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The “Shack”

“basic station layouts”

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Written by K4OCD

The Shack - Basic Station Layouts

This information tutorial was written for distribution by radio clubs to illustrate basic station layouts to new licensees. It is intended to be used in an amateur radio group's mentoring class in conjunction with the Practical Radio Application for New Technician Licensees' manual downloadable from: www.piccentric.com

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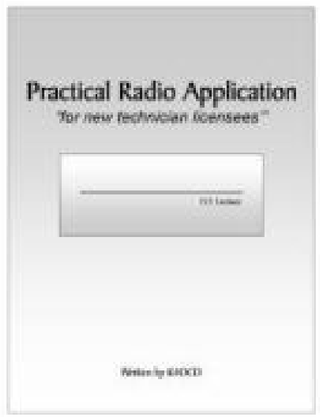

Please download

Practical Radio Application "for new technician licensees'"

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Portable / HT

The term portable usually refers to handheld radios, better known as HTs . The term HT originated from Motorola during the advent of the "Handie Talkie." HTs are all-in-one solutions, comprised of a transceiver, power source (internal battery) and antenna. As illustrated here, one might opt to add an external antenna, additional battery (or quick charger) and speaker/mic. Programming software and cable assemblies are also common additions.

~ Tips For HT Users ~

Learn the basics; you may not always have access to the user manual. Learn how to set the following functions:

Programming a memory

Enter / exit memory / VFO

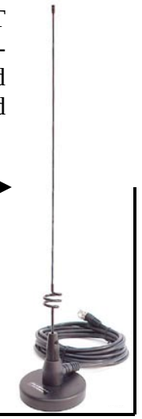
Set a Tone frequency
Set the Offset

Scanning

Check battery voltage

Be sure to have a spare battery or access to power!

This Diamond MR77sma mag-mount antenna is a great addition to the FT-60r for mobile applications. The antenna includes 13' of coax. The coax includes an SMA connector compatible with an HTs SMA antenna mount.

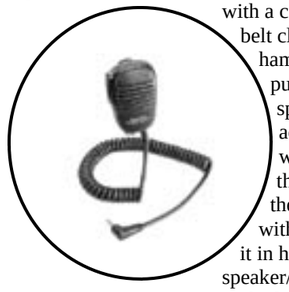


External Antenna

Transceiver

Pictured here is the Yaesu FT-60r dual band (2m/70cm) handheld. Capable of 5 watts transmit, these radios are popular for first time buyers as they offer an all-in-one solution.

Speaker/Mic



Most HTs come with a convenient belt clip; many hams opt to purchase the speaker/mic accessory, which allows them to use the transceiver without holding it in hand. The speaker/mic attaches to the lapel.

Battery / Power

The FT-60r comes packaged with a NiMh battery and power cube, one might choose to add a second battery, drop in quick charger or the FBA-25 "AA" battery cell holder.

HTs are great for public service events such as walk-a-thons, missing children booths, parades and anywhere the user requires ultra portability. They are often used with repeaters for broader coverage.

Mobile

Mobile radio applications vary greatly depending on budget and license class of the operator. The simplest installation might consist of a mono-band transceiver attached to an external mag-mount antenna and powered by the vehicles' battery. More elaborate installations may consist of a dual-band transceiver installed under a seat, utilizing the remote face plate for operation; still connected to an external antenna and the vehicles' power supply. For those with HF privileges or intending to upgrade to General or Amateur Extra, a mobile installation might include a multi-mode, all-band radio with both VHF/UHF and HF antennas.

UHF/VHF

HF

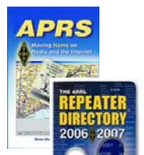
Mono-band

Dual-band

Multi-mode All-band HF Transceiver

Mobile radios should be connected directly to the vehicle battery w/ proper fusing. When indoor use is desired, one should consider an AGM type battery as they are safer in unventilated spaces.

Power / Battery



Antenna

Installing a high-gain external antenna will aid in the useful range of your mobile radio. Mobile antennas are designed to allow higher wattage outputs and because they are vehicle mounted, the occupants are relatively safe from RF exposure. Installation options include drilling in a mount, a no-holes lip mount as pictured above or a simple mag-mount.

Speaker

Mobile speakers are a handy addition to any mobile installation, especially remote face-plate mounted radios. They overcome the ambient noise found in mobile applications and aid in the creative installation of detachable faceplate units.

~ Tips For Mobile Users ~

As with an HT, learn the basic operation of the unit, such as volume and squelch

Pre-program the radio with your favorite frequencies and know how to quickly change the frequency via knob or push button with minimal visual interaction.

Never program the radio while driving!

Carry a copy of the manual along with a repeater directory in your glove box.

Avoid getting stranded, don't transmit for prolonged periods without checking your battery!

Are congratulations in order?

Whether you recently earned your FCC amateur license privileges or are in the study process, undoubtedly you are beginning to consider what equipment to buy. This illustrated tutorial is intended to show many of the various components that comprise a basic station. It also is intended to inspire you as you visualize the different aspects of your station based on your anticipated use, while simplifying the components. All "shacks" include a transceiver, power supply and antenna. While these items are depicted in this tutorial, an attempt is made to introduce you to the often overlooked details such as ergonomics, grounding, microphones and speakers. This is, however, not a definitive guide, rather a very concise one intended for use in a mentoring setting, sponsored by local radio groups, as a guide to aid discussion.

As you use this material, imagine how you see yourself using your license privileges. Do you plan to remain at the technician level or will you upgrade to General and then Amateur Extra? Do you plan to focus on EmComm or does HF DXing appeal to you? The "Shack" is as diverse as the intended use.

Primary station setups:

Portable - The term portable usually refers to handheld radios, better known as HTs or Handie Talkies. They are all-in-one solutions, comprise of a transceiver, power source (internal battery) and antenna. Popular accessories may include an additional battery, "AA" battery holder, lighter adapter, a speaker/mic and for some, programming software and computer interface cable.

Mobile - Mobile stations are those usually mounted in a vehicle. The most basic of mobile stations consists of a transceiver, magnet-mounted antenna and powered by the vehicles' battery. More advanced installations might include a removable face plate, installation of coax cable, through-hole antenna mount and a speaker.

Base - A base station is the station at your QTH or home. The equipment comprising this type of station can vary widely by budget and intended use. For instance one might use their mobile radio at home, while another might just attach their HT to an external j-pole. Then there are those who want to talk to the world and have multi-mode radios attached to amplifiers and a tower with beam antennas. Components illustrated here are utilized in an average station setup that offers all-band, multi-mode operation in the amateur bands.

EmComm - Emcomm or emergency communications is a specific area of interest to many in the amateur service. It's how we repay the community for the frequency privileges we have received. Many EmComm groups vary by region, each experiencing different types of response characteristics. For instance, in Florida a group may be activated because of hurricanes, while another in California is deployed to a wildfire or mud slide. In the Midwest storm chasers follow the path of destruction caused by a tornado, while in the northeast a blizzard has all but rendered a community "locked in". While each application may differ, the common factors in this type of station setup are portability and the ability to deploy and operate quickly. They tend to include a transceiver, antenna, feed line and a battery of some sort. Of course, each area, having different geographical characteristics, will need to select equipment that can transmit the required distance and power that is adequate for the required deployment. I have not illustrated an EmComm station setup in this resource.

So... let's take a look at some basic station layouts...

Base / QTH

Base / QTH

The Base / QTH station, often known as “the shack,” can be as simple or as complicated as the licensee chooses to make it. For instance, one might use an HT with an external antenna, as is common in nursing homes and deeded communities where elaborate setups are impossible. Another licensee may choose to use his/her mobile station at home by simply removing it from the car and attaching a 12V supply and external antenna. The more common stations are comprised of a multi-mode HF radio, also known as a “rig,” attached to a 12V power supply and an external antenna. This is usually mounted high on a mast, roof or tower. It’s all up to the user, their needs and desires and maybe more importantly, budget.

This illustration presents three common transceivers for multi-mode, all-band operation, the iCom 706MKIIg, iCom 756ProIII and the dream machine Ten-Tec Orion II. Other popular brands are Alinco, Kenwood and Yaesu. The 706MKIIg in this example offers HF as well as UHF/VHF operation on 2m and 70cm, whereas the 756ProIII and the Ten-Tec Orion II operate on HF bands only, but include an automatic antenna tuner for ease of operation.

The budget for a base station can vary greatly. Most multi-mode, all-band transceivers cost from $700 up to $10,000 with the average units costing between $1,500 and $3,000. Of course there are always the “extras” and the infrastructure, as illustrated here. One of the biggest expenses in setting up a base station is the antenna and support structure, taking into account proper grounding. Permits, construction of the footer, tower, grounding, feed line and more! It all adds up, but the return on investment can be reaped by years of enjoyment.

Power selection is also very important, as not all power supplies and chargers are made equal. Selecting a quality supply or charger that provides clean power with low noise will offer the best results in your transceivers output.

The ARRL Handbook is a tremendous resource to radio amateurs, a must have in every shack!

HF Transceiver **iCom 756ProIII**

Ten-Tec Orion II

Filters & TCXO

CW Key

SWR Meter

Coax / Feedline

Not all feed lines are equal!

You get what you pay for. Better quality cable such as LMR-400, RG-8 and RG-8x offer lower loss characteristics over coax such as RG-58 and RG-174

Grounding

I can’t stress the importance of grounding enough! Proper grounding is critical to the protection of life and property. Do your homework, search the web and learn proper methods for grounding not only external antennas but your equipment and feed lines. Disconnecting your radio from the coax feedline when not in use is also a measure of precaution, just be sure to reattach it before transmitting!

iCom 706MKIIg

Clean quality power is paramount in the shack. One should select a supply that provides low noise, clean power while sized appropriately for the application. For instance the iCom 756ProIII requires 23 Amps at 100 watt transmit.

You may opt to use an AGM (safe for indoor use) with a charger designed for AGM chemistry like the Xantrex Truecharge 20+

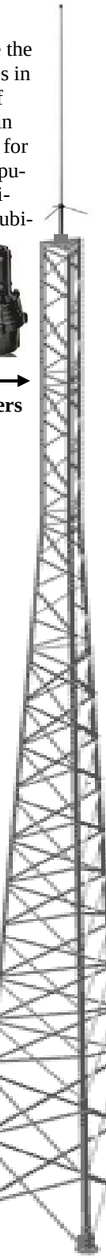
Power / Battery / Charging

Microphone & Speaker

When running a base station, many opt to use a better quality microphone and filtered speaker than those supplied to narrow the audio response to those found on the amateur bands. These items add to the transmit and receive audio and over all enjoyment of your station. Generally speaking, a quality microphone and filtered speaker will cost around $175 each.

No one antenna will provide the coverage allotted to licensees in the amateur service. Band of operation plays a large role in selecting the proper antenna for your desired application. Popular antennas include Yagi, dipole, vertical, j-pole, wire, cubical quad and more! Remember, HF usually employs horizontal, while VHF/UHF communications use vertical polarization.

Antennas, Rotators & Towers



Antenna Tuner

Used to fine tune the resonant frequency of most any antenna on the HF bands, they are great additions to the shack and help protect the power amplifier circuit of your costly HF rig.

~ Tips For Base Users ~

Make grounding and lightning safety a priority!

Plan your station carefully…

If you select a higher-end HF rig that does not include VHF/UHF operation, don’t forget to supplement it with a 2m/70cm radio.

Look at the ergonomics of the radio you may purchase; easy access to rf power output, mic gain and filters will aid in making successful contacts.

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