracted to the SW bands owing to the ease with which world-wide broadcasters are heard. They seek a greater challenge, failing to realize that all modes of broadcasting are closely interrelated. The MW DXer who ignores SW broadcasts cuts himself off from a potential broadening of his expertise, which he could also apply to MW. The *Voice of America* is so seldom heard by pure DXers, for instance, that one reported the "Yankee Doodle" VOA inter-

val signal as a new thing—a great many months after it had replaced "Columbia, Gem of the Ocean."

The domestic MW DXers often use simple receivers which do not even cover shortwave. Thus they cannot benefit from DXing harmonics of domestic mediumwave stations, which they otherwise might have little or no chance of ever hearing due to interference on the fundamental. Some deliberately avoid harmonic DX opportunities, feeling it's a form of cheating to hear MW stations on SW. But it's not cheating unless they claim to have heard a harmonic on its fundamental!

We know of only one domestic station which has a program especially for DXers (KDOWN-720, Las Vegas, Nevada, Wednesdays at 10 p.m. Pacific time). Yet, many of the shortwave stations ignored by the MW-only DXer have DX programs including items of interest to MX DXers. And, for that matter, some programs also cover news of amateur



radio activities—but how many hams even know about these programs?

Shortwave DXers tend to avoid mediumwave, where the station congestion problem is even worse and the resulting interference much greater. They also tend to think of MW as being of domestic interest only. This leads SW specialists not to consider such goals as seeing how many *states* can be heard via SW broadcasts. (Beyond the first five, you have to go after pirates and harmonics from MW.)

The simple fact that programming material obviously designed for public consumption—in other words, a broadcast—originated at a domestic MW station is enough for your average SW Dyer to lose all interest in hearing it. It's simply too close! MW harmonics are often regarded as nuisances, rather than golden DX opportunities. By any objective measure, harmonics of MW stations appearing on SW—or heard beyond the local area—are as noteworthy, if not more so, than "true" shortwave broadcasters. They are always low-powered; unintentionally transmitted; and transitory, as traps are installed and transmitters become adjusted and maladjusted.

One reason for the lack of interest in DXing these little gems is the fact that organized SW clubs do not allow them to be tallied in station and country totals, or to qualify for awards, because they do not originate on SW. At the same time, MW clubs exclude them from such recognition because they fall above the arbitrary upper limit of the MW band (1605 kHz). They're in limbo, and so are those who would DX and report them, although many editors have come around to publishing harmonic DX items.

Among the most-sought-after SW stations are those regional or tropical broadcasters which are not intended to be received overseas, but only in the country or continent of origin. These operate primarily on the 120, 90, 60, and 49-meter bands. Almost without exception, these stations carry exactly the same programming as MW stations at the same studio. Yet, for the simple reason that these transmitters are *not* harmonically related to their corresponding MW stations, they are considered bona-fide SW, whereas any harmonics of these very same MW stations are not!

All of this is no problem for the DX listener who sets his own goals. But those swept into the "mainstream" of organized clubs are likely to be diverted from such fascinating oddities, for which they will get little or no recognition or even criticism. Once we break away from the

"Mediumwave programs, whether heard on MW, or simulcast on SW, more closely reflect a nation's character and concerns, as they are intended primarily for domestic consumption. International SW programs are designed to put across a certain favorable national image, not necessarily meshing with reality."

idea of categorizing DX by band limits, and instead think of types of programming first, we find the boundaries between MW, SW, FM, and even TV becoming less and less rigid. To illustrate the point, we'll show examples of how one can hear mediumwave programming without possessing a broadcast-band AM radio.

Tuning In. Chances are good that within a few hundred kilometers of you (in the USA) there will be at least one BCB AM station radiating enough power on an exact multiple of its proper frequency (usually twice or thrice) to allow you to hear it somewhere in the 2 or 3 MHz area—when you *can't* hear it on the fundamental frequency because of distance, daytime absorption, or a closer co-channel station. If you find none at first, just wait a while and one will eventually appear.

For instance, in eastern Tennessee we hear WMTC, Vancleve, Kentucky on 2190 kHz, while its fundamental of 730 kHz is blocked by a much closer station in Lenoir City, Tennessee (which has much better harmonic suppression).

Western USA DXers have a chance to hear a *trans-oceanic* harmonic from Cheju Island, part of South Korea. Station HLDA occasionally puts out a very strong signal on 3140 kHz (2×1570). Best time to try is just before local sunrise.

Albania is the Cheju-Do of Europe, with harmonics on 2914 kHz (2×1457)

and 2428 (2×1214). However, we know of no North American receptions of these yet. Best time to try is around 0400 GMT.

All other MW harmonics we can hear come from Latin America. With the selection constantly changing, the best approach is to tune the 2-3 MHz area frequently, familiarizing yourself with which frequencies are ordinarily open, which bear fundamental broadcasters or utility stations, which have local harmonics or mixing products, and which provide DX harmonics.

A good place to start is 2200 kHz, where two Latin American harmonics have held forth for several years now: Radio Superior in Guatemala, and Emisora La Lider in Nicaragua (currently the best, or even the only way to hear that country on SWBC). One of them signs off earlier than the other, around 0400 GMT. Although "Rumbos" doesn't refer to the effects of an earthquake, a station by the name of Radio Rumbos appeared on 2420 kHz from Guatemala following the quake. Perhaps its 1210 kHz transmitter/antenna system was jostled out of whack by the shock. Before it submerged, it put out enough signal to be heard as far away as Invercargill, New Zealand.

Radio Pipaton also appeared for the first time last spring on 2580 kHz. This Colombian station belongs to the Todelar network, in Barrancanormeja (meaning Crimson Cliff). It began with an 0300 GMT close, but then went all night. R. Pipaton intends to transmit only on 1290 kHz. As with all harmonics, DXers should *not* report reception to the station, lest it become alarmed about its harmonic radiation level. If you cannot detect R. Pipaton now, chances are somebody told them about 2580 kHz since press time. If it's gone, others will replace it, perhaps even on the same frequency.

How else can you hear MW programming without a BCB AM radio? Almost every Latin American station on SW is merely a parallel transmission of its main MW outlet to extend coverage. It's easy to tell from listing in the "World Radio-TV Handbook" which are the few SW-only Latin American stations. Some of them, such as La Voz del Maestro in Mexico City, took to SW-only because there was no room for them on the densely packed local MW dial. Such an alternative is never even considered in major U.S. cities!

The "SW parallelers" are "once removed" from their MW origin—but now and then an SW transmitter relaying

radio activities—but how many hams even know about these programs?

Shortwave DXers tend to avoid mediumwave, where the station congestion problem is even worse and the resulting interference much greater. They also tend to think of MW as being of domestic interest only. This leads SW specialists not to consider such goals as seeing how many states can be heard via SW broadcasts. (Beyond the first five, you have to go after pirates and harmonics from MW.)

The simple fact that programming material obviously designed for public consumption—in other words, a broadcast—originated at a domestic MW station is enough for your average SW DXer to lose all interest in hearing it. It's simply too close! MW harmonics are often regarded as nuisances, rather than golden DX opportunities. By any objective measure, harmonics of MW stations appearing on SW—or heard beyond the local area—are as noteworthy, if not more so, than "true" shortwave broadcasters. They are always low-powered; unintentionally transmitted; and transmit, as traps are installed, and transmitters become adjusted and maladjusted.

One reason for the lack of interest in DXing these little gems is the fact that organized SW clubs do not allow them to be tallied in station and country totals, or to qualify for awards, because they do not originate on SW. At the same time, MW clubs exclude them from such recognition because they fall above the arbitrary upper limit of the MW band (1605 kHz). They're in limbo, and so are those who would DX and report them, although many editors have come around to publishing harmonic DX items.

Among the most-sought-after SW stations are those regional or tropical broadcasters which are not intended to be received overseas, but only in the country or continent of origin. These operate primarily on the 120, 90, 60, and 49-meter bands. Almost without exception, these stations carry exactly the same programming as MW stations at the same studio. Yet, for the simple reason that these transmitters are not harmonically related to their corresponding MW stations, they are considered bona-fide SW, whereas any harmonics of these very same MW stations are not!

All of this is no problem for the DX listener who sets his own goals. But those swept into the "mainstream" of organized clubs are likely to be diverted from such fascinating oddities, for which they will get little or no recognition or even criticism. Once we break away from the

and 2428 (2 x 1214). However, we know of no North American receptions of these yet. Best time to try is around 0400 GMT.

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MW, itself puts out a harmonic, for "twice removed" transmission, such as Radio Neiva, Colombia, originating on 1230 kHz (where hearing it in the USA is virtually impossible), relayed on 4855 kHz, and that "harmonized" to 14565 kHz, where we heard it ten years ago.

Play-by-play coverage of special sports events by certain AM stations sometimes appears on SW, where it can be fed to other countries more economically than via satellite. For instance, Bob Zilmer in Wisconsin heard a Cincinnati vs New York baseball game, from WNEW, on 9460 kHz one night around 0245 GMT. The WNEW feed was simply transmitted by an RCA station on Long Island, N.Y., in what's called a "blind broadcast" by a point-to-point station. Such transmissions are often on regular AM (here referring to the type of modulation, not the band; AM can be employed at any frequency, with the standard broadcast band called "mediumwave"), but SSB is preferred if the receiving antenna can handle it. Another such case is 11675 kHz, where Pitt McNeil of Washington, D.C. reports that Venezuelan Radio Continente games are carried on upper sideband.

Mediumwave programs, whether heard on MW, or simulcast on SW, more closely reflect a nation's character and concerns, as they are intended primarily for domestic consumption. International SW programs are designed to put across a certain favorable national image, not necessarily meshing with reality.

South Africa has bought a pair of new 100-kW SW transmitters, for the purpose of relaying the MW "Radio Five" program (which replaced "LM Radio" from Mozambique upon independence). After several false stops, once again all MW transmitters are to be phased-out in South Africa, once the SW is established.

FM and TV Broadcasts. At first, almost all FM programs in the USA were simulcasts of AM. As FM listenership increased, more and more FM-originated programming ensued, by law. Still, you can hear FM stations in some small communities carrying the same programming as their companion AM station, with hardly a mention on the air that FM exists.

In Latin America, the FM band was first used as a convenient way to link an AM studio with its transmitter in another part of town (although we've seen some small Mexican MW stations with the tower on top of the building—and no radials

at all). Some of these highly directional, low-powered anachronisms remain in Mexico, despite an official move to bands such as 170, 217, or 950 kHz for studio-transmitter links. Since receivers covering the FM band can be bought easily by the public, many stations publicized their links proudly as their FM outlet, although there is rarely any advantage to tuning for the FM link instead of the AM retransmission.

We were amused by one enterprising station in Sabinas, Coahuila, which for years has promoted its 173.42 MHz link to the general public, long before low-cost VHF-band portable radios were commonplace (see photo).

Even in Mexico City, many of the FM stations serve this dual purpose, although the trend is toward more and more FM-only programming. But a link that never appeared in the usual lists was on 90.9 MHz there, carrying XEW (AM) programming (not to be confused with XEW-FM, separately programmed on 96.9 MHz). It's so low powered and so directional that hearing it in most of Mexico City itself is more difficult than hearing it 1500 km away via a good sporadic-E opening!

Not only is MW programming to be heard on FM, but also on TV! Those who are closest to the 1500-km arc from Cuba (roughly, Texas to North Caroli-

"The average listener in Europe, where countries are the size of U.S. states, does not restrict his attention to AM only, FM only, or SW only."

na), and have channel 2, 3, 4, 5, or 6 open in that direction, can pick up Cuban TV most often, especially in the summer. TV Cubana programs are not continuous during the day, so while palm-tree test patterns fill the video void, "Reloj Nacional" audio accompanies it. This lively service includes bits of news, socialist homilies, by a man and woman alternating, and highly accurate time stingers every minute. It's actually one of Cuba's several MW networks, transmitted daily on TV too.

During extremely good SW propagation periods, French TV audio can be heard all over the world, thanks to the

low (for TV) frequency of an antiquated 819-line channel, 41.25 MHz. When we heard it, they were carrying audio from a Bordeaux MW station. Perhaps for this reason, no verification was forthcoming. The Soviet Union does this too. We've heard Russian radio programs carried on 56.25 MHz, the audio frequency of OIRT Channel 1.

The top-rated adults-only Mexican news program, "24 Horas," is projected nationally on the TV network of Canal 2, weeknights at 0430-0600 GMT. But it's also carried on XEX (AM), clear channel 900 kHz. Here we have the reverse—a TV program being relayed on MW!

Not only can you hear MW programs on SW broadcast and utility, FM, and even TV, but also on longwave. Many of the superpower longwave emissions from Europe are also carried on mediumwave, although it is our North American point of view that makes us think of LW as duplicating MW, rather than vice versa.

Conclusion. If MW DXing appeals to you, by all means become involved in an MW-specialty club, such as NRC (Box 127, Boonton, N.J. 07005) or IRCA Box 21462, Seattle, Wash. 98111. If SW DXing is of interest, by all means join a SW-specialized club, such as NASWA (Box 13, Liberty, Ind. 47353). And if FM/TV DXing is your bag, there's no equal to WTFDA (Box 163, Deerfield, Ill. 60015). But to keep in touch with a little of everything, try an all-band club such as NNRC (Box 539, Newark, N.J. 07101).

Keep in mind the examples we have given of the unified and interrelated nature of broadcasting, however, lest you become carried away with the arbitrary divisions that have come to be taken for granted in the U.S. DX community.

Perhaps you don't have the time, or the equipment, to be interested in everything at once. Nevertheless, you can change your emphasis every few years as the spirit moves you; or concentrate on each aspect when its particular frequency range is most productive. The average listener in Europe, where countries are the size of U.S. states, does not restrict his attention to AM only, FM only, or SW only. Multi-band radios are commonplace and the listener chooses whichever band delivers best the count he wants to hear at a particular time. The same attitude carries over to those who go into radio listening deeply enough to be called DXers. It's a holistic outlook American DX listeners could emulate. ◇

Good Listening and Rare Catches

frequency away from genuine signals. To combat these problems, double or triple conversion is used, in which the incoming signal is converted to two or three different frequencies for processing. Such receivers are free of spurs and offer improved sensitivity and selectivity thanks to the added conversion stages.

When looking at solid-state receivers, it's wise to see if the receivers use field-effect transistors (FETs) or similar devices such as MOSFETs. FETs have better signal-handling capability than ordinary transistors, and are less prone to produce overloading and cross-modulation problems. As mentioned earlier, these have become major headaches for the SWL in this day of proliferating superpower transmitters.

How Good Are Portables? Many long-time SWL's still have a great deal of disdain for portable receivers. And, until recently, such an attitude has been justified. Portables have traditionally been beset with a variety of ills, such as wall-to-wall images, poor selectivity, and difficult tuning. Combined with wildly inaccurate calibration, finding a desired station on such receivers was a Herculean task. But now portables are being introduced that offer features and performance that rival some communications receivers.

The first "new generation" portable introduced was the Barlow-Wadley XCR-30. This receiver uses the Wadley Loop circuit to provide accurate frequency readout and excellent sensitivity throughout the shortwave spectrum. An upsurge of interest in SWL'ing in Japan prompted both Sony and Panasonic to introduce their own shortwave portables. Both the Sony ICF-5900W and Panasonic RF-2200 employ double conversion and a highly-refined main tuning dial and bandwidth which can give accurate frequency readout to approximately 10 kHz. More manufacturers are expected to introduce their own "new generation" portables in the near future.

Most SWL's agree that no portable can give completely satisfactory service as a primary listening receiver. Yet such receivers are ideal for the SWL who is interested only in receiving high-powered stations such as the BBC and Radio Moscow, as well as for the SWL that travels frequently. They also offer an ideal way to get started in SWL'ing at a low cost, which should appeal to those who are reluctant to make a large investment in SWL gear until they are sure that they are "hooked" on the hobby. ◇

mode switch will be a good investment. If you are perhaps interested in amateur radio, you will find a receiver with a narrow bandwidth for CW, about 500 kHz or so, to be very useful.

Some receivers today will accept virtually any sort of antenna input. Such receivers will usually have a screw terminal antenna connector and an antenna trimmer control to properly match the antenna to the receiver. Other receivers have a coaxial input designed for 50-75 ohm unbalanced coaxial cable. When using such receivers with random wire antennas, an antenna tuning unit, such as the type used by radio amateurs, will be necessary for maximum performance. These are widely available for less than \$50.

New or Used? While most SWL's buy their gear new, it is possible to find true bargains in used equipment. Sometimes used equipment is actually preferred to new, as evidenced by the popularity of old Hammarlund Models HQ150 and HQ180 receivers among broadcast band DX'ers. Many equipment dealers have used receivers taken in trade on new equipment. Hamfests are another good source of used receivers. Military surplus also provides some bargains, with many SWL's considering the military R390A/URR receiver to perhaps be one of the finest shortwave receivers ever made.

But, there are pitfalls to avoid when buying used equipment. One should have a written guarantee from the seller if at all possible. Failing this, prior to purchase, the receiver should be inspected by a friend knowledgeable in radio. Then there is the matter of replacement parts for certain sets, which are becoming increasingly difficult to find. Vacuum tubes are virtually impossible to find for certain receivers. Finally, many older receivers are plagued with frequency drift, a problem almost unknown among today's new models.

Circuit Details. Two points in receiver design are worth looking for when comparing models. Conversion is the process of changing a radio signal from the antenna to a fixed frequency, such as 455 kHz, where it is processed and converted into audio output for your speaker or headphones. The simplest receivers use only single conversion, usually at 455 kHz. Such receivers can deliver good performance, but are often afflicted with images—spurious signals located at multiples of the conversion

the standard broadcast band due to the nature of the circuit. Popular receivers employing this system include the Drake SSR-1, Yaesu FRG-7, and the Barlow-Wadley XCR-30.

Other Features. Many receivers today come equipped with an automatic noise limiter (ANL) circuit. Unfortunately, such circuits are often designed for maximum effectiveness in the SSB mode and do an inadequate job in the AM mode. Such limiters work by clipping the peaks off noise pulses but not noise that's part of the transmitted signal. Yet such circuits are often quite useful for SSB and CW operation.

A more elaborate noise suppression circuit is the noise blanker. This circuit squelches noises within the signal momentarily. The action generally takes place so quickly, that one cannot hear it operating. These are more effective in the AM mode than limiters and do a superior job in the SSB and CW modes. Along with their increased effectiveness is a larger price tag. If not incorporated in the receiver, they are available as an add-on accessory.

Another useful feature is a variable automatic volume control (AVC). The AVC functions to keep the receiver's gain wide open for weak signals and to prevent blasting volume when a stronger signal is suddenly tuned. Variable AVC is most useful for coping with rapidly fading signals caused by, say, propagation conditions. Thus, there could be a slow and fast AVC position.

Virtually every shortwave receiver today comes equipped with some sort of beat-frequency oscillator (BFO) for reception of SSB and CW signals. If you plan to do a lot of listening to SSB and CW, a receiver with selectable sidebands (USB and LSB) positions on the

Most SW receivers today have BFO which, with selectable sidebands and a clarifier, permits reception of ham broadcasts.

SHORTWAVE schedules, frequencies, and programs are constantly changing. We've tried to pick some of the more stable stations, but for the latest information, listen each week to the DX Digest on Radio Canada International's Saturday or Sunday broadcasts.

All frequencies are in kHz, and times are GMT, unless otherwise specified.

1614 Eastern Crete is served by a 1-kW station here signing off at 2100. Would be a very rare catch in North America on a frequency some consider shortwave, some consider medium-wave.

1620 WDDX is a pirate in New York City with a phone-in format; irregular schedule; heard at 0120; 2200-2247.

2200 La Voz de la Victoria, Managua, Nicaragua, puts in a good signal almost every evening until 0300 or so; a very reliable second harmonic. Informal ID is "La Líder"—The Leader.

2490 Radio Educação Rural, Coari, Amazonas, Brazil. This 250-watt station was heard in Puerto Rico, closing at 0230. With luck it can make it to the mainland.

3275 Radio Mara, Venezuela, has an Arabic program called "La Voz del Mundo Árabe" for oilfield workers, heard at 2335-2405.

3290 Tristian Radio says it has issued only one or two QSLs to convincing reports: The reason—power is only 40 watts. Schedule is 1900-2205 on Wed., Fri., Sun. only. There's a chance *Tristan da Cunha* will get a 500-watt transmitter.

3320 Radio Five is South Africa's successor to LM Radio which used to operate from colonial Mozambique. Not hard to catch, with 100 kW, signing on at 0300, off at 2200.

3380 MBC, Blantyre, Malawi, should make it whenever Radio Five does. Also 100 kW, in a mixture of English and Chichewa, at 0245-0520.

3988 New Directions Radio is an SSB net proving that ham radio can delve into substantial topics such as alternate sources of energy, religion, futurism. Check this frequency in the Midwest at 1978 EDTION

2000 Central Time on Sun., Tues., Thurs. For a complete NDR schedule, send an SASE to Randy Brink, 1174 S.E. Fern Rd., Port Orchard, WA 98366.

4115 If you can get past the marine traffic around this channel, you may hear a Brazilian broadcaster called *Rádio Difusora*, Cruzeiro do Sul, in the frontier territory of Acre. Best time is around 1000 hours.

4740 If you dig the "Triumphal March" from Aida, check for the East European spy station which plays it over and over when not reading out numbers. Heard at 0341 and at 2045. See also 6675.

4750 Radio Bertoua is a new regional station in the Cameroons, closing at 2032.

4780 Surinam made a shortwave comeback a year ago. Sometimes there's English around 0300. The frequency can vary and interference can be heavy. You may have better luck with the mediumwave parallel of 725 kHz. TV sweep harmonics permitting.

4844 Radio San Ysidro, Honduras, is a rare catch because it operates only during religious festivals. Try for it around Easter and Christmas at 0100.

4880 Voice of Kawthlay is an anti-Burmese government clandestine recently reactivated. It opens Thurs.-Sun. at 1130 in native languages, and has English at 1300-1330 on Thur. and Fri.: 1330-1400 on Sat. and Sun.

4980 A new pro-Burmese government station is heard at 1030-1330. I'd like to think it's in Mandalay, which has lacked a radio station far too long. Jayapura, Indonesia is also using this frequency now.

5920 & 5945 Radio Nacional, Nicaragua, periodically becomes active on one of these frequencies. Sometimes broadcasts for 24 hours.

5980 Greenland Radio is a tough one because of low power and interference. Check at 2130, and by 2230 for a parallel on 3989 kHz.

6080 BRT, Belgium, has a lively English show hosted by David Monson, at

0015-0100. Includes a mailbag two days a week, with transcripts sent out to those called.

6100 Deutsche Welle announcers jibe at the management for allowing them only 20 minutes for English to North America. At 0130 this is via Malta; at 0530 from Germany direct. Other nearby frequencies are probably better.

6130 "New York, New York" is one of VOA's most entertaining programs. Previously hosted by Ben Grauer and Garry Moore, Arlene Francis is now in charge. Check this frequency GMT Sundays at 0130. It's on many other Saturdays at 1130, 1530, 1830, 1930.

6159 Radio Miramundo, Guatemala, can be heard around 1215. Or, try 2040 kHz for the second harmonic of medium-wave 1020.

6550 A clandestine with commercials? The phalangist Voice of Lebanon runs to 2100 and makes it to North America during the winter. Watch out for Radio Peking on the same frequency.

6675 Heard the "Aida" station here at 2313-2320. See 4740.

7085 Radio Abdala is the only anti-Castro clandestine we know of at present. Check Sundays at 2300-2345, Tues. and Fri. at 0200. Frequency varies slightly. Modulation can be awful. Theme music is from "2001: A Space Odyssey". CW hams really cut it up.

7105 BBC African Alternative attempts to provide a general home service for an entire continent from outside! This and another Ascension relay frequency, 9580, operate at 0330-0400 with African news and "Network Africa" Mon-Fri, "This Week and Africa" on GMT Saturdays, and "Postmark Africa" on GMT Sundays.

7120 Radio Peking is relayed from Albania at 0100 and 0300. Watch this variable frequency for a hint of the state of relations between China and Albania.

7210 International Committee of the Red Cross, Geneva runs regular tests every other month. English is on Mondays, March 27, May 22, July 24, September 25, November 20, 1978, at 0600,

1130, 1700, 2200. A special QSL card goes to listeners outside Europe.

9090 CFRB, Toronto, sometimes puts out a ninth harmonic from 1010 kHz, and a tenth on 10100 kHz. Reception can be better here than on the intentional SW outlet of 6070.

9475 Radio Cairo, the only Arab world station consistently heard in English in North America, has lots of interesting programs and good music. Daily at 0200-0330.

9600 Radio Tashkent provides a refreshing alternative to *Radio Moscow*. In English at 1200-1230 and 1400-1430. In summers they go up to the 11 and 15 MHz bands. The programs intended for India reach us via the north or south poles.

9610 ABC, Perth. With *Radio Australia* becoming more and more a music and news station, we must listen to domestic Australian radio for programs of substance. This service for the Outback puts a good signal into North America from one of the most distant points on earth. Listen in the mornings until 1600 GMT (or 1500 if Western Australia is on summer time).

9610 Voice of Revolutionary Ethiopia may interfere with Perth. English has been re-scheduled several times. Try at 1700-1800 over this transmitter formerly owned by *Radio Voice of the Gospel*.

9625 Tops for good listening is the *CBC*, via its Northern Service. Also widely audible elsewhere. It runs from 6:30 a.m. past 1:00 a.m. Eastern time. Tune for humor and drama Mon.-Fri. at 8:05 p.m., followed by 90 minutes of a different musical genre each night. Other *CBC NS* frequencies are 6065, 6195, 11720. For a complete schedule, write to *CBC NS*, Box 6000, Montreal, PQ Canada H3C 3A8.

9705 Radio El Mundo, Argentina. This channel is more seldom reported than 6120 and 11755. The station may become more active once government control is lifted from it, *Radio Splendid*, and *Radio Belgrano*, as is reportedly planned.

9745 Radio Cameroon International is a new one, operating around 1630-1830, sometimes including an English program called "Mixed Grill."

9770 Cyprus has an external service for Greek Cypriots living in Britain, appropriately via BBC transmitters in Cyprus. Listen for the distinctive ID signal at 2210 Fri., Sat., and Sun. only, followed by a 15-minute program at 2215. Frequencies often change—at one time 6155 and 7230 were also used.

11645 Radio Hargeisa, Somali Rep., is a perennial DX target, difficult because of interference, propagation, power and language. Try for it around 1500. Frequency varies.

11700 Rudy Espinal is the most jovial, informal compere on shortwave. Listen to his "This is Santo Domingo" program from *Radio Clarin* at 2130-2200 and 2300-2400. A shift to 11985 kHz is possible.

11710 RAE, Argentina, has such a distinctive sound that you can soon recognize it instantly. The English program at 2300 avoids the political and plays up the cultural in lots of brief segments interspersed with tangos. Mon.-Fri. only.

11730 Voice of Greece provides a great deal of fine Greek Music in the mornings and evenings, in addition to English news at 1215, 1515, 0015, 0215.

11805 Radio Globo, and a huge number of other private Brazilian SW stations are due to be taken off the air, with only government stations remaining. It may already have happened. SW will never quite be the same again without this and several other 25-meter band Brazilians heard in the evenings with their music and sports and fantastic enthusiasm.

11860 ELWA has a brief Liberian news summary in English at 2115, just before signing off.

11885 SODRE, Uruguay, unexpectedly began an international service in 1977. Mostly Spanish but some English at variable times—if you can get past WYFR on the same frequency. Try 9515 too, in the evening hours.

15105 Radio Finland In Its Sunday Best is the title of a weekly 90-minute magazine at 1325, following the daily 1300 broadcast. This may not last, as Finland has been ordered to cut its external service in 1978 by a thousand hours.

15130 Voice of Chile is adding more and more transmitters and antennas for an expanding international service. This is a widely heard frequency in afternoons and evenings. Let's hope they do better than their repetitive 20-minute segments so far.

15190 RTVC, Brazzaville, Congo carries some clandestine programs, such as "The Voice of Namibia", Mon.-Sat. at 1630-1645. RTVC also has news in English at 2130-2145.

15270 Radio Japan's English hour at 2345-0045 includes an excellent summary of Asian news at 0035.

15300 "Paris Calling Africa" is the

only English program from France, at 1706 in winter, 1606 in summer, on this and several other 19-meter channels. A very lively show—the mailbag reveals they have lots of listeners outside Africa.

15308 Conakry, Guinea recently reactivated this variable channel, which causes a lot of interference to 15305 and 15310 stations. At times it may be in the clear during the afternoon, for some West African music.

15400 Radio Nacional, Venezuela has an English program at 2200 that is sometimes off the air for months at a time.

15470 You'll probably hear a huge multiplexed utility signal of strange disagreeable noises here most of the day. It's from Guantanamo Bay, Cuba. If you can bear it, sometimes SSB phone calls are included from GIs stationed there to their gals back home. It's OK to listen, as long as you don't repeat what you hear.

17790 Radio Sweden moved here last December from 15305 for the 1400 broadcast. This is a sign of the steadily increasing sunspot count. *Radio Sweden* never fails to come up with interesting programs from the Nordic angle. There's a stamp competition the first Monday of each month, DX program on Tuesdays, mailbag on Sundays.

19860 Radio Santa Fé, Colombia, is a regular in darkness on 4945 kHz, but when the skip is right, it's a regular in daytime on the fourth harmonic.

21455 Radio Liberty now uses this frequency in the mornings, but you'll be lucky to hear anything besides jamming. In the afternoons and evening, *Radio Australia* is here—sometimes the only signal on the entire 13 meter band.

21490 Radio Free Australia was a low-powered hobby pirate station heard in Australia last year around 1200. Should it operate in our evenings, it could make it to North America. A little power can go a long way on this band, just as on 15-m ham.

21510 RAI, Italy has play by play coverage of the soccer championship games on Sundays only during our morning hours. Also on 21630.

21604 & 21685 Radio Kuwait's Arabic home service puts in a strong signal until 1305 and 1510, respectively.

24780 BBC World Service puts out a small signal here as the fourth harmonic of the 6195 kHz transmitter on Antigua. Many afternoons, propagation conditions allow it to be heard strongly enough for casual listening. Under even better conditions, the fifth harmonic can be heard on 30975.