

DXING ON THE ROAD

A Compendium of Advice, Tips and Techniques

Rowland Archer

INTRODUCTION

Our radio hobby has a nice tie-in to travel. Even a small change in geographical location can make new stations audible. One time zone east or west of your QTH exposes you to a new grayline. Travelling to the opposite coast radically changes DX opportunities. A business trip or vacation to another continent can give you a chance to hear new radio countries, or enjoy local quality reception of your favorite DX targets.

All this sounds good on paper — then it comes time to travel. You stroll over to your shack and stare at the array of equipment: receivers, antenna tuners, tape decks, audio processors, headphones, and bookshelves full of reference material and old DX bulletins. What should you bring along? How should you pack it? Will power be a problem? The answers will depend on where you're going, how you're getting there, how long you're staying, and what you want to hear.

Whatever your plans, you should get organized well in advance, and this article is full of ideas that will help you. You probably know the feeling of arriving at your vacation Shangri La and discovering that you forgot to pack a bathing suit or bring your fishing pole. It's a pain, but you can buy or borrow one at your destination, and your vacation isn't ruined. However, just try buying a spare **DSWCI Tropical Band Survey** or **Passport to World Band Radio** if you forget to bring a station list along — that's not so easy!

Recognizing that DXing on the road has special requirements, I wrote up my experiences in the *DXer's Forum* column in the *NASWA Journal*. Response was good, and we decided to expand on the subject for **Proceedings '90**. The interest in this topic is strong, and I'd like to thank all the contributors for helping out with a great variety of information. The following compendium combines the new contributions with items from my *Journal* article, contributions to last year's *Proceedings*, and a contribution to the *Journal* by Dan Sheedy.

PACKING

KNAPSACKS: My travelling DX shack fits easily into a knapsack, with room left over for a few books and some snacks for long bus rides. The radio and tape recorder are each wrapped in a shirt or pair of pants, both to protect them from being kicked around, and to assure me of dry clothes upon reaching my destination (bus drivers aren't always efficient at covering rooftop luggage with the canvas tarp).
—Don Moore

SHOULDER TOTE BAG: My whole kit weighs about twenty pounds, and fits in a shoulder tote bag. I wrap the radio and tape recorder in terry-cloth towels for two reasons: first, it cushions impact, and second, if something should get spilled into the bag, the machines won't suffer from it. —Gerry Bishop

CASSETTE CARRYING CASE: Cassette tapes are the first choice for take-along music, and a wide variety of cassette cases are available. Included among these are a type of soft-sided travel cases that have a removable, rigid plastic insert that accepts 30 to 40 cassettes.

With the plastic insert removed, these sturdy Nylon (or leather) travel bags can easily transport a Sony 2010 receiver (or similar), AC power adapter, reference books, notebook and pen, and other such supplies.

Last year I spotted the "Musicmovers" MM-300 series of cassette cases at a local drug store chain on sale for \$6.99. I bought three for storing and transporting DXpedition supplies. It wasn't until my next vacation that I thought of using one as a DX travel bag. Measuring 13-1/2 by 9-1/2 by 5 inches, the MM-300 series of bag has a main compartment, two smaller pouches, a detachable shoulder strap, and a briefcase-like soft "rip-stop" Nylon handle.

These bags are well made and incorporate a layer of sheet foam rubber in between layers of Nylon cloth on the sides. This helps protect the contents.

With careful packing, it is surprising how many DXing accessories can fit into this case. In addition to the supplies mentioned above, I can bring along Walkman-type headphones, small cassette recorder & a tape or two, and the very compact AC-1 active antenna made by Inline Components Inc. I've replaced the AC-1's 9vdc power adapter with a 9vdc transistor battery & clip, which is mounted on the side of the AC-1's enclosure. This way I can leave the bulky power adapter at home.

I've noticed other similar cassette cases made out of leather, which sell for around \$20.00. These may or may not have the internal foam padding. Whichever type you purchase, I'm sure you'll find these converted cassette cases to be a good low cost alternative to DX travel bags sold through SW supply houses. —*Guy Atkins*

ULTIMATE UNDER-SEAT BAG: For years, I've searched for the perfect under-seat bag—a light/strong bag that would allow me to carry my 525, MAP unit, log books and references right thru security and on the plane with me. Finally, I have found it: The Back Door Convertible Suitcase/Rucksack is specially manufactured by world traveller and travel book author (Europe Through the Back Door, etc.) Rick Steves. Over 15,000 of these beauties have been made/sold in the past few years by Europe Through the Back Door, Inc. (120 4th Ave. N., Edmonds, WA 98020. Phone 206-771-8303). At 9" x 21" x 13" it's the absolute maximum allowed carry-on size for most airlines. The dimensions are also perfect for the 525, the MAP, the headphones and various logs. That is enough of a load that the "secret compartment" shoulder straps are VERY welcome. The Back Door bag is made of rugged water-resistant Cordura nylon (1000 Denier). It converts easily from a smart looking suitcase to a handy backpack. It has a large main compartment and two outside pockets that are perfect for logs or reference items. And when you're not using the shoulder straps for the backpack, you don't have to worry about them—they hide away in the zippered secret compartment in the back!



Rick himself lives out of one of these bags for 3 months each summer. The perfect

Back Door Convertible Suitcase/Rucksack

bag for the Travelling DXer includes these features:

1. Handles on top and side for easy carrying as a suitcase.
 2. A "secret" compartment for rucksack shoulder straps.
 3. A clip-on shoulder strap for use in the suitcase mode.
 4. Water-resistant and machine-washable tough material.
 5. Lockable perimeter YKK zippers for easy access.
 6. Four colors available (gray, navy, black, burgundy).
 7. Extra nylon stuff bag included.
 8. Two extra elastic-topped interior compartments.
 9. Two-year manufacturer's guarantee.
- Price: \$65.00 (no tax or postage add-ons)

I am hesitant to recommend a non-radio commercial item, but this is simply the best underseat bag for our kinda folks....period! and the price is right, too! —*John Bryant*

PORTABLE COMPUTER CARRYING CASE: I travel mostly by air, and I prefer a bag that I can carry on to the plane. I found a portable computer carrying case works well. It's a cloth-covered bag, 12"W x 14"H x 5"D, padded, with a front and back compartment, pockets for cassette tapes, and a convenient carrying handle. I put the receiver, tape recorder, and active antenna in one compartment, and the reference materials, cables, spare batteries, and blank tapes in the other. A stiff-sided bag with padding will protect your equipment much better than a soft nylon carry-all sack. If you have to ship your gear as checked baggage, a metal case such as those used for photographic gear is best. These are expensive. An alternative is to use plenty of padding in a hard-sided suitcase. —*Rowland Archer*

BEAN BAG: I only take carry-on luggage. I bring a Sony 2010, the supplied 20' of wire, MDR20 headphones from Sony, a clock, a notebook, and a couple of pens with highlighter attached, my DX target list, and the MW frequency and Latin American sections from the WRTH. This all fits in an L L Bean "Deluxe Sportsman's Seat Bag" with plenty of space left for clothes, toilet articles, tickets, etc. —*Dan Sheedy*

TRAVELLING

LEGALITIES AND CUSTOMS: If you're travelling abroad, do some homework first to make sure your radio gear is legal at your destination. Some countries place restrictions on what their citizens can hear, and you could unintentionally run afoul of such laws. Many country guide books include information on travelling with radios, tape recorders, and portable computers. The most up-to-date source of information is the embassy of the country you will visit.

Many countries have stiff import and export duties on electronic equipment. Take the receipts for your equipment with you so you can establish where you purchased it. It may help to register the equipment with customs on entering the country and clear it with them on leaving. Check with the embassy for guidance before you start your trip. —*Rowland Archer*

BORDERS: I have never had a problem taking my Sony across borders. Few customs officials have unpacked my bags enough to uncover it, and those who have ignored it. Yet, as I frequently cross borders at out-of-the-way places, I sometimes worry about what the officials will think of it. Digital push-button radios could become a lot of things in the minds of semi-literate border guards raised on a steady diet of James Bond movies. Before crossing a border, I always preset the memories to local AM stations at the crossing point. Hopefully that will calm anyone who finds the radio suspicious. —*Don Moore*

POWER

BATTERIES: Hotel rooms are chronically short of spare electrical outlets. My solution is to use battery-powered equipment. I carry extra batteries, as I don't want to run out of power at 4AM local time in the middle of a great listening session. I don't like the weight of the spare batteries, but then I can dispense with heavy AC adapters. I do like the quick setup — no scrounging around the hotel room rearranging lamps to free up outlets, or discovering that my extension cord is too short. —*Rowland Archer*

VOLTAGE CHECK: For short trips it is possible to carry enough batteries to last the vacation, but for longer, or more DX-intensive trips, that's clearly impossible. Alkaline batteries are imported and expensive in most of Latin America, so I use AC for the Sony whenever possible. There is an easy way to check the voltage of an outlet. If your room has a lamp, check the voltage of the bulb. If it says 220 & you plug it in to 110, it will be very dim. If you plug a 110 bulb into 220, it will light up very brightly for a fraction of a second. If there's no lamp in your room, borrow one from the hallway. Do not rely on the voltage of a ceiling light; sometimes they are on separate circuits. —*Don Moore*

WORLDWIDE PLUG/SOCKET STANDARDS: It always seems tough to get accurate information about the voltages and plug patterns before travelling abroad, much less locating the proper adapters. A comprehensive guide appears in a catalog published by Panel Components Corporation, P.O. Box 6626, Santa Rosa, CA 95406. The guide is reprinted at the end of this article. Panel Components has a toll-free order line, 1-800-662-2290. —*Gordon Darling*

ANTENNAS

HOOKUP WIRE: I use 50-75 feet of hookup wire for an antenna. Insulated antenna wire is a must, and the way Theresa and I travel, it does double duty. Self-service laundromats are unheard of in most of Latin America, but most cheap hotels have facilities for doing laundry by hand. However, few have adequate clothesline space for all their guests, so our drying-clothes get draped over my antenna wire, which is strung across our room. Tile and cement floors are a definite advantage here.

At least for the cheap places we stay at, the hotel's location usually doesn't have much effect on reception. I had surprisingly good reception in downtown Quito, Lima, and Asuncion. However, the room's location in the hotel can make a difference. Basically, the higher the room, the better. Also, it should have a window. Many cheap hotels have windowless inner rooms, which are considered safer and therefore more frequently given to foreigners.

Besides asking for a room on the top floor, a good trick to improve signal strength and get away from manmade QRN is to DX from the hotel roof. In cheap hotels, it's easy to get to - usually that's where the clotheslines are. It's just a matter of stringing up the antenna wire, and, of course, bringing along a flashlight. An alligator clip can be used to attach the wire to a support, or to spouting or metal pipes that might serve as antennas. —*Don Moore*

INLINE COMPONENTS AC-1: In early 1989, I heard a rumor about a new indoor active antenna at the unbelievable price of \$30. Rich Arland, who is well known for his equipment reviews, swore by the AC-1 from Inline Components. Besides the price, he was impressed by the extremely broad-band performance of the AC-1. It is a reasonably good MW antenna and yet gives FM signals a real boost, too. On short wave, it is often the winner when I compare it to a 60' random wire antenna!

The AC-1 consists of a very small amplifier housing (a 2" x 2.7" x .75" plastic box) and the antenna element itself—a meter of multi-stranded wire. The wire has a hanging loop at the end. The basic idea is to attach the antenna element to an outside window with a suction cup (supplied) after determining the best location. Opposite the antenna element, two other meter-or-so long cables emerge from the case. One of these is the power cable. It may be attached to a 9v plug-in power module or you may use a 9v battery with an attached 1/8" male jack. Guy Atkins went the 9v battery route and attached a

standard battery clip to the back of the main case. Guy also installed an AC-1 module internally in his 2010. (See the 2010/2001D article elsewhere in Proceedings 1990).

One word of caution: it may be possible to "blow the very fragile front end" of the ICF-2010 with the AC-1 or any other antenna plugged in to the ports on the left-hand side of that otherwise fine receiver. You should protect the fragile FET as discussed in the 2010/2001D article before using ANY antenna with that receiver.

I heartily recommend the ICI active antenna, Model AC-1. It is small enough to be rolled up and put in your pocket while travelling and can have you listening/DXing within seconds of walking into the hotel room.

Inline Components, Inc. 4521 Campus Drive, #113, Irvine, CA 92715. —*John Bryant*

WINDOW AND BALCONY ANTENNAS: DX'ing through the concrete and steel walls of most modern hotels is a challenge. I have observed a dramatic difference in reception in hotel rooms when comparing the whip antenna and a 20' length of random wire. Reception improves again when I add a properly tuned active antenna/preamplifier to the 20' wire.

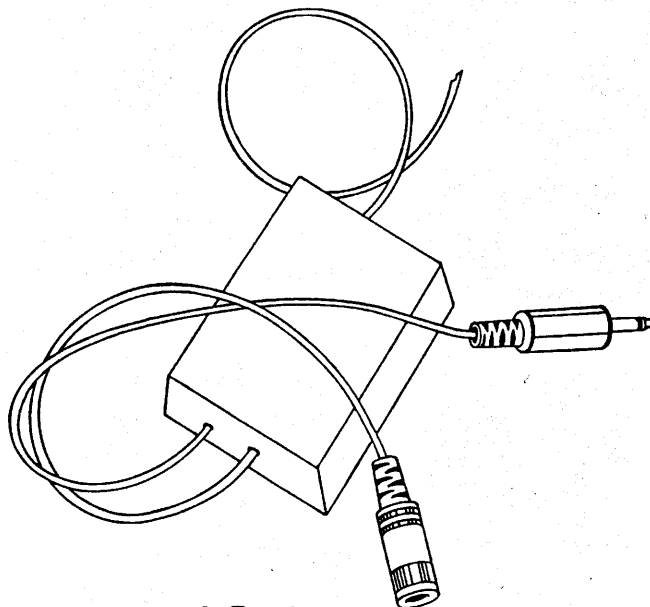
I use the insulated hank of wire that Sony packs with the ICF-2001D, feeding an MFJ-1020 active antenna/preamplifier. This wire seems to resist knotting and tangling; it's 18 gauge stranded copper wire covered with plastic insulation.

Placement of the wire is critical. If you can't open your hotel window, the best thing is to run the wire up along the top of the curtain bar, looping around the window. Set up a table near the window and make sure the end of the wire reaches it. If the room has sliding doors to a balcony, run the wire out to the balcony and loop it around the railing, as inconspicuously as possible. Be careful that the sliding doors don't wear through the insulation and ground out your antenna. —*Rowland Archer*

WINDOW STRIPS: Here's a solution I have found to be useful in getting a portable antenna out the hotel window when on vacation with my Sony 2010.

I have used a method as old as radio itself that may not be known to some of the younger DXers. In the 1930's, all radios had to use an outdoor antenna. One of the common methods of bringing wire inside the house was the use of a window strip, available in all radio supply houses. It was a flat, insulated copper strip about ten inches in length and with a copper spring clip attached to each end. The strip was thin and flexible enough so that most windows could be closed over it. The antenna wire is attached to the clip protruding outside and a short lead to the receiver is attached to the inside clip.

I made good use of one of these strips when my wife and I spent a holiday at a motel in Carmel, CA. I found that the motel window opened with a crank and there was a screen over the window on the inside. The screen was removable, so I was able to put the strip in place, crank the window shut and then replace the screen. —*William S. Sparks*



AC-1
Active Antenna

STRANDED WIRE PLUS GROVE TUN-3: I have a short length of insulated, stranded wire which I drape around the room to use as an antenna. This is attached to the radio through a Grove Tun-3 mini tuner and a short patch lead (also insulated stranded wire). I have had no problems with overload or spurious signals. —*Stephen H. Ponder*

PORTABLE BEVERAGE ANTENNA: I use an orange plastic "cord wheel", sold for storing extension cords, to hold 1000' of twin conductor, 24 gauge, insulated speaker wire. The unit is 10 1/2" in diameter at the outer rim, and fits together with a 2' long ground rod in my folding carry-on suit bag.

To set up this antenna:

1. Find 1000' of straight road pointed within plus or minus 20 degrees of the Great Circle Route to your DX target area. The road should be lined with weeds ranging from knee to waist high or trees with fairly low branches or both.
2. Park your car where you want to use it as a portable DX shack. Attach the antenna firmly to the car, get the ground rod and cable reel and walk down the road until the antenna is fully unwound.
3. Put the antenna under about 15 pounds or so of tension. Put the ground rod in the ground and tie the antenna mechanically to the base of the rod. Make the electrical connection to the rod through a 560 ohm resistor.
4. You now have the Beverage on the ground, under a moderate amount of tension, stretched between the car and the ground rod. Walk back to the car picking the wire up and tossing it on top of the road-side bushes. It's best if the wire doesn't touch the ground, but mine often does in a couple of places. That's another reason for using insulated wire.
5. When you get back to the car, clip your antenna lead on to the near end of the beverage and DX away.

This antenna's characteristic impedance will be in the range of 500 to 600 ohms. If you use coax as a lead-in, or if your receiver has only a 50 ohm antenna input, you should fabricate an impedance matching transformer. These are covered in the Proceedings 1988 article by Hall-Patch and Bryant. You are cautioned that running a 500-600 ohm Beverage into 50 ohm impedance causes signal loss of about 10 DB.

I know this system sounds too easy, but it works magnificently. It receives DX signals at least as well as my much more sophisticated, permanent Beverages. —*John Bryant*

RECEIVERS AND ACCESSORIES

SONY ICF-7600D: My favorite travel receiver is the Sony ICF-7600D (a.k.a. 2002, 2003). The 2010 is much too big for constantly hopping from bus to bus with a duffle bag and knapsack. The receiver is supplemented with a small cassette recorder (a digital counter is a must), blank cassettes, and *two* of all needed cables and adapters. Outside of major cities, replacements can be hard to find. Rather than carrying headphones, I take two earphones and a Y-adaptor. It's more compact, and allows Theresa and I to both listen to the radio without disturbing others. Some of these small items fit nicely into 35mm film canisters. —*Don Moore*

SONY ICF-2001: My kit is a SONY ICF-2001, a 50 foot spool of 22 ga stranded antenna wire, a Radio Shack Minisette II tape recorder, two earphones, appropriate jack adapters for the headphones, and spare batteries.

Finally, I've just learned that a flashlight, a simple two cell penlight, can be valuable. For example, when turning out the noise-making lights found in hotels worldwide, DX can be tricky. The penlight saves eyestrain when checking the books.

I carry about a dozen 90 minute blank tapes. —*Gerry Bishop*

TOSHIBA RP-F11 AND MAGNAVOX D-1875: I use two small portables for DX'ing on the road. The first, a Toshiba RP-F11, which I purchased at a local hamfest for \$30 (including the AC adapter), has been used for medium-wave DX (I'm also an active member of the NRC). The other portable is a Magnavox D-1875 purchased for around \$50. Unlike the Toshiba, the Magnavox has an abbreviated LW band (155-265 kHz). Its SW coverage is also more limited than the Toshiba (it does not begin until 5.95 MHz; the Toshiba includes the 60, 75, 90 and 120 meter bands). I have not used the Grove Tun-3 setup with the Magnavox because it does not have an external antenna lug. —*Stephen H. Ponder*

SONY ICF-2001D: (ICF-2010 in the US) I use this rig on the road when I want to go after serious DX but I don't want to have to haul the NRD-515 with me. It's very sensitive, has digital readout and memories, and does a nice job with ECSSB, very handy for separating packed-in DX targets. I find this rig offers an excellent balance between size and performance. There are smaller and lighter rigs that work well for SWL on the road, but the 2001D can really DX.

I always carry a tape recorder so I can record my DX for later ID checks and reception report program details. A portable recorder with an AUX input is ideal, as the MIC input usually overloads if you drive it with the headphone output of your radio. An alternative is to use an attenuating cable, available at Radio Shack. I prefer a recorder with a tape counter so I can note the counter value at probable ID's for later re-checks. Auto-reverse is also nice, along with a locking fast forward control. —*Rowland Archer*

REFERENCE MATERIAL AND LOGGINGS

WRTH FREQUENCY LISTS, DX EDITORS, ENGLISH NEWS: I take along the back-of-the-book WRTH frequency list, at least up through 10MHz. This is either torn out or photocopied. I also photocopy the country sections for the region I'm visiting. Several weeks before leaving, I begin going through recent issues of *Fine Tuning*, *Numero Uno*, the *NASWA Journal*, etc. and taking notes on anything interesting. Usually the relevant info can be condensed to two or three pages.

I also include the addresses for Glenn Hauser and other DX editors to mail my DX news to. Blank log sheets and note paper complete my DX resources. In addition, I would never go anywhere without a current list of English broadcasts & frequencies. Not only is such a list useful for entertainment listening, but if natural or political disaster strikes, knowing where to find BBC or CBC news quickly could be life-saving. All these items easily fit into a pocket folder. —*Don Moore*

TARGET LIST: For MW DX'ing I carry the *NRC Domestic Log*, which I try to keep updated through club bulletins. For SW DX'ing I usually have an older copy of the WRTH. I always try to have a separate list of my 'target stations' arranged in frequency order. Many times I have sheets of info photocopied from *DX News*, *NASWA Journal*, *Monitoring Times*, and/or *Popular Communications*. I find the 'by-time' Sundstrom listings in the *NASWA Journal* to be of immense help.

I carry a tablet of paper to use as my log while on the road. I use one sheet of paper for each station heard. When I get back home, I write my reception reports and file these log sheets by frequency in my master notebooks. —*Stephen H. Ponder*

IDENTIFICATION AND TARGETS: My reference materials include both current and archival DX information for target setting and tentative identification. It's best to take what you normally use. I pack a copy of *Passport to World Band Radio*, and the *Danish Short Wave Club's Tropical Band Survey*. I supplement these with the last few issues of *fine tuning* and the *DX Spread*, and perhaps some target-region oriented reference material, such as the *fine tuning Indonesian Survey*. Finally, I add my own current station target list. —*Rowland Archer*

VISITING STATIONS

If you're going to do some travelling in Latin America, or anywhere else for that matter, you might as well do a little "door-to-door DXing" and drop in on the local broadcasters. Theresa named it that one day while we were roaming the streets of Chota, Peru in search of Radio Acunta. Usually, though, it's not too difficult to find local radio stations. They are usually downtown, even in the largest cities. If looking for a particular station, a good place to ask for directions is any other radio station you come across. Everybody knows where the competition is located.

Most stations will be quite excited with a foreign visitor. Lack of interest usually indicates an over-worked staff. After introducing myself, I always ask to see the manager. It's not always easy to see the manager, though, especially in the larger more professional city stations. It may be necessary to make an appointment and come back. Usually in that situation, I just visit with whomever is available; the secretary, an announcer, or an engineer. Obviously the best time to visit is during office hours, Monday to Friday, but it never hurts to stop by in the evening or on a weekend. Sometimes I've hit it lucky, other times I've been asked to come back the next day. On a few occasions I had an interesting conversation with an otherwise bored DJ.

Language is only a problem if the traveler chooses to make it one. Obviously, the more Spanish (or whatever) one speaks, the easier it will be, but throughout Latin America we met numerous travelers who knew no Spanish. They got along fine carrying just a smile and a phrase book. Latin Americans are very patient and understanding with people who make an honest attempt to use Spanish and are willing to laugh at their own mistakes. I've seen these smile-and-a-phrase-book people have real conversations in restaurants, parks, and markets, and there doesn't seem to be any reason it can't happen in a radio station as well. —*Don Moore*

TRAVELLING QSLING

What about QSLs? Many of the same rules for sending reports apply to personal visits: be polite and chatty, but specific in what you want. Shortwave stations will usually have some idea of what a QSL is, but if you pick up a local MW or FM station in your hotel and decide to stop by and get an unusual veri, remember they may have never seen a reception report before. But then you may end up with the only QSL in existence for that station! A few copies of the National Radio Club's 'Broadcaster's Guide to DXing' pamphlet (available in English, Spanish & French) can be quite useful.

Be sure to ask for any pennants or stickers. Remember, however, that even if there is one on the wall, they may have none left to give away. They might give you that last one, if you make a good impression — it happened to me on several occasions. If there is a quantity of pennants or stickers, it doesn't hurt to ask for "two or three more for my friends". You won't be turned down, and probably will be given many more. However, asking for a large quantity, like a dozen, may make you look very greedy and sour the station towards DXers.

While in Honduras, I verified a number of local stations for DXers, and well in advance of my South American trip, I got in touch with some other DXers who valued Latin American QSLs and offered my services. It's not that difficult to solicit a few extra QSLs for DX friends, and I hope anyone planning to visit stations will take along reports for more than themselves.

Remember, however, that if you have only one or two reports, it is not unreasonable to ask the station to type up a veri letter or two. However, with three or more, that can be quite a chore. The best thing to do is either bring some prepared card QSLs along with the reports, or buy some attractive local postcards & write the veri information on the back. Using postcards impresses the stations more. Theresa wrote most of the postcard veri-statements for me in South America, and I suspect she holds the world's record in having one's handwriting on QSLs from the most different stations! Whether with plain ppcs or postcards, the station manager just has to sign and rubber stamp the cards. Of course as the person bringing the reports, you can ask for a special letter verification to commemorate your visit!

If you're planning to do some station visits, be sure to bring along some little gifts. These can include the usual enclosures of postcards, shack or family photos, and hometown travel brochures. It's also a good time to bring along things that aren't as easily sent, such as records & tapes, sports pennants, local picture books, and calenders. The Norman Rockwell type calenders given out by insurance companies and banks make especially nice free gifts, even if the year is already half gone. The pictures will probably end up on the station wall or in somebody's home.

I encourage all hobbyists to do a little "door-to-door DXing". It's a great way to get a first hand view of what the other end of the hobby looks like. Also, while travelling it is very difficult to meet and interact with the "common people" in other countries. The common interest in radio seems to bridge a gap, and on occasion even opens up peoples hearts and homes. —*Don Moore*

BATTLEFIELD DXING

Those of us who like to take our radio camping or in the field with the armed services need additional protection for our rigs when they are not in use. When I bought a Sony ICF-4920 to take with me in the field, I realized that it needed protection. Tupperware was the answer. A small Tupperware container not much larger than the radio itself protected my radio from dust and wetness, even at times when I was either dusty or wet or both. It even works in extreme cases. During a field exercise, I was driving a vehicle at night. Lightning wrecked my night vision and as I was moving into a position, the jeep I was driving fell into a sinkhole. I climbed out to see how bad I was stuck. My radio, which had been next to me behind the mount for the radio, bounced out of the vehicle as it settled into the sinkhole. Guess what? It floated and I waded out and retrieved my radio still safe and dry in its little Tupperware boat. —*Hans Johnson*







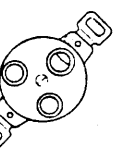
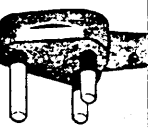


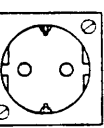

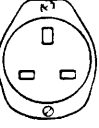
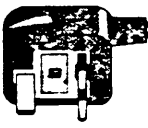
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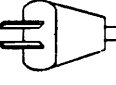
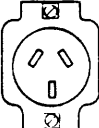

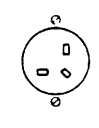

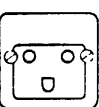

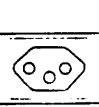

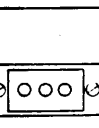
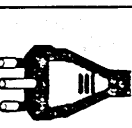
Single-phase Voltages and Frequencies

See pages 163-164 for listing of countries; refer to the illustrations below to determine plug/socket standard. The information provided for developing countries, particularly that related to plug/socket patterns, is imprecise at best.* For example, as many as five different plug patterns are listed for some countries. The reason is that formal electrical standards, where they exist at all, do not cover plugs and sockets or they are ignored in the marketplace. Furthermore, with regard to voltages and frequencies, power generating and distribution systems have been installed at various times by different contractors. These systems occasionally produce power at different frequencies and provide for final distribution at different voltages. Therefore, some cities—even individual buildings in those cities—may be supplied by two or more generating plants and power distribution systems, each with a different single-phase

voltage and frequency. The voltages, frequencies and plug/socket patterns listed here are the most common ones for each country. Most third world electrical distribution systems are ungrounded, hence three contact grounded plugs, while mateable with the sockets, are not necessarily providing the expected equipment ground. Alternative methods of equipment ground may be a desirable feature in these cases.

The data given for single phase voltages are nominal and are subject to a standard tolerance of 10%, but in some areas, particularly in developing countries, tolerances may be much greater. Although standard frequency tolerances are defined differently, variations from the nominal frequencies as listed may be considerably greater in developing countries than in the industrialized world.

Plug Type	Socket Pattern	Plug Pattern	Refer to Catalog Pages
Type A			North American Ungrounded
Type B			North American NEMA 5-15 Plugs & Sockets, see pages 99-114 Cords & Cordsets, see pages 43-48
Type C			Ungrounded Eurocord (CEE 7/16) Cord, see page 30
Type D			Old British Standard BS 546 Plugs & Sockets, see page 106 Cordset, see page 37
Type E			Belgian/French Socket/ CEE 7/7 plug Socket, see page 105 Cords & Cordsets, see pages 25-29
Type F			"Schuko" European CEE 7 Plugs & Sockets, see page 102 Cords & Cordsets, see pages 25-29
Type G			British Standard BS 1363 Plugs & Sockets, see page 104 Cords & Cordsets, see pages 33-34

Plug Type	Socket Pattern	Plug Pattern	Refer to Catalog Pages
Type H			Ungrounded Australian
Type I			Australian Plugs & Sockets, see page 103 Cords & Cordsets, see pages 31-32
Type J			Israeli Plugs & Sockets, see page 106 Cords & Cordsets, see page 38
Type K			Danish Plugs & Sockets, see page 105 Cords & Cordsets, see page 35
Type L			Swiss Plugs & Sockets, see page 108 Cords & Cordsets, see page 40
Type M			Italian 10-amp Plugs & Sockets, see page 107 Cords & Cordsets, see page 39

* The data presented here was compiled from several sources, including the following:
British Bank of the Middle East, Business Profile Series (Bahrain, 1983; Djibouti, 1981;
Jordan, 1983; Qatar, 1982; Saudi Arabia, 1982; Sultanate of Oman, 1982; United Arab
Emirates, 1982; Yemen Arab Republic, 1980)
"Electric Current Abroad," 1984 edition, U.S. Dept. of Commerce
"Electrical Plugs—An International Survey," Technical Help to Exporters, British Stan-
dards Institution, 1980
"World Electricity Supplies," Technical Help to Exporters, 1975; Supplement, 1978

Guide to Worldwide Plug/Socket Standards

Single-phase Voltages and Frequencies (Cont'd.)

Country Name	Single Phase Voltage	Frequency (Hz)	Plug Pattern (see p. 162)	Country Name	Single Phase Voltage	Frequency (Hz)	Plug Pattern (see p. 162)
AFGHANISTAN	220	50	D	FRANCE	220	50	C, E
ALGERIA	127/220	50	C, D	FRENCH GUIANA	220	50	C, E
AMERICAN SAMOA	120/240	60	A, B, F, I	GABON	220	50	C, E
ANGOLA	220	50	C	GAMBIA, THE	220	50	G
ANGUILLA (GB)	240	50	G	GERMAN DEM. REP.	220	50	C, F
ANTIGUA	230	60	A, B, G	GERMANY, FED. REP. OF	220	50	F
ARGENTINA	220	50	C, I	GHANA	220	50	C, D, G
ARUBA	115/127	60	A, B, C, D, F	GIBRALTAR	240	50	C, G
AUSTRALIA	240	50	I	GREECE	220	50	C, F
AUSTRIA	220	50	F	GREENLAND (DEN.)	220	50	C, K
AZORES (PORTUGAL)	220	50	C, D	GRENADA	230	50	C, D, G
BAHAMAS	120	60	A, B	GUADELOPE	220	50	C, E
BAHRAIN	220	50	D, G	GUAM	110-120	60	A, B
BANGLADESH	220	50	C, D	GUATEMALA	120	60	A, B
BARBADOS	115	50	A, B	GUINEA	220	50	C, E
BELGIUM	220	50	C, E	GUINEA-BISSAU	220	50	C, F
BELIZE	110	60	A, B	GUYANA	110	50-60	A, B, C, D, G
BENIN	220	50	D	HAITI	110-120	50-60	A, B
BERMUDA	120	60	A, B, G, I	HONDURAS	110	60	A, B
BOLIVIA	110-115/220	50	A, B, C, F	HONG KONG	200	50	D, G
BOTSWANA	220	50	D, G	HUNGARY	220	50	F
BRAZIL	110-220	60	A, B, C	ICELAND	220	50	C, F
BULGARIA	220	50	C, F	INDIA	220-250	50	C, D
BURKINA FASO	220	50	C	INDONESIA	220	50	C, F
BURMA	230	50	D, G	IRAN	220	50	C, F
BURUNDI	220	50	C, E, F	IRAQ	220	50	C, D, G
CAMBODIA	120/220	50	C	IRELAND	220	50	F, G
CAMEROON	220-230	50	C, E	ISLE OF MAN	240	50	C, G
CANADA	120	60	A, B	ISRAEL	230	50	J
CANARY ISLANDS (SPAIN)	220	50	C, E	ITALY	220	50	C, M
CAPE VERDE, REP. OF	220	50	C, F	IVORY COAST	220	50	C
CAYMAN ISLANDS	120	60	A, B	JAMAICA	110	50	A, B
CENTRAL AFRICAN REP.	220	50	C	JAPAN	100	50 & 60	A, B
CHAD	220	50	D, E, F	JORDAN	220	50	C, F, G
CHANNEL ISLANDS	240	50	C, G	KENYA	240	50	D, G
CHILE	220	50	C, M	KOREA	100/220	60	A, F
CHINA, People's Rep. of	220	50	C, I	KUWAIT	240	50	C, D, G
CHRISTMAS IS. (AUST.)	240	50	I	LAOS	220	50	A, C
COCOS ISLANDS (AUST.)	240	50	I	LEBANON	110-220	50	C
COLOMBIA	110-220	60	A, C	LESOTHO	240	50	C, D
CONGO, REP. OF	220	50	C	LIBERIA	120	60	A, G
COOK ISLANDS (N.Z.)	240	50	I	LIBYA	127-230	50	D
COSTA RICA	120	60	A, B	LIECHTENSTEIN	220	50	L
CYPRUS	240	50	G	LUXEMBOURG	220	50	C, F
CZECHOSLAVAKIA	220	50	F	MACAO	220	50	C, D
DENMARK	220	50	C, K	MADAGASCAR	220	50	C, E
DJIBOUTI, REP. OF	220	50	C, E	MADEIRA (PORTUGAL)	220	50	C, D
DOMINICA	230	50	G	MAJORCA	220	50	C, F
DOMINICAN REP.	110	60	A, B	MALAWI	230	50	G
EGYPT	220	50	C	MALAYSIA	240	50	G
EL SALVADOR	115	60	A, B	MALDIVES	230	50	D
EQUADOR	120	60	A, C	MALI, REP. OF	220	50	C, E
EQUATORIAL GUINEA	220	50	C	MALTA	240	50	G
ETHIOPIA	220	50	C, D, F	MARTINIQUE	220	50	C, E
FIJI	240	50	I				
FINLAND	220	50	C, F				



U.S. Toll-free: (800) 662-2290 • Canadian Toll-free: (800) 346-4526
 Other callers: (707) 523-0600 • Telex 176-747 • FAX (707) 578-5478
 P. O. Box 6626, Santa Rosa, CA 95406 (U.S.A.)

Guide to Worldwide Plug/Socket Standards

Single-phase Voltages and Frequencies (Cont'd.)

Country Name	Single Phase Voltage	Frequency (Hz)	Plug Pattern (see p. 162)
MAURITANIA	220	50	C
MAURITIUS	230	50	C, D, G
MEXICO	127	60	A
MONACO	220	50	C, E
MONGOLIA	220	50	C
MONTSERAT	230	60	A, B, G
MOZAMBIQUE	220	50	C, F
MOROCCO	220	50	C, D, E, F
NAMIBIA	220-250	50	D
NEPAL	220	50	D
NETHERLANDS	220	50	C, F
NETHER. ANTILLES	120-127/220	50/60	A, B, C, F
NEW CALEDONIA	220	50	C, E
NEW ZEALAND	230	50	I
NICARAGUA	120	60	A
NIGER	220	50	C
NIGERIA	230	50	D, G
NORFOLK IS. (AUST.)	240	50	I
NO. MARIANA IS. (US)	115	60	A, B
NORWAY	220	50	C, F
OKINAWA	100-120	60	A
OMAN	240	50	D, G
PAKISTAN	230	50	C, D
PANAMA	110-120	60	A, B
PAPUA	240	50	H, I
PARAGUAY	220	50	C
PERU	110/220	50/60	A
PHILIPPINES	115	60	A, B, C
PITCAIRN ISLANDS(GB)	240	50	G
POLAND	220	50	C, F
PORTUGAL	220	50	C, D, F
PUERTO RICO	120	60	A, B
QATAR	240	50	D, G
ROMANIA	220	50	C, F
RWANDA	220	50	C
SAUDI ARABIA	127/220	50/60	A, B, E, F
SENEGAL	220	50	E
SEYCHELLES	240	50	D, G
SIERRA LEONE	230	50	D, G
SINGAPORE	230	50	C, D, G
SOMALIA	110/220	50	C, E

Country Name	Single Phase Voltage	Frequency (Hz)	Plug Pattern (see p. 162)
SOUTH AFRICA	220-250	50	D
SPAIN	220	50	C, F
SRI LANKA	230	50	D
ST. PIERRE & MIQUELON (FR.)	115	60	A, B
ST. KITTS AND NEVIS	230	60	D, G
ST. LUCIA	240	50	G
ST. VINCENT	230	50	G
SUDAN	240	50	C, F, G
SURINAM	115	60	C, F
SVALBARD (NORWAY)	220	50	F
SWAZILAND	230	50	D
SWEDEN	220	50	C, F
SWITZERLAND	220	50	C, L
SYRIA	220	50	C
TAHITI	220	50	E
TAIWAN	110	60	A, B
TANZANIA	230	50	D, G
THAILAND	220	50	A, C
TOGO	220	50	C, E
TONGA	115	60	D, I
TRINIDAD & TOBAGO	115/230	60	A, B, D, G
TUNISIA	220	50	C
TURKEY	220	50	C, F
UGANDA	240	50	G
UNITED ARAB EMIR	220	50	D, G
UNITED KINGDOM	240	60	D, G
UNITED STATES	120	60	B
URUGUAY	220	50	C, I
U.S.S.R.	220	50	C, F
VENEZUELA	120	60	A, B
VIETNAM	120/220	50	A, B, C, E
VIRGIN ISLANDS	120	60	A, B
WESTERN SAMOA	230	50	NO INFORMATION
YEMEN (ADEN)	220	50	D, G
YEMEN (ARAB REP.)	220	50	C, D
YUGOSLAVIA	220	50	C, F
ZAIRE, REP. OF	220	50	E
ZAMBIA	220	50	D, G
ZIMBABWE	220	50	D, G