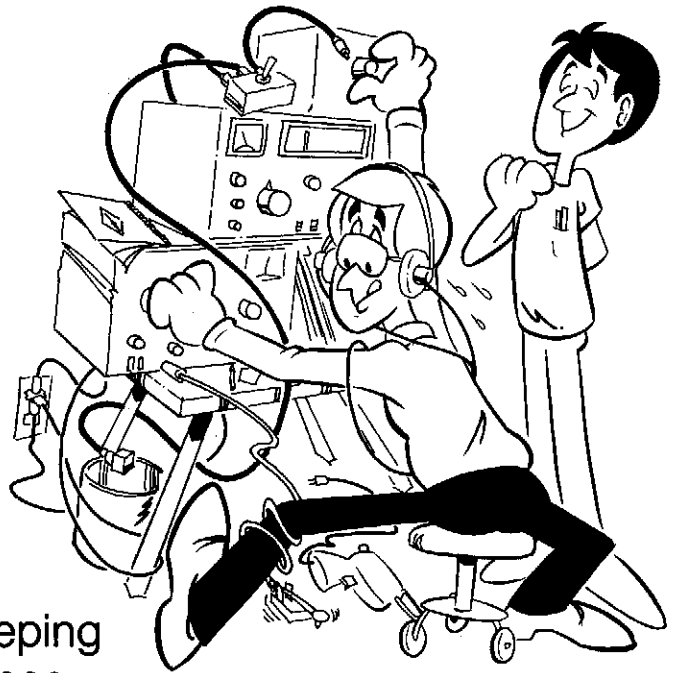




Setting Up Your Station

Amateur Radio is supposed to be fun, but an awkward ham-station setup can turn enjoyment to frustration. Good lighting, orderly layout and other housekeeping measures can make a big difference.



By Doug DeMaw,* W1FB

How orderly and convenient is your station layout? Chances are you have a few annoyances when you sit down to operate — caused by too little room, cluttered equipment stacks and awkward methods for changing antennas. All of this may be complicated by poor lighting that can make your shack seem like it's in a crypt or a wine cellar. I know a chap who runs a kilowatt almost nightly, but burns a single 60-W lamp in his shack because "it saves money to use smaller bulbs." This old "penny-wise and pound foolish" philosophy can lead to a lot of squinting and shadowy QSOs for no good reason. I'm sure the spiders and other creatures of the night are pleased with my friend's subdued lightning, but I'm not.

I've seen other ham stations that required an octopus to keep things on track. Controls are out of reach from the operator's position, antenna changeover necessitates unscrewing and reconnecting coaxial cables to other terminals, and what have you. I marvel also at some CW operators who use a tiny desk or table, with barely enough room for the key or paddle let alone the operator's arm. If I were to operate CW in that manner I'd fatigue and develop a "glass arm" in a matter of minutes.

I certainly don't consider myself an oracle when it comes to laying out a radio station, but I do love convenience and an orderly setup in my station, especially for

contesting and fast band changing. Furthermore, I have always been afflicted with an incurable case of lassitude, which makes me want to have things as easy as possible. I'd like to share some of my thoughts with you in the hope they will give you some ideas for your station. Those who have network-studio-quality consoles need not read further!

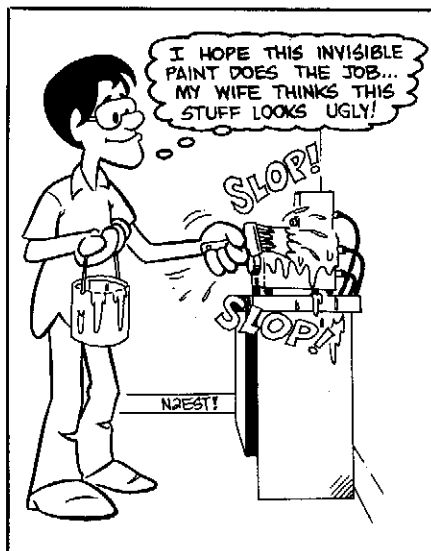
The Operating Desk or Table

Some amateurs are tempted to occupy the smallest space possible when setting up their ham stations. This is often inspired by a misbelief that ham gear is ugly, and

that family members or visitors might be offended by a spread of radio equipment in some frequently occupied room. I have found that most nonamateur guests are fascinated by ham stations, irrespective of the size of the "shack." I have yet to hear, "Oh my, how dreadful that looks in your home!" If the layout is neat and well-organized, it can look very impressive to outsiders. But, if you try to cram a lot of equipment on too small a desk, overall appearance will suffer. Small operating positions are difficult to endure for long hours of operating, and there can be a psychological effect on those who tend to suffer from claustrophobia.

A small table or desk can be expanded easily and inexpensively by adopting the method illustrated in Fig. 1. Drawing A shows a new and larger desk top made from ½-inch plywood.' This platform can be any size you prefer, provided it is not so long that it sags at the hangover points. Too great an overhang — especially if equipment is sitting on that part of the platform — will cause warping and sagging with time. This plywood addition can be placed on an existing small table or on an office desk.

Framework A (illustrations A and C) is affixed to the bottom surface of the platform to keep it from shifting on the desk top. It should be approximately 1/8 inch larger inner opening than the desk or table top. Screws or white glue may be used to



*ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

1mm = in x 25.4.

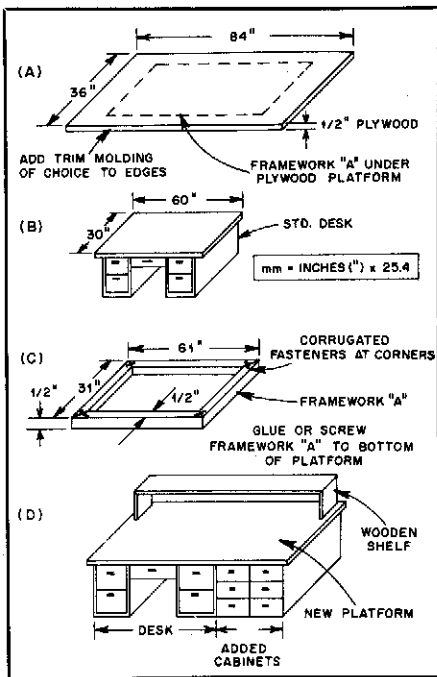


Fig. 1 — Suggested methods of increasing the area of an operating desk. Drawing A shows a false desk or table top that can be added to provide more desk-top room. Sketch B shows a typical desk on which the new platform can be added. Details of a wooden frame for keeping the new top in place is shown at C. The method at D shows the addition of two chests of drawers and a desk-top shelf.

secure the frame to the platform. Scotch fasteners or corrugated nails will hold the corners of the framework in place until it is affixed to the platform. The upper surface of the platform can be finished with stain and two coats of varnish. Alternatively, a sheet of Masonite® may be added to provide a smooth, attractive surface. You might opt for a top surface of Formica® if a truly professional finish is desired. Trim molding or Formica is added to cover the raw edges of the platform.

Fig. 1D shows a further elaboration of the general concept. You might want additional drawer space for storing clip leads, tools, cables, microphones and such. If so, one or two chests of drawers can be added as shown. They will also help to support the large platform you have added to your desk. Finally, a homemade wooden shelf can be placed atop the new platform as shown. Fig. 1D is representative of the operating layout I use at W1FB. My desk is an old office type (wooden) with a multitude of scars and dings. It was purchased for a very low price at an office auction. Some sandpaper and a coat of gray paint gave it a needed facelift.

Where to Place Your Gear

Convenience is of paramount importance in your radio station. Those units that require frequent adjustment, such as transmitters, receivers, transceivers,

Transmatch and keyer, should be toward the front of where you sit, within arm's reach if possible. You should not have to leave your chair to adjust those items of equipment. The receiver or transceiver tuning knob needs to be immediately in front of your right or left hand, depending on your natural inclination. Analog or digital frequency readout displays should be in your direct line of vision to ensure easy and accurate frequency adjustment. The station accessories that require infrequent attention are best arranged off to the right or left of your main focal point.

Hand keys, bug keys and paddles need special attention with regard to location. The primary consideration is to have the unit placed so that your sending arm is completely supported by the table from the key to your elbow. Your arm should rest easily and comfortably when you are sending CW. Only your fingers should be used to manipulate the key (left-footed sending, known fondly as QLF, is being ignored here).

I suggest you experiment with the placement of your key to find a spot that results in complete ease when sending. Anchor the key to that spot by means of double adhesive-backed tape pieces or pads. These are generally available at building-supply stores. How often have you heard someone try to excuse poor CW sending by saying, "Sorry my sending it so sloppy, but my paddle is sliding all over the table." The cure is simple, if that's the real cause of some of the bum fists we hear!

If you suffer from a "glass arm" after sending for long periods, try elevating your key or paddle on a 1/2- or 3/4-inch platform to raise it above desktop level. An old timer suggested this trick to me some years ago. It helped me to avoid sending errors created by my arm muscles stiffening because of high-speed CW tension during long transmissions. The remedy may have been purely a psychological one, but it did work.

Brighten Your Shack

Dim lights mean hard-to-read dials and meters. Logging and note taking is often more accurate when we can plainly see what we're putting on paper. Although a



cocktail-lounge atmosphere is comforting to some operators who prefer ragchewing as a steady diet, I believe good lighting is essential to sharp operating. It's too easy to become inattentive, or even drowsy, when the light level is very low.

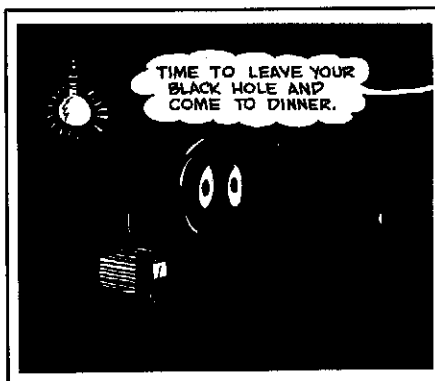
I prefer a medium-intensity light source behind my left shoulder (a lamp with a 100-W bulb and a lampshade that permits plenty of light to pass through it). A reading lamp on the desk is also an aid to easy operating. I use one of those adjustable lamps on a movable arm. It clamps to the edge of my desk. A 60-W bulb furnishes ample illumination. I direct the light toward the table top, directly in front of me, which is helpful for logging, note taking and reading.

Be Sure You're Grounded

An effective earth ground is nearly as important as the antenna system. I say this from a safety and TVI/RFI point of view. All electrical units in a ham station should be connected to a ground system to prevent accidental shock and to minimize the flow of RF energy except via the intended paths. I strip the shield braid from RG-8/U or RG-11/U coaxial cable and use it for the ground bus in my ham shack. It is stapled to the back edge of my operating desk from one end to the other. This enables me to attach short ground straps (also made from shield braid) to each piece of equipment.

From the main ground bus I use additional shield braid to a pair of 6-foot ground rods that are driven into the soil just outside my shack window. A second ground lead passes through the floor to the cold-water pipes in my basement. At those points where the sections of copper braid are joined, I ensure a good electrical bond by using solder. I cannot adequately express the importance of good grounding.

For ease of grounding, and for other reasons, you will fare much better when you can locate your radio room on the first floor or in the basement: The longer the ground lead, the greater the difficulty you will have in keeping the RF voltage off your equipment cabinets, microphones and keys.



A second- or third-floor installation is apt to cause tingling sensations when you touch the metal parts of your equipment during transmission periods! This is caused by unwanted RF energy flowing on the cabinets and leads instead of flowing to ground through the intended path. I've had this experience many times, and nothing short of tuning the ground lead (as you would with an antenna) for each band of operation seemed to stop the nightmare. I've heard my wife yelp in anguish more than once when she touched a lamp and received an unwelcome RF tingle!

RF in the shack can also cause the keyer to misfire and send gibberish, to say nothing of encouraging transmitter and frequency instability in severe cases. The moral of this story is to install as short and effective a ground system as possible. The larger the ground conductors the better.

Getting the Feed Line into the Shack

Bringing our feed lines into the house causes aesthetic and practical problems. At some point we must ask ourselves, "Have I the courage to make holes through the wall of my home?" Most hams say, "No." But several years ago I took a wanton outlook and decided that convenience was more important than honoring the sanctity of the outer wall of my radio room. The saber saw was put to work, and a nice feed-through jack panel resulted.

Fig. 2 shows the method I used then, and continue to employ. An aluminum plate of identical dimensions and layout is used on the inner and outer house wall. The size chosen will depend on how many lines you plan to feed into the shack. I always include a through-connection for bringing in the earth ground. A 1/4-inch bolt is suitable, although smaller diameters are probably okay. Short lengths of coaxial cable are used within the wall to join the

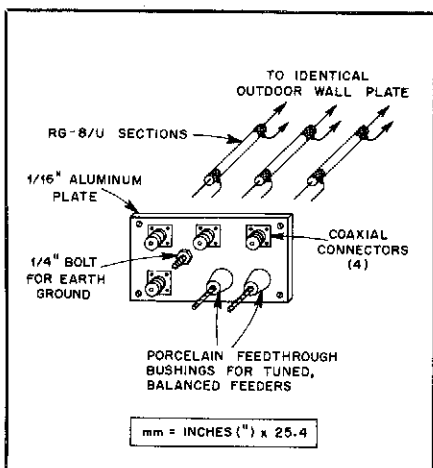


Fig. 2 — A method for bringing feed lines into the house. Two wall plates with suitable antenna connectors and a ground post can be joined by lengths of coaxial cable. A rectangular hole must be sawed in the outer and inner walls of the house where the feed-through panel is installed.

coaxial-connector jacks. The shield braid is made common to the wall plates at both ends of the cable. A short section of shield braid joins the two ground terminals, and the feedthrough bushings are joined by pieces of RG-8/U inner conductor and insulation. The braid and outer jacket are removed from these leads. All leads are soldered in position at one of the plates, then the plate is installed by using four wood screws. The outer-wall plate is allowed to hang loose until all leads are soldered to it. This requires that all leads be somewhat longer than the wall thickness in order to have access to the rear of the jacks.

A layer of caulking compound is spread along the perimeter of the outdoor plate before it is screwed into position. This will prevent dust, air and moisture from entering the space between the walls. If you decide later to sell your home, it will be a simple matter to cover the holes where the panels were. Some window screen, joint or spackling compound, and paint will do the job rather handily.

An alternative to this type of access is to make a panel that will fit snugly under the lower part of the window in the shack. Fig. 3 illustrates this method. A panel of suitable size is inserted between the window casing and the bottom of the raised lower-window section. Weatherproofing material should be placed around the insert panel. Foam rubber or plastic stripping needs to be wedged between the upper and lower window sections where the gap will be formed. If you use a storm window on your home, this method will present a problem unless you have your storm window shortened and install a second insert panel of the kind in Fig. 3. I don't care much for this method, but I have used it a number of times.

A third technique for bringing antenna

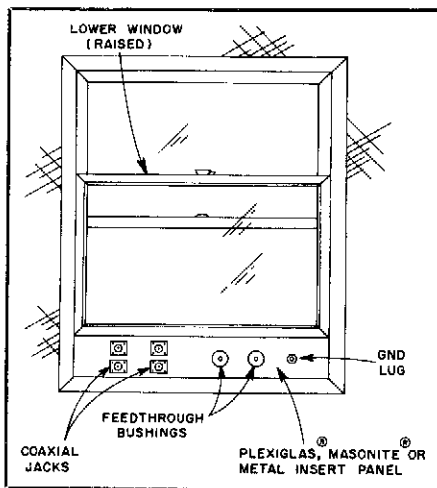


Fig. 3 — Alternative method for bringing feed lines into the station. The lower half of the window is raised, then a feedthrough panel is placed under it. This requires extensive weatherproofing, and may not be the best way to deal with the problem.

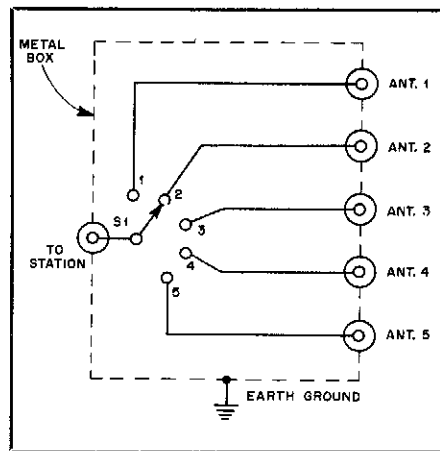


Fig. 4 — Schematic diagram of an easy-to-build switch box for selecting various antennas from within the shack. See text.

leads into the house involves routing the cables through the foundation of the house, into the cellar, and then through the floor of the radio room under the desk. A large number of hams have adopted this technique. A section of wall molding can be removed for this purpose. Later, if the house is to be sold, or the shack moved to another room, the molding strip can be replaced to cover the holes in the floor.

Antenna Selection

We mentioned earlier the annoyance of unscrewing cable connectors and reconnecting them in order to change antennas. It is a simple job to build an antenna switch box (or you may purchase one). A circuit example is given in Fig. 4. I use this method in my station. The switch box is within reach from my operating position. Coaxial jacks of your choice can be used as connectors. I recommend a well-insulated switch with large electrical contacts, preferably a rugged ceramic switch. Many of these can be found at flea markets and in surplus stores. My present switch is an Ohmite power-tap switch. I paid \$1 for it (new) at a ham flea market. It handles 1 kW of RF power very well at 50-ohms line impedance. My switch box is mounted just below my feed-through panel.

Some Final Touches

A degree of "law and order" is needed to prevent the numerous ac cords of your equipment from becoming a tangle of hissing snakes. Nothing looks worse in our stations than power cords dangling and coiled haphazardly every which way!

I have found that the best way to deal with the problem is to install a multioutlet strip (or two) along the back wall or rear edge of the desk. Each equipment cord is plugged into it, then folded back on itself several times until it is just long enough to reach the plug strip. A couple wraps of tape or long garbage-bag "twistems" can be

used to keep the cord folded neatly.

The plug strip is then connected to the wall outlet through an ac line filter that has its case attached to the earth-ground bus. The filter will not only help to prevent your RF signal from being radiated by the power lines, but it will filter away some of the QRN noise that enters the shack via the mains. Many a case of TVI or RFI has been cured by the simple installation of a "brute-force line filter." No shack should be without one.

A circuit you can duplicate is shown in Fig. 5. You may want to build this filter as your workshop project this month. The coils can be wound on hot/cold type PVC tubing. C1, C2, C3 and C4 are disc-ceramic capacitors with a 1.5-kV dc rating. Be sure to use heavy-gauge enameled wire for the coils. I suggest no. 14 wire for rigs under 150 W. No. 12 wire or larger should be used for greater amounts of ac power.

Warning: Do not plug the line filter into the ac outlet until the earth ground is attached to it. Without the ground connection you can get a mild shock if you touch ground and the filter box or equipment cabinets at the same time. Be sure to wire the plug and socket as shown (neutral, hot and ground connections). The filter should be installed as close to the station equipment as possible to prevent radiation of RF from the ac leads to the filter box. In an ideal situation we would have a separate line filter for each piece of RF equipment. These filters would be located inside the equipment cabinets, or attached to the rear walls of the cabinets.

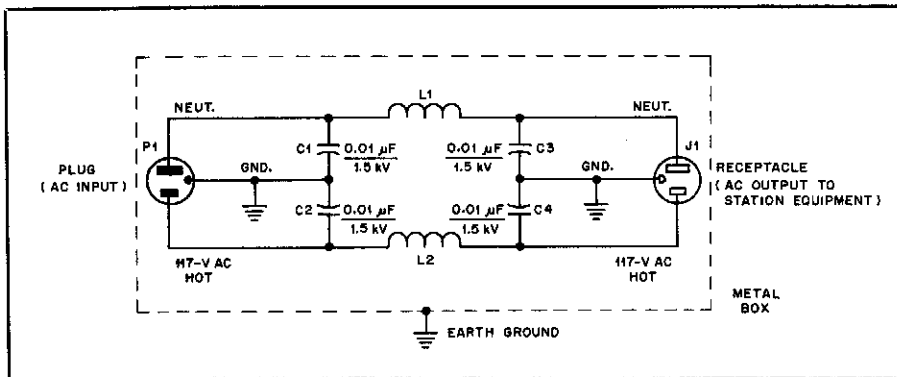



Fig. 5 — Schematic diagram of a brute-force line filter for preventing RFI and TVI from the station transmitter. The capacitors must be able to handle the line-voltage surges. Disc-ceramic units with a 1.5-kV or higher rating are recommended. L1 and L2 are 8-inch lengths of PVC pipe on which no. 14 enameled wire is close wound over a 7-inch area. The filter is enclosed in a metal box, to which an earth ground is attached.

If you use an amplifier to increase your station power, it is best to operate it from the 234-V mains in your house. High-power amplifiers (1 kW, for example) draw a lot of current from the line, and most homes do not contain 117-V ac lines that are suitable for big amplifiers. They will operate, for certain, but the plate voltage in the amplifiers will sag (drop) considerably during key-down periods, and the power output will decline as a result. Worse still, the lights in your home will blink each time you key the transmitter. That *will*, without question, elicit some pointed comments from others in your home! This is not normally a problem when the amplifier

is connected to the 234-V lines.

A separate ac line of this kind should be routed to the radio room by a licensed electrician. It must be attached to the circuit-breaker box so it is protected from overloads. The outlet in your shack should be a 234-V type to prevent accidental connection of 117-V equipment.

In Closing

An organized and safe ham station is a joy to use. Yours will be much better if you adopt some of the ideas presented here, and it matters not whether the gear is homemade or commercial. Good luck, and may your titivating be titulating! 

Strays



NEW 2-METER BAND PLAN TO BE DEBATED NEXT MONTH

□ The Texas VHF-FM Society has issued a call for comments, either in person or in writing, on a proposal to change from a 15-kHz spacing band plan to a 20-kHz band plan between 146 and 148 MHz. A forum for the presentation of these papers and comments will be held at the summer meeting of the Texas VHF-FM Society in Austin, August 11, 1984. Substantial time will be allotted for both presentation and debate of the issue. This forum will be chaired by Joe Jarrett, K5FOG, past president of the Texas VHF-FM Society and past 5th call district member of the ARRL's VHF Repeater Advisory Committee (VRAC).

Papers must be submitted at least 30 days in advance of the meeting. Papers read at the forum will be those judged to best

represent the various sides of the issue. If the author is unable to be present, the paper will be read by a competent speaker. All papers submitted will be available for review by forum attendees.

Speakers who wish to make a presentation at the forum without a written paper must submit an outline of their talk at least 15 days in advance of the meeting. If more speakers apply than time permits, one or more representative speakers will be picked from each of the various sides of the issue. Speakers are expected to remain for the debate.

All correspondence should be addressed to Joe Jarrett, 8501 Spring Valley Dr., Austin, TX 78736.

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

□ Wonder what you've been missing by not subscribing to *QEX*, the ARRL

newsletter for experimenters? Among the features in the June issue were:

- Part 2 of the RSGB article, "The GB3US Mk2: A Microprocessor Repeater Logic System," by A. J. T. Whitaker, G3RKL
- Do you own a Heathkit ET-3400A Microprocessor Trainer? Double its memory capacity using a modification by Donald G. Varner, WB3CEH
- Two new products are reviewed: The Linker 100: an Industrial Portable Terminal/Controller, and The Motorola MC3361P: a low-power narrow-band FM-IF circuit

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members is \$6 for 12 issues; for nonmembers, \$12. There are additional postage surcharges for mailing outside the U.S.; write to Headquarters for details.