

THE CARE AND FEEDING OF YOUR HT



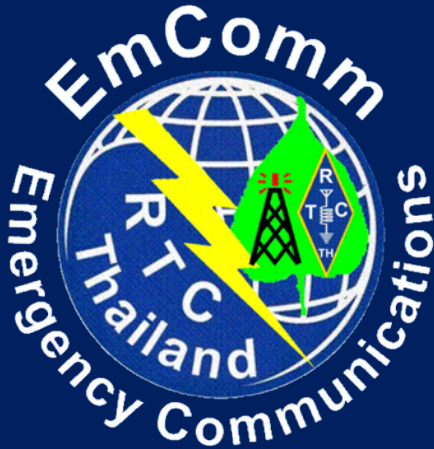
The Care and Feeding of Your HT

Community-based Education for
Amateur Radio and Emergency Communications

Lesson B 3.3



An RTC-TH EmComm / GERC Collaborative Training Series presentation



Compiled and Edited by
HS0ZHM and N7YLA

For other lessons in the series visit

www.neighborhoodlink.com/org/rtcth
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A part of the RTC-TH EmComm Program

The Rural Training Center-
Thailand Emergency
Communications program is a
volunteer effort to provide
emergency amateur radio
communications for local
community self-sufficiency and
sustainability in times of need.



Ready to serve and sustain our community



The Glendora Emergency Response Communications (GERC)

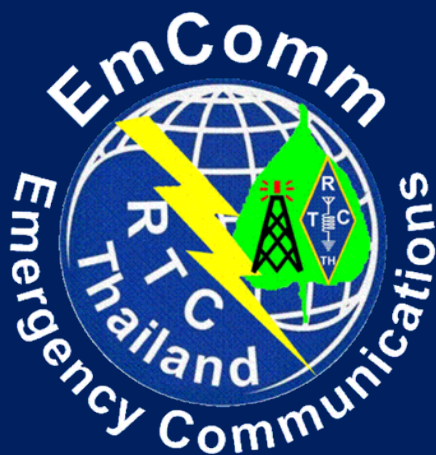


The mission of the Glendora Emergency Response Communications group, herein known as GERC, is to unite those amateur radio operators who have a common interest in communications, specifically to provide training, support and encouragement to radio amateurs who wish to serve as emergency communicators for the Church of Jesus Christ of Latter-day Saints (LDS).



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Caring for and Feeding Your HT

Topics in this lesson



- Basic Set Up
- HT Care & Protection
- Some Basic Tools
- External Power Supplies
- Power Interoperability
- External Antennas





Our Assumptions for this lesson

Our basic assumptions about you and your amateur radio needs:

- You are not a techno-geek
- You are relatively new to amateur radio
- You are a relatively new first time owner of an HT
- You didn't get training wheels with your new HT
- You're hoping you and your HT can grow old together



If most of these don't fit you, this may not be the lesson for you at this time.

Basic Set Up

FOB (fresh out of the box)

**Hooray!
Congratulations!!
Your baby is
finally home!**

**You are now the
proud owner of a
brand new HT!!**



But before your open the box, keep the following ideas in mind.....



Basic Set Up

FOB: Unpacking



Keep the original box and packing. If you decide to sell the HT, you may get a better price if you have all of the original packaging.

Complete, copy, and send the warranty card. Keep the original sales receipt (and charge card slip if any esp. if your credit card company has terms for extended warranty coverage) stapled to your copy of the warranty card.

Carefully inventory the contents to make sure all of the components are there. Keep original plastic bags / wrapping. Any items not being used should be re-wrapped and stored in the box.

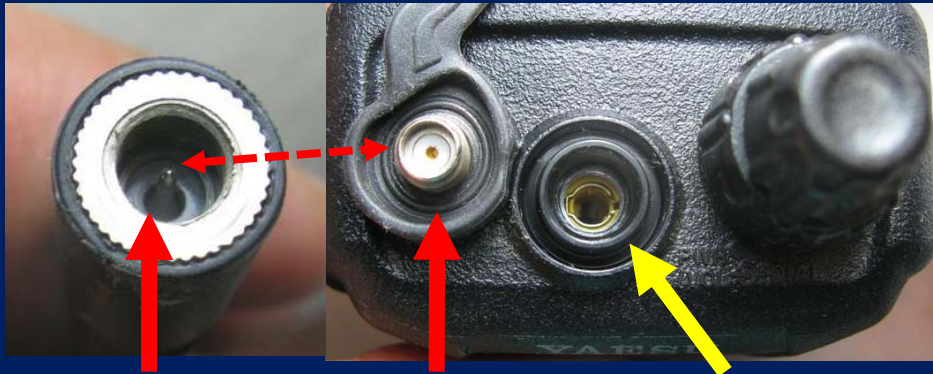
Photos courtesy of RTC-TH



Basic Set Up

Attach the Antenna

Start with the “rubber duck”. Carefully thread the antenna onto the radio. Do not force it. Once damaged you either suffer a repair bill or a poor connection.

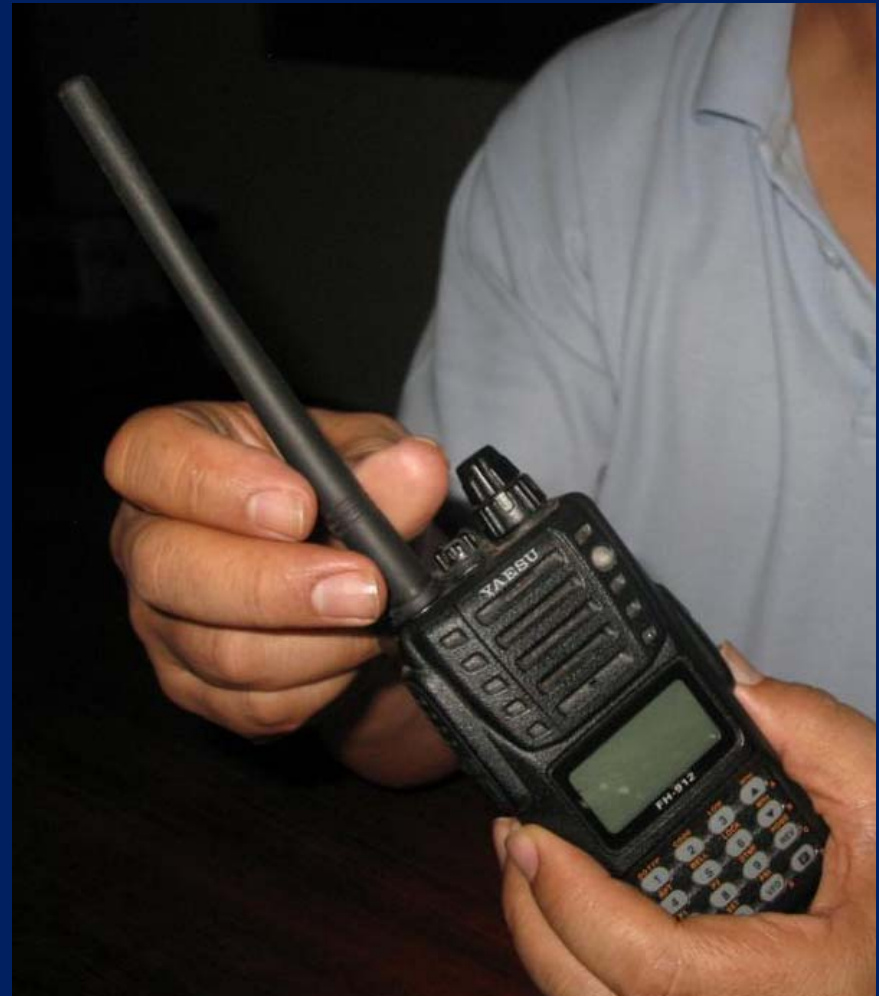


The antenna has an SMA male connector (center pin).

The radio has an SMA female connector (center socket).

This jack is for connecting optional mic / speaker / headphones

The SMA connector is one of the smaller external radio connectors. The fine threads can be easily damaged.



Basic Set Up

Battery Charger Types

You can't operate the HT without power, and you probably need to charge the battery first.

- Read the instructions on how to charge your battery.
- There are 2 basic kinds of chargers; wall warts and desk top (rapid chargers)

A wall wart connects directly to the radio to charge the battery. Charging can take several hours (e.g. 6+).



With a desk top or drop in charger, the battery or the radio is put on the charger. Charging can take a few hours (e.g. 3-5).

For any charger, check what kinds of batteries it can charge. Desk top chargers are usually an option. They are larger and cost more.

Check the manual to see if the radio can be used while being charged.



Basic Set Up

Battery Charging

Start by charging the battery. This will take some time and you can finish reading the manual while you wait.

Before charging your batteries use a pencil eraser to clean the battery terminals and the battery contacts on the charger.



A thin film of oxidation creates electrical resistance that can seriously affect charging efficiency.

Keep track of the start / stop time to get a full charge. Be careful not to “over charge” the battery. Remove it from the charger as soon as it is ready.



Basic Set Up

Charge Date Tags

When a battery is fully charged, remove it from the charger. Put a tag on the battery with the date when it was last fully charged.



Photos courtesy of RTC-TH

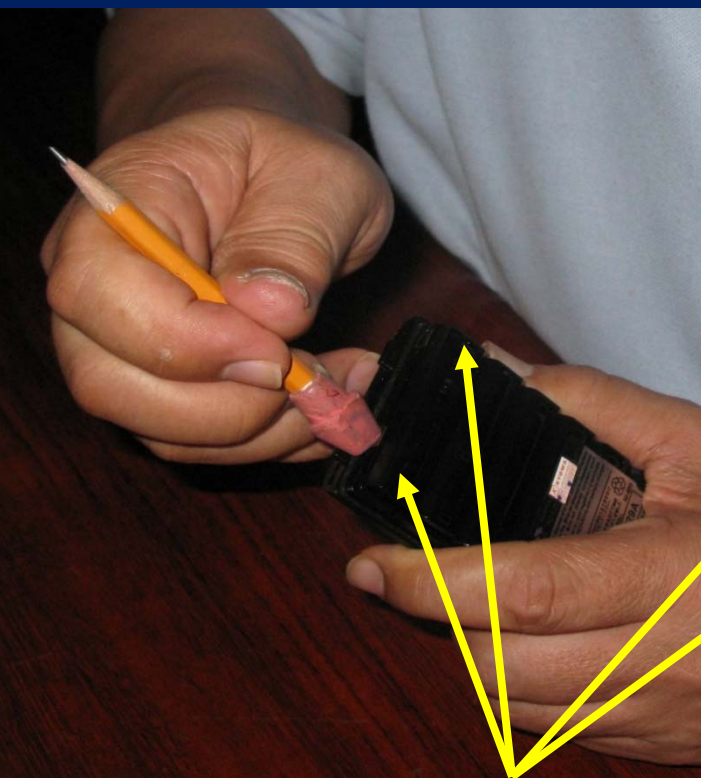
Rotate your “main” and “spare” batteries to “exercise” them. Check the charge status every 3 months. Fully discharge a battery (especially NiCd batteries) before charging them even if it means leaving the radio “ON”.



Basic Set Up

Attaching the Battery

Get into the habit of always cleaning the battery terminals and battery contacts in the radio any time you change the battery.



Clean the battery terminals.



Clean the battery contacts.

Even a thin layer of oxidation adds resistance to the circuit reducing battery power preventing effective use of even fresh batteries.



Basic Set Up

Attaching the Battery

Be sure the radio Power switch is turned "OFF".

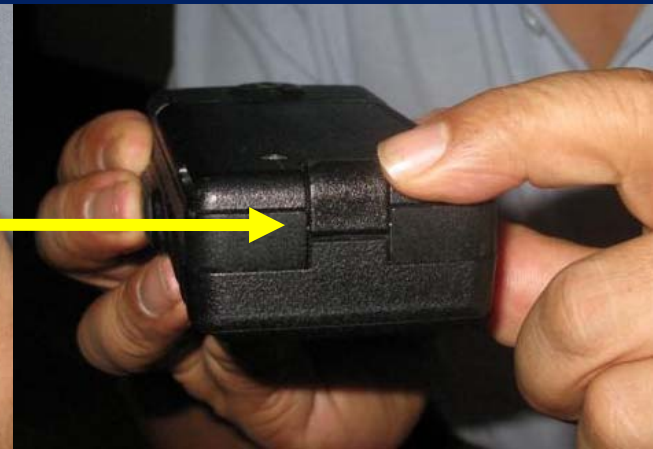
Attach the battery to the radio. Do not use excessive force.
Align the battery locking tabs and edges to the points on the radio.



Tabs at the top of the battery
hook into slots in the radio.



The battery nests inside
the rim of the radio body.



Securely fasten the battery
latch to lock it in place.

Photos courtesy
of RTC-TH

Be careful NOT to drop the radio battery.
It can be damaged and may not work properly.



*Any time a battery is not mounted
on the radio, take precautions the
terminals are not shorted out.*



Basic Set Up

Battery Terminal Protection

This “snack” size plastic zip bag prevents the battery terminals from accidental shorts when stored in the radio pouch. Protect the terminals any time a battery is NOT mounted on the radio.



Photo courtesy of RTC-TH



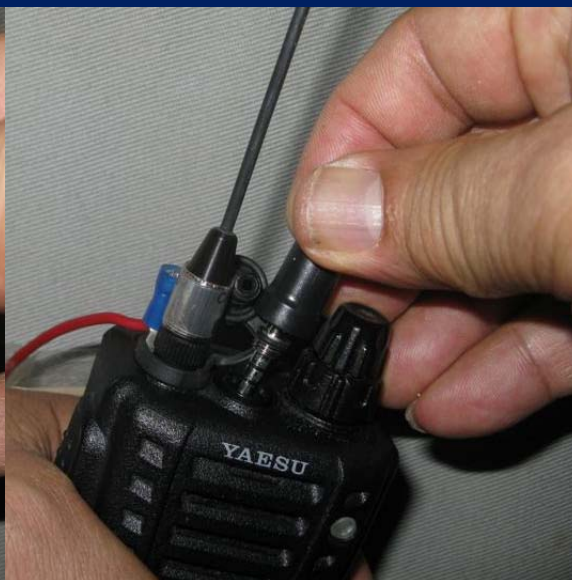
Basic Set Up

Attaching the Ear Bud

Specific instructions may vary for different radios. Refer to your radio instruction manual for details.



Brand name accessories cost money. "Third party" accessories may be less, but not all connectors and plugs are the same so make sure the accessory is intended for your make/model HT, and even then...."let the buyer beware."



Turn the power switch "OFF". Open the access cover to the headset / mic / speaker jack on the HT. Firmly insert the plug for the ear bud unit. You are good to go.



Review Lessons

You may want to review the Battery information found in Lesson 2 in the section on the GERC EmComm HT.

The Basic GERC EmComm HT

This is the suggested RTC-TH / GERC basic HT EmComm system


- 
- High gain whip Antenna rather than “rubber duck”
 - Headset
 - Spare battery & AA Battery pack
 - Carrying case / bag
 - Power adapter cord
 - Reference cards
 - plastic bag “rain coat” (a clear baggie)
 - “Tiger Tail” ground radial (easy home project)



Photo courtesy of GERC

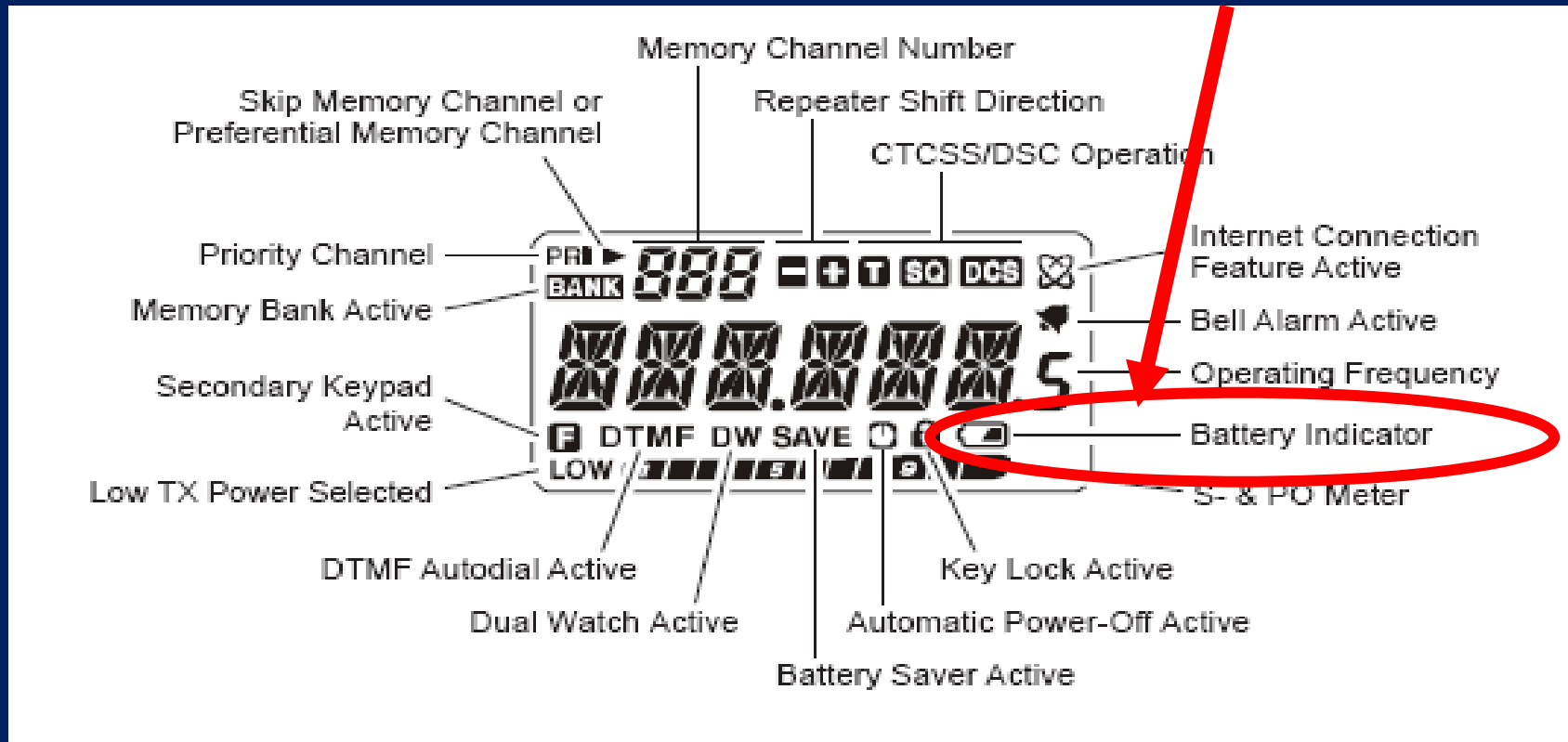
KENT (KD6BOO) with his HT in a fashionable GERC vest

Consider getting everything at the start.
If you get things a little at a time, some items may not be available later.



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Some radios will display a battery icon in the LCD screen showing the battery level.



Generally your power consumption is based on your “duty cycle” (amount of time spent transmitting vs. receiving). It takes more power to send than to receive. Read your manual for more ways to reduce power consumption and conserve battery power.

Some radios have keypad commands to get a battery level status report of the battery voltage.

For example, on my Yaesu FH-912 the keypad sequence is:

- Press [**F**] then [**0/Set**] to get Menu
- Turn **Dial** to select menu item 12 “DC VLT”
- Press [**F**] to show present voltage
- Can press [**PTT**] to see drop in voltage on TX
- Press [**F**] then [**PTT**] to return to normal operation.



You can also use a VOM (Volt-Ohm Meter) to measure the battery level.



Photo courtesy of RTC-TH

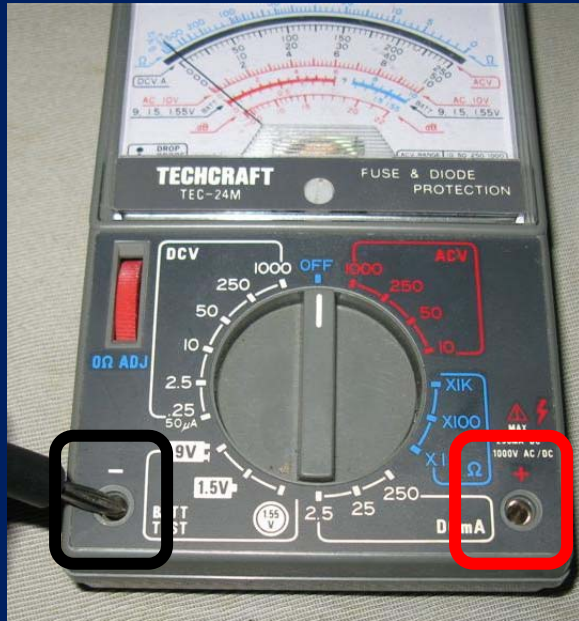
If you don't already have one, consider buying an inexpensive one for your Go Bag. It is easy to use and can do some very handy simple tests as you do more in Ham radio.

You might be able to borrow one from a Ham

This particular meter will measure AC / DC volts, Ohms, DC milliamps, and test 9V, 1.5 V, and 1.55 V batteries.



Setting up the VOM (Volt-Ohm Meter) to measure the battery level.

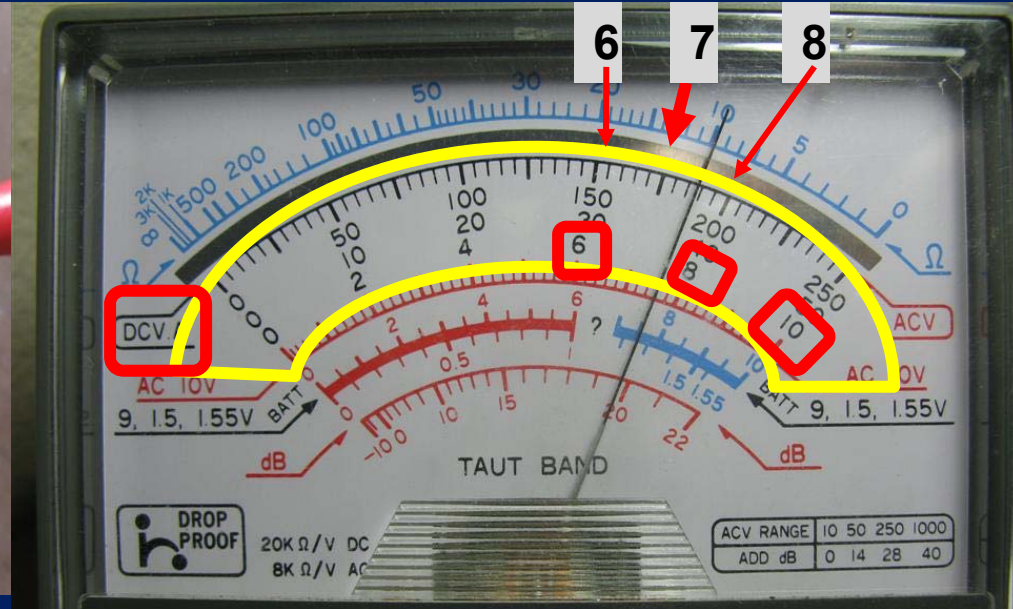
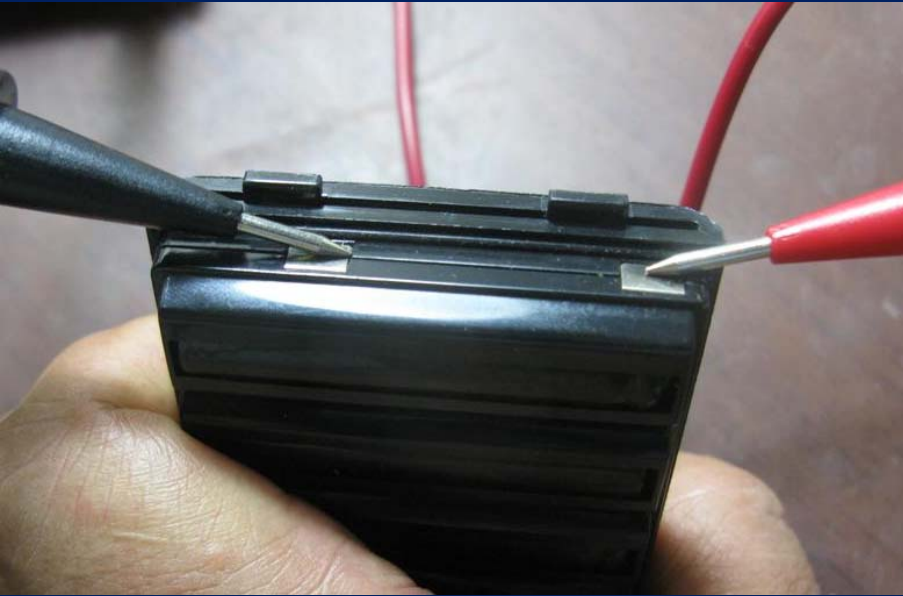


Insert the test leads:
black to “-” negative;
red to “+” positive)



My radio battery is rated at 7.2 V;
Turn the selector dial to “10 DCV”
[Standard practice is to select a voltage
higher than the battery being tested so
you won't damage the VOM.]

Using a VOM (Volt-Ohm Meter) to measure the battery level.



Touch each test lead to the matching battery terminal (black to “-” negative; red to “+” positive).

Read the scale for 10 DCV. The reading is ~7.2+ V. So this battery is fully charged.

When you are done, turn the meter “OFF”, remove the test leads, and properly store the unit until you need it again.

HT Care: Protection

Avoid Sunlight

Don't leave your HT in the sun on your dashboard.

Not all UV rays are created equal.

- UVC is blocked by ozone in the upper atmosphere.
- UVB is blocked by most types of glass.
- UVA is ~90+% of the UV reaching the Earth's surface and can pass through glass.

Not all glass is created equal.

- Ordinary (clear)—allows up to 75 % of UVA to pass through.
- Reflective (can see in one direction better than the other)—allows 25 to 50 % to pass through.
- Tinted—allows 25 to 50 % to pass through.

Remember, absorbed short wave radiation is converted into heat!



Photo courtesy of RTC-TH

Thailand allows front windshield to be tinted.



A sunshade gives more UVA protection; but don't leave your HT in a locked car. See next slide.

Photos from the internet: educational fair use clause.



HT Care: Protection

Avoid Heat

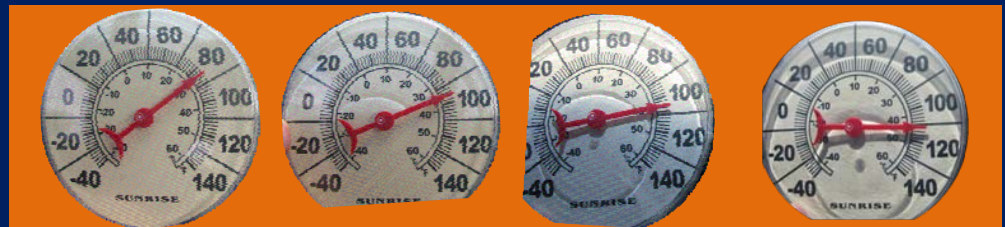
Don't bake your HT on the dashboard in the sun.



Thailand allows front windshield to be tinted, but it still gets up to 42°C / 110°F inside the vehicle.

The heat may damage your HT and it will shorten the effective life of its expensive battery. It's best not to leave your HT in a hot car.

Temperature inside a locked car can be 30-40°F more than the outside air temperature.



The temperatures at 1 hour intervals in a locked car on a clear summer day in Thailand from 1000-1300 hrs.



HT Care: Protection

Rain / Dust Shield

High gain
whip
antenna

Plastic
bag dust /
rain shield

“Tiger” tail
counterpoise



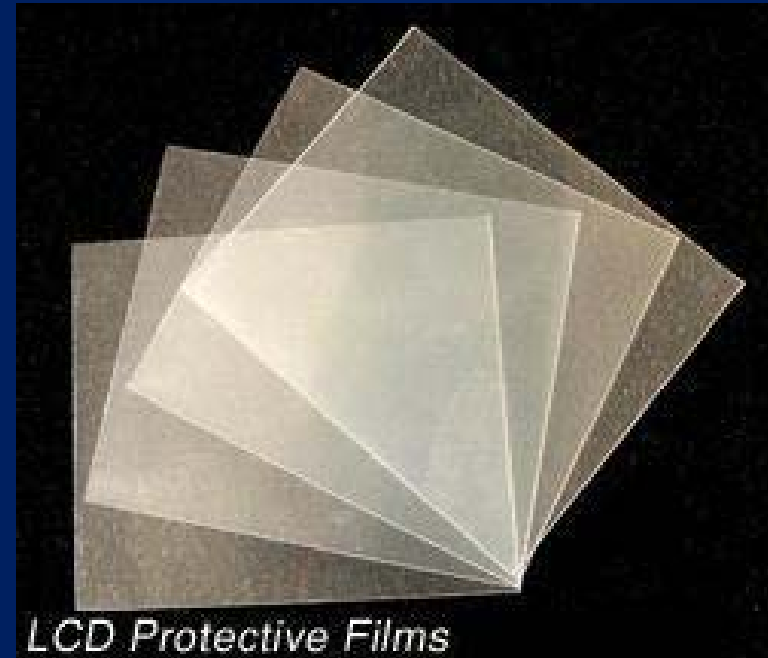
- Get a plastic bag big enough to fit around your hand as you hold the HT
- Cut a tiny hole for the whip antenna to fit snugly through the bag
- If conditions are particularly wet or dusty, use tape to close the antenna hole.
- If using a headset, punch another hole in the bag and seal it as needed.

This isn't “waterproof”; it's more like a raincoat. So be careful because things can still get really wet.



Consider getting LCD screen protecting film like that used on digital cameras and cell phones.

Once the screen is damaged it may be hard to read clearly.

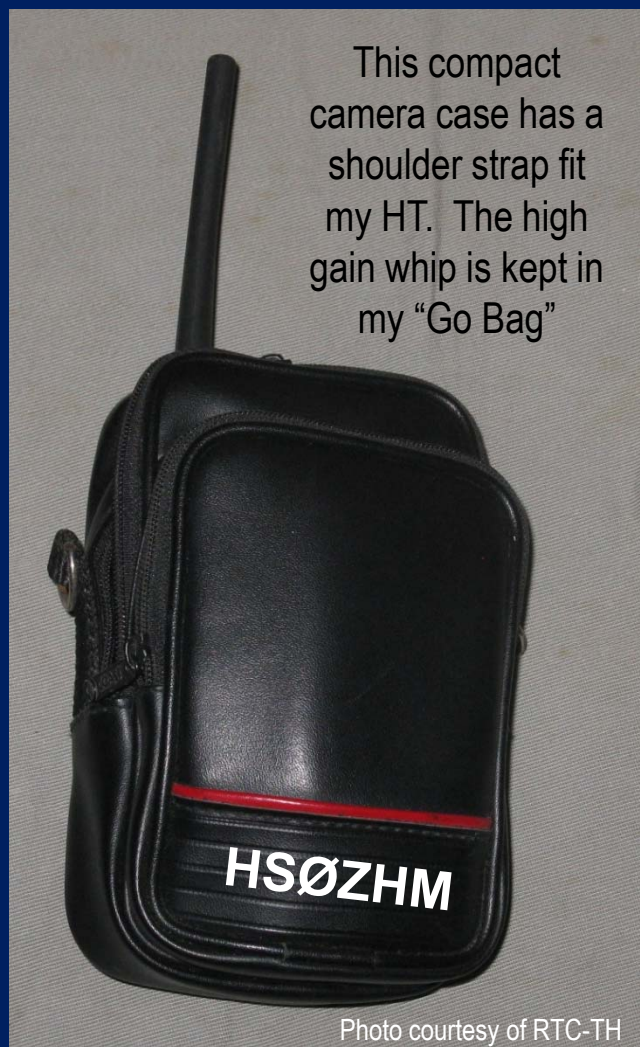




Many HTs come with a belt clip or a “wrapper” like a cell phone “sleeve” or “jacket”. OK, so they gave you something. But consider dumping those in favor of a bag or pouch so you can keep extra batteries with the HT.

My personal feeling is that belt clips invite HTs to slip from your fingers subjecting them to drops and falls (neither of them do much good for the HT or your wallet when it comes to repairs or replacement). But then again, maybe its just me being Mr. “fumble fingers”.





Most HTs are built tough but there's no sense to drop testing one unnecessarily. I found this padded camera bag at the 99¢ Store.

It is big enough to hold my HT, spare NiMH battery and the AA battery pack with 12 AA batteries, small note pad, pen, radio reference cards, whistle, and a combination thermometer / compass.



HT Care: Protection

RTC-TH Radio Pouch

These are the basic essentials in the HT radio pouch in the previous slide. This is a bare bones RTC-TH EmComm radio pouch.

- HT radio
- “Tiger” tail
- Spare NiMH battery
- AA battery pack & 12 AA batteries
- combo magnetic compass / thermometer
- Sight ruler
- Notepad and pencil
- Radio reference card
- Whistle
- Small flash light / spare batteries



HT Care: Protection

Carrying it in the field



Photo courtesy of GERC

This HT with a speaker mic is in a belt pack with a pocket for extra batteries.

It is important to have extra battery power close at hand.

Remember, no power = no radio.

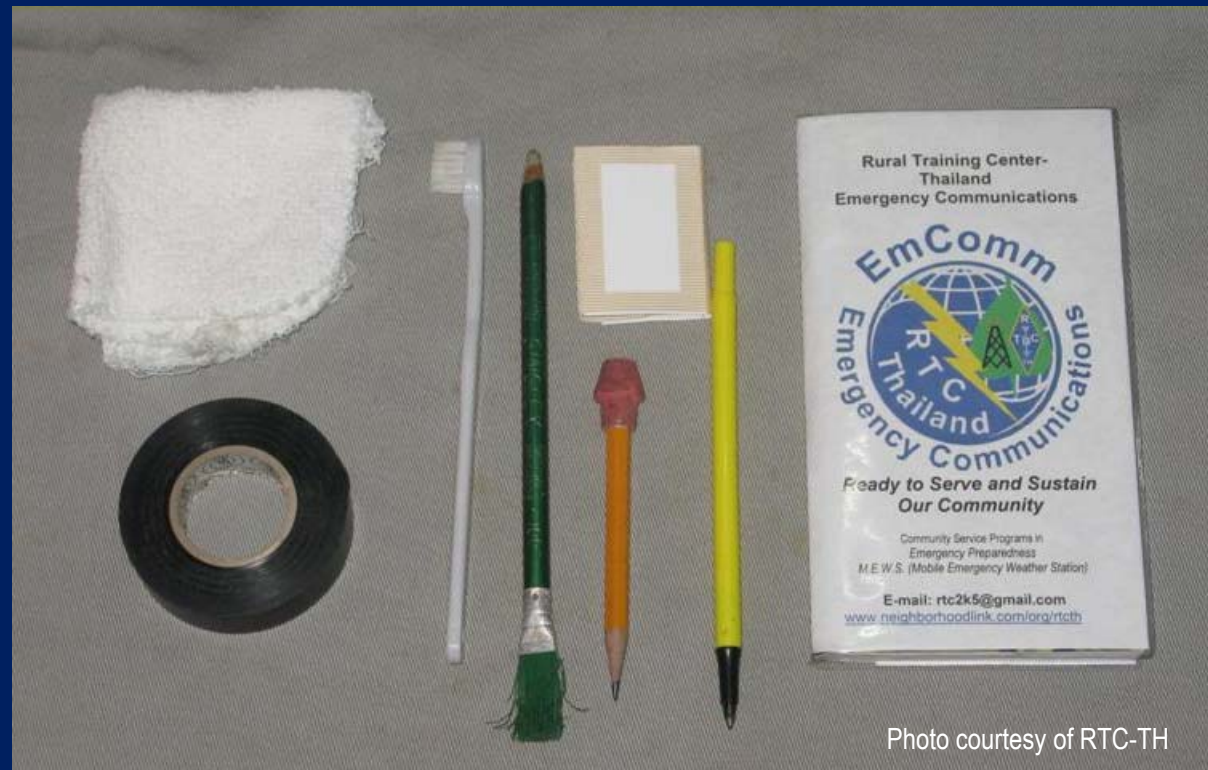


HT Care

Simple Care Kit

Read the instruction manual about cleaning your radio. Generally a soft, damp cloth is best. Avoid solvents and cleaners. The items in a simple care kit easily fit into a plastic sandwich bag.

- Soft cloth
- Old toothbrush
- Roll of electrical tape
- Erasers (pencil and typing)
- Small adhesive labels and pen
- Pocket calendar



HT Care

Basic Tools

Add these items to the Simple Care Kit from an earlier slide:

- VOM (Volt/Ohm Meter)
- Small tool kit
- Small hex or allen wrenches

Use the VOM to check batteries as some radio battery terminals don't fit common battery testers.

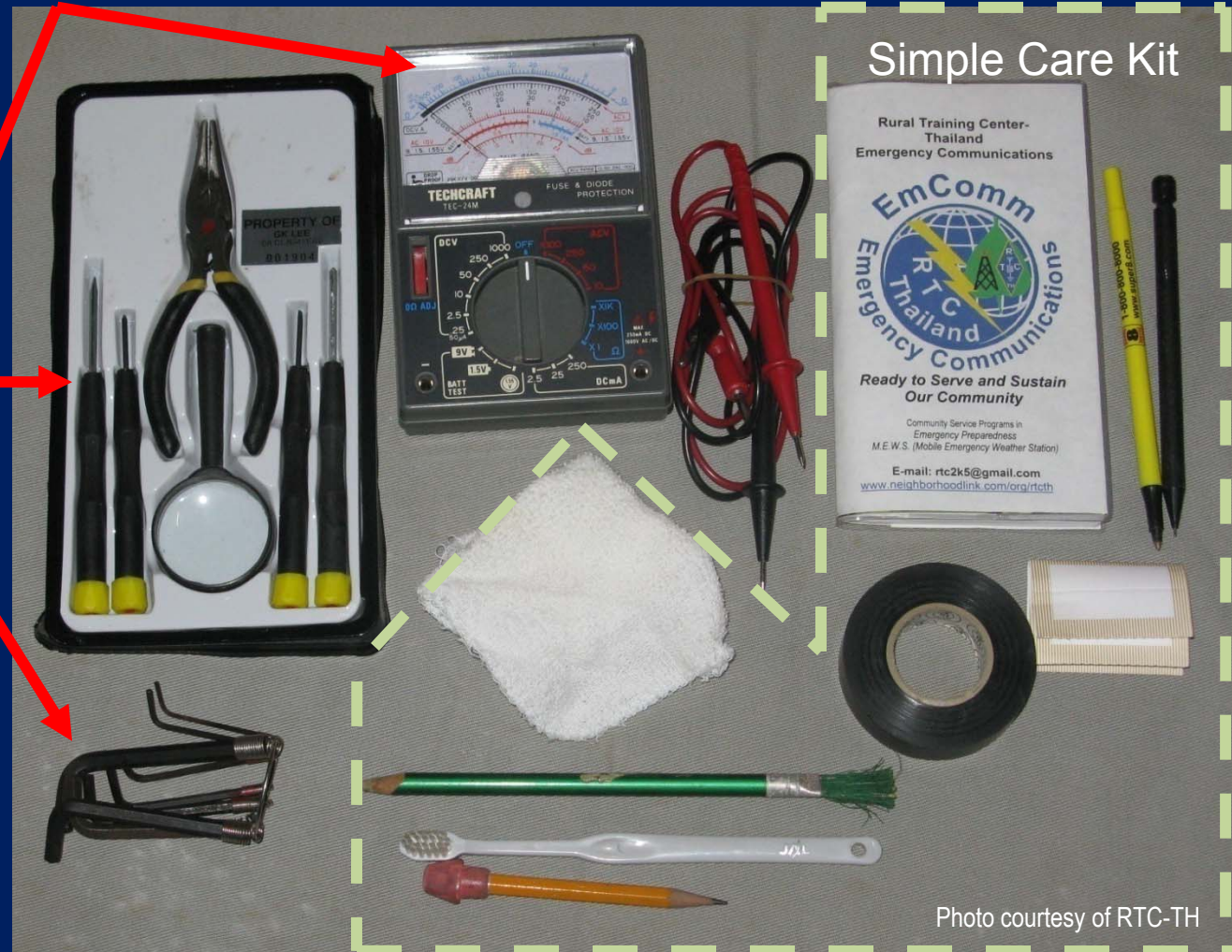


Photo courtesy of RTC-TH



To learn more about this topic visit www.hamuniverse.com/toolsandtest.htm

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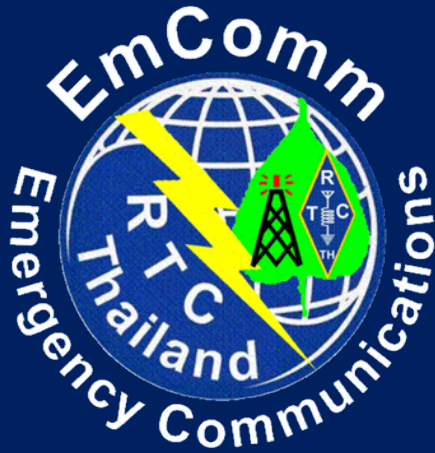
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Community-based Education for the Amateur Radio and Emergency Communications



The End

(of this lesson; the beginning of more amateur radio adventures)



Continue past this slide to see assorted footnotes of more details of some of the topics in the lesson.

When it comes to EmComm planning, you are wise not to put all your power supply eggs in one basket. Diverse alternative energy sources give you flexibility and a higher probability of operating success

Think in terms of “what if” any particular power source was no longer available. Then how would you operate? And how long could you operate?

We are not striving for a “magic” number. You need to know the capabilities of your station and then operate within those limits so you don’t over commit and then fail to perform when others may be relying upon you.



Warning about rechargeable AA NiMH batteries.

Read your radio instructions carefully regarding AA battery packs. My Yaesu FH-912 / VX-170 AA battery pack instructions says NOT to use rechargeable batteries. Only alkaline batteries should be used.



Photo courtesy of RTC-TH

Check your owner's manual to see if NiCd/NiMH rechargeable batteries can be used in the radio's AA battery pack.



More HT Feeding

Rechargeable AA NiMH Batteries

Consider using rechargeable AA NiMH batteries.

Check your owner's manual to see if NiCd/NiMH rechargeable batteries can be used in the radio's AA battery pack.

These are for my camera and GPS use 4 AA batteries, so this is my 2 set minimum. They are always in the same "team" of 4.



Photo courtesy of RTC-TH

For some people, using these kinds of batteries means packing another charger. But I carry this for my camera anyway.



More HT Feeding

External Power

In an emergency, HT battery power, spares, and AA batter packs may not be enough. Learn about tapping into other power sources is a good back up plan. Here are some of the more common external power supplies you might find:



Car battery
12 VDC



Photo by RTC-TH

Gel Pack
12 VDC



Deep cycle battery
12 VDC



Solar panel



Generator
12 VDC / 110 VAC /
220 VAC



You may want to connect your HT to the 12 VDC power in your vehicle. This can be via the power accessory socket .



In Thailand, cars still have cigarette lighters, so with an accessory socket, we have 2 possible outlets.



If mounting a mobile VHF radio in your vehicle, using the accessory power socket is NOT the recommended way to power the radio.

The using car's accessory power socket is quick and easy. Be sure the 12 VDC power cord delivers the correct voltage to your HT. Check to be sure the radio's power switch is "OFF" before plugging in the power cord. Check your radio's instruction manual for details.



More HT Feeding

External Power Connectors

Be sure to have some of these in your Go Bag just in case you need to connect to external 12 VDC power sources. Many of these connectors enable you to use the HT 12 VDC power cord in the previous slide.

1. Car accessory plug with Anderson PowerPole connectors
2. Car accessory socket with battery clamp connectors



3. Car accessory plug with double sockets
4. Car accessory plug with double sockets and battery status LEDs

Talk with experienced Hams and read reports about EmComm operators in recent disasters to be better prepared for the crunch.



You can connect your HT directly to the 12 VDC battery in your vehicle. You will need to prepare a power cable ahead of time.

Get bare battery clips and make your own cables with different terminals to fit your equipment needs.



Photo courtesy of RTC-TH

Always connect the “+” first, (red cable) then the “-” (black cable). When disconnecting, remove the “-” (black) lead first and the “+” (red) last.

Be sure the 12 VDC power cord delivers the correct voltage to your HT. Check your radio's instruction manual for details.



For normal Ham station operations, 12 VDC auto batteries are not recommended. Better performance comes from 12 VDC deep cycle batteries.

If connecting your HT directly to the 12 VDC battery in your vehicle, put in-line fuses on BOTH cables close to the battery. In case the vehicle ground cable fails, your radio is protected.



Photo courtesy of RTC-TH

For normal Ham station operations, 12 VDC auto batteries are not recommended. Better performance comes from 12 VDC deep cycle batteries.



More HT Feeding

12 VDC Gel Pack

A Gel pack is smaller and lighter than wet lead acid batteries. It has no liquid so there is no hazard of spills, leaks, or toxic / explosive vapors.

- Wall wart to charge from AC power or 12 VDC.
- Output 12 VDC via 2 auto accessory sockets
- Can attach cables to output 12 VDC
- 10 Amp fuse
- Power level LED indicators

We have used these on road trips to supply 12 VDC power when stopped; then recharged the Gel Pack while driving.



Photo courtesy of RTC-TH



More HT Feeding **12 VDC Deep Cycle Battery**

The sealed deep cycle battery is used to feed 12 VDC power to the a 12 VDC distribution panel.

Anderson PowerPole connectors on the lines from the battery permits connection to any other RTC-TH equipment fitted with Anderson PowerPoles. The bolts on the battery terminals are more secure than battery clips.



This is the RTC-TH standard set up for 12 VDC radio power supplies.



Some of the critical concerns about a generator are:

- proper ventilation
- proper grounding
- adequate fuel supply
- safe fuel storage
- generator output voltages

Generator output voltage may not be constant. It is better to use the generator to recharge a 12 VDC battery. Then use the battery to power your radio.



Photo from the internet: educational fair use clause.



More HT Feeding

Solar Panel

If you have a sunny location and clear skies, this is a good option. As with generators, it may be better to recharge batteries and drawing radio power from the batteries.

When it comes to EmComm planning, you are wise not to put all your power supply eggs in one basket. Diverse alternative energy sources give you flexibility and a higher probability of operating success.



Photo from the internet, educational fair use clause.



More HT Feeding Anderson PowerPole Connectors

Use of Anderson PowerPole connectors eliminates the possibility of incorrect polarity when connecting radios to 12 VDC power.

Many EmComm groups have made this connector the standard in their quest for interoperability.



Photos courtesy of RTC-TH

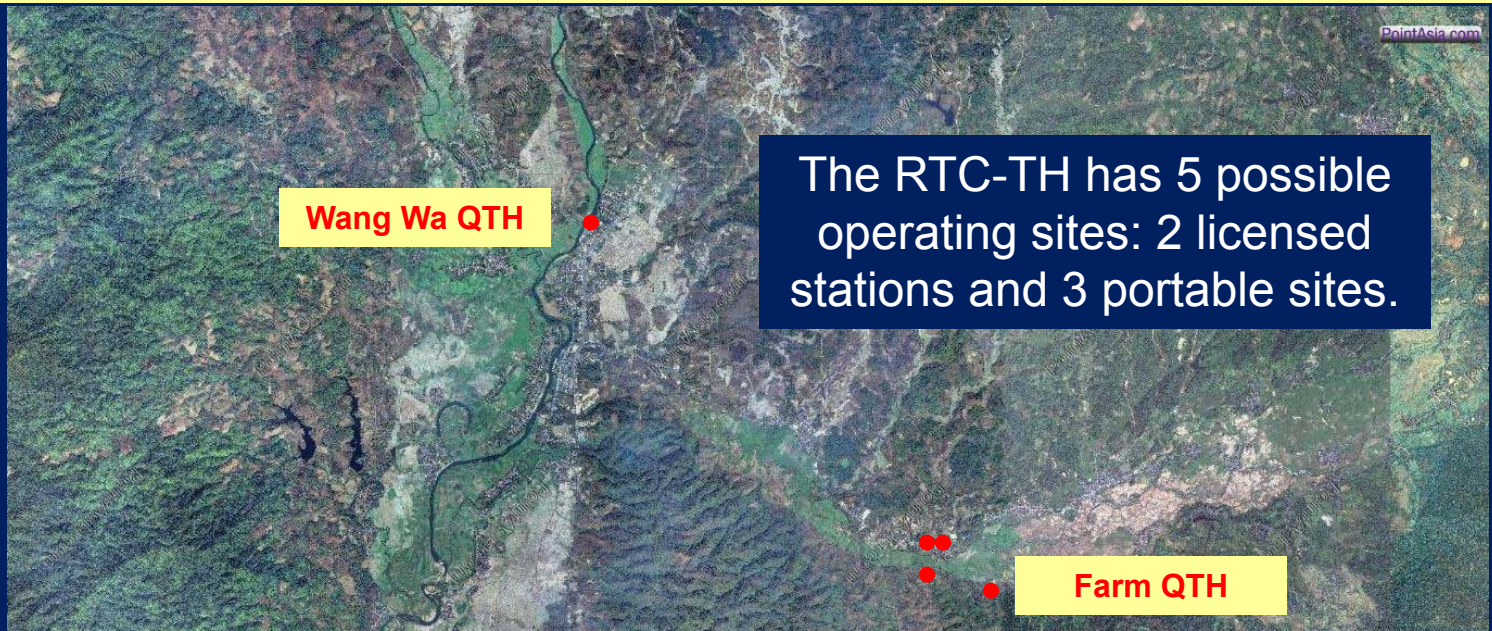
Anderson PowerPole connections are used for ALL 12 VDC power connections for RTC-TH radio equipment.

FFI: <http://www.powerwerx.com/anderson-powerpoles/>



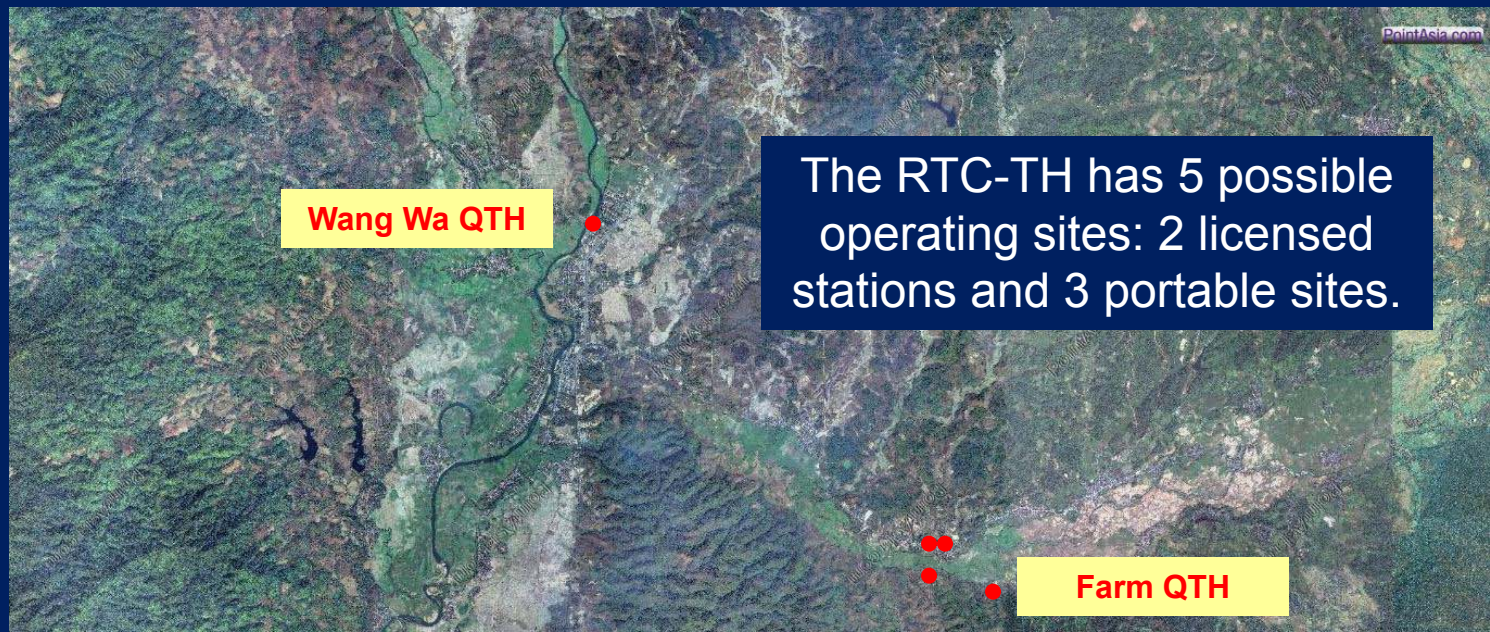
Inter-operability is a multi-faceted buzz word with many functional meanings. Remember: Without power for the radio, the best radio and the best operator can do nothing.

Our primary goal is to correctly connect to a wide variety of power sources with speed and efficiency with the lowest number of adapters needed to make the connection.



Location	Power Availability
Ban Wang Wa Station	220 VAC line power; 12 VDC*
Ban Na Fa (portable site)	220 VAC line power
Ban Na Fa Elem. Sch. (portable site)	220 VAC line power
RTC-TH Hill Top (portable site)	No power
RTC-TH Farm Station	220 VAC; 12 VDC Solar Battery

* Current operations use a 12 VDC deep cycle battery on float charge.
Portable operations use Sparky or Sam which have their own 12 VDC power onboard.



The RTC-TH EmComm policy is to operate **only** on 12 VDC batteries and to NEVER connect radios directly to 220 VAC line power or other sources.

12 VDC is the lowest common denominator for RTC-TH EmComm operations because:

- It is widely available and could be salvaged from and recharged by vehicles or other means IF fuel is available.
- It is convenient for both mobile and portable operations.
- Using 12 VDC for normal operations means in an emergency there is no need to change over procedures or power sources.
- Power connections at all 5 potential operating sites are the same.

Anderson PowerPole connections are used for ALL 12 VDC power connections for RTC-TH radio equipment.



More HT Feeding

DC Power Distribution Panels

All RTC-TH 12 VDC power distribution panels are fitted with Anderson PowerPole connectors.



The RIGRunner panels (in Sparky, top photo; in Sam, bottom photo) came with Anderson PowerPole fittings as standard.



The MFJ panel in the Ban Wang Wa station did not come with Anderson PowerPole fittings. We made these “adapters” so the panel can be used with Anderson PowerPole connectors. The panel for the farm station has not be set up yet.

Any RTC-TH EmComm radio can be set up at any operating site and connect to any RTC-TH 12 VDC power distribution panel. No other adapters or cables are needed as all equipment uses the same Anderson PowerPole fittings.



HT Sky Hooks

Replace the “Duck”

In Lesson 2, we encouraged you “Dump the Duck” and replace it with a high gain whip antenna. Replacement is easy. Make sure the radio is turned “OFF”. Remove the “rubber duck” and replace it with the high gain whip that you got.

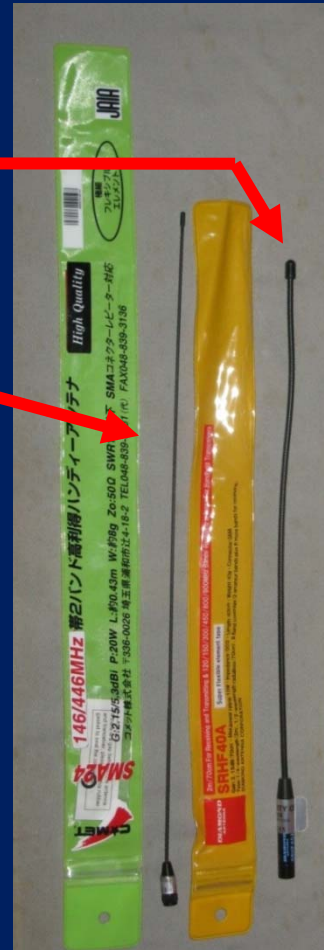


The thick whip is a Diamond SRHF40A

The thin whip is a Comet SMA24

If you haven't done so, do it now. The added boost in signal helps.

Keep the rubber duck antenna in case you store or want to sell the radio in the future.



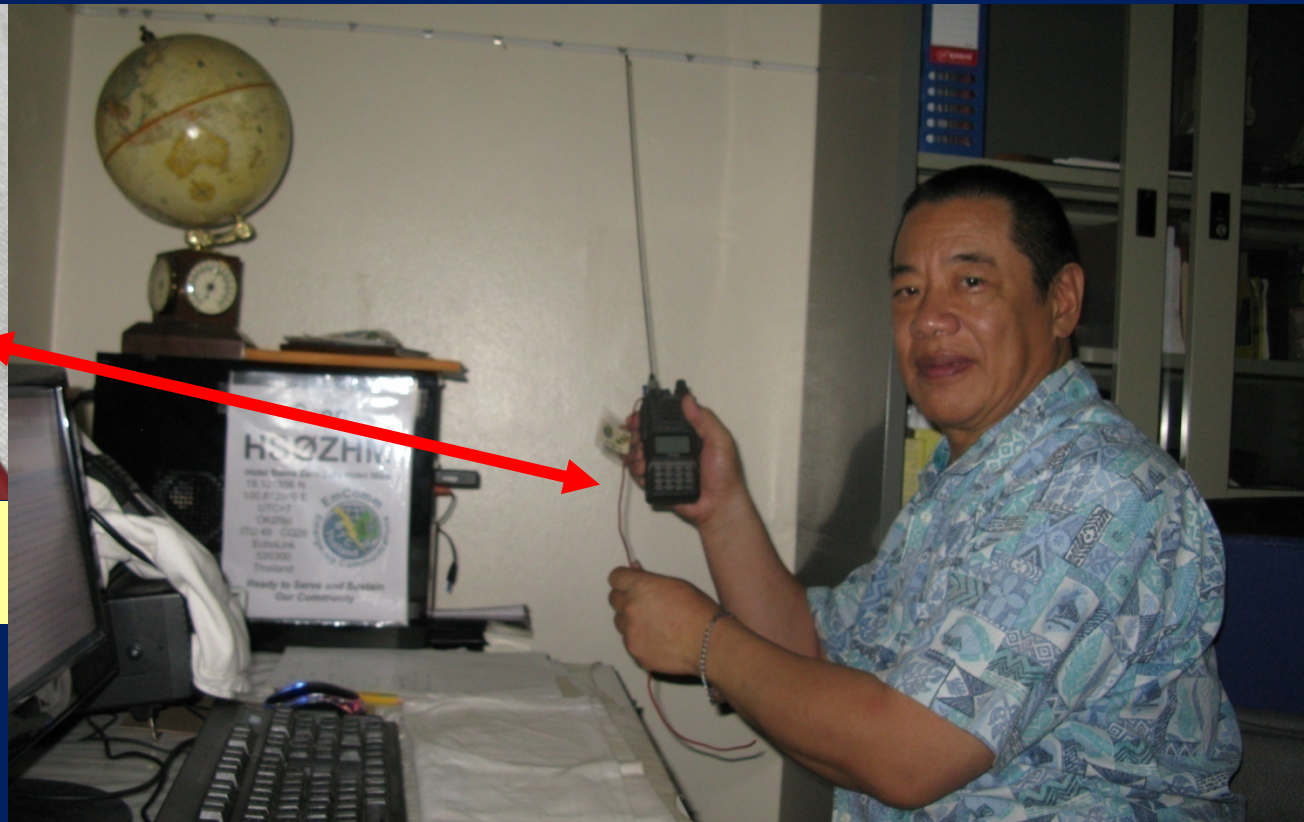
HT Sky Hooks

“Tiger” Tail

In Lesson 2, we encouraged you to make and use a “Tiger” Tail



If you haven't done so, do it now.
The added 3 dB boost in signal helps.



A tiger tail is a $\frac{1}{4} \lambda$ counterpoise for the HT's vertical antenna giving ~ 3 dB boost in transmit / receive. Keep the tail vertical though some users report directionality if pointing the tail toward the intended receiving station.



HT Sky Hooks

“Tiger” Tail

Installing the “Tiger” Tail is easy. Remove the antenna from the HT, then...



... position the “Tiger” Tail over the SMA connector and re-attach the antenna.



This is a fairly easy project to do. Contact GERC and suggest a “pot luck” project meeting to do this with a group of Hams.

Visit www.hamuniverse.com/htantennamod.html for details.



“Standard” antennas for HTs are often short and compact. Anything longer than $\frac{1}{4} \lambda$ becomes cumbersome and reduces the ease of using an HT. Also, the SMA antenna fitting may not be strong enough to support a larger antenna mounted directly to the HT.



Photo courtesy of RTC-TH

Early tests putting guyed towers on HTs proved to be a dead end idea.



HT Sky Hooks

Car Mag Mounts

A magnet mounted antenna on your car roof is an easy first external antenna for an HT. Two different sizes are shown as examples: $\frac{1}{4} \lambda$ whip “button” mag mount, and a larger $\frac{5}{8} \lambda$ whip on a larger NMO mag mount.

With mag mounts, you don't need to drill holes in the car. The antenna can be removed to get into the garage. Removing the antenna also conceals the fact that you have a Ham radio in the car. If traveling for business, mag mounts can be put on rental cars.



Don't leave a mag mount in place long term or uneven sun fading of the car paint may occur.



Two very important thoughts on mobile operating:

- Sudden, rapid deceleration (a crash that went to college and got a PhD) turns HTs and magnetic mount antennas into potentially deadly missiles.
- Regular driving is already a multi-tasking challenge. ANY additional distraction adds to the risk. Always exercise good judgment and keep safety first when operating mobile.

The RTC-TH practices a modified “mobile” operating mode called “Stop ‘n Park”. So we are not literally “mobile” (i.e. underway in motion while transmitting). This may not be suitable for all EmComm operators, but it works for us. Everyone should operate within their comfort zone and limitations.

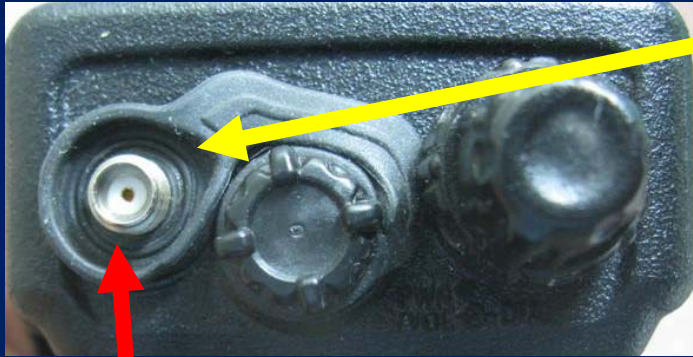
When driving, your #1 duty is to maintain control of the vehicle at all times.



Welcome to the bigger world of Ham radio and “real” antennas! The basic wisdom about antennas: the bigger and the higher, the better.

But to get your HT to connect to these “real” antennas, you need to get some adapters and connectors. And you need to learn a new alphabet soup of names / terms.





Most HTs have an SMA female connector. So your adapters must have an SMA male connector on one end, and an adapter that fits the external antenna connector.



Adapting to an external antenna begins with an SMA male fitting on one end of the adapter.

Two very common antenna fittings are the PL-259 (which is male) and the BNC male.

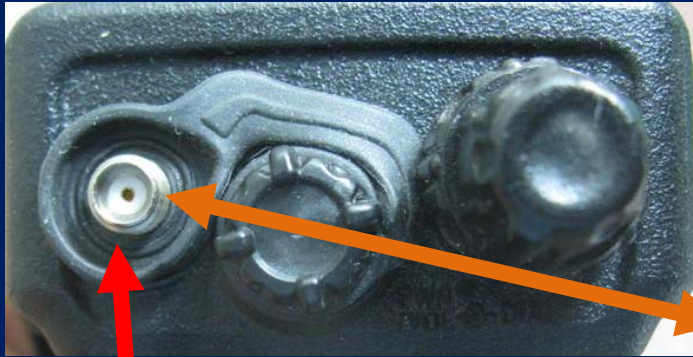


The BNC male fitting has a center pin and 2 external “bayonet” slots for the adapter locking pins.



HT Sky Hooks

SMA Adapters

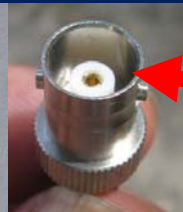


The PL-259 is a very common fitting on antenna coax cable



Adapting to an external antenna begins with an SMA male fitting on one end of the adapter.

The SMA male / SO-239 adapter is an SO-239 fitting (a socket) matching the PL-259 center pin



The SMA male / BNC female adapter has a BNC socket in the center the 2 external bayonet pins to match the BNC center pit and 2 external bayonet slots on the antenna BNC fitting



Organize and protect your connectors / adaptors



Clearly identify the connectors / adapters and keep them clean. You save time finding the right fitting when you need it. Clean connectors reduce signal loss in the radio / antenna system.

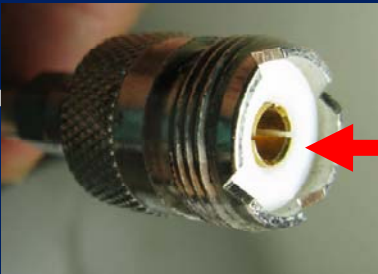
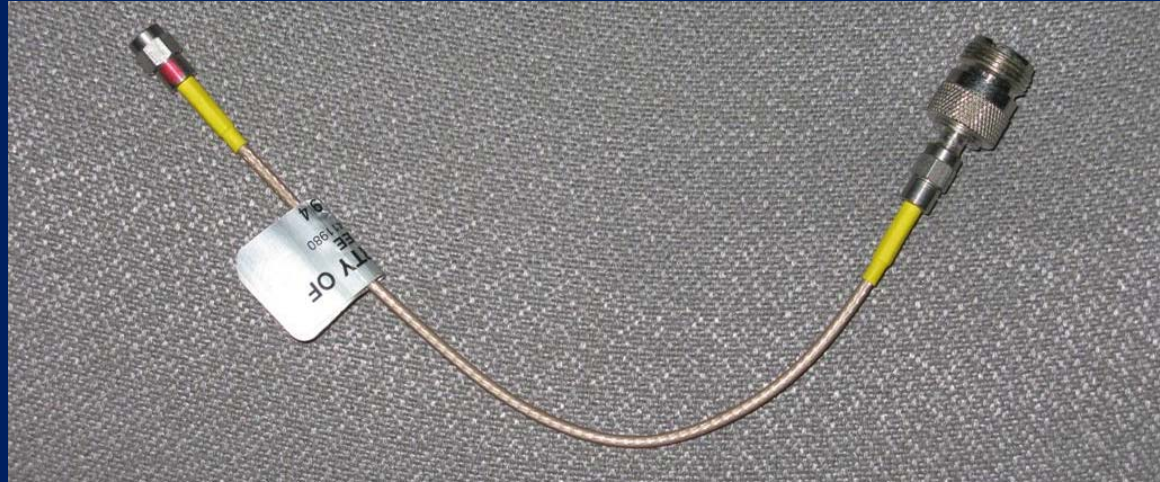


Cardboard, rubber bands, and “snack” size zip bags and a label keeps connectors neat, clean, and easy to find.

A pigtail is an adapter with a length of cable between the two ends. This gives more flexibility and “reach” between the radio and the connection to the antenna fitting.



The pigtail begins an SMA male fitting on radio end of the pigtail.

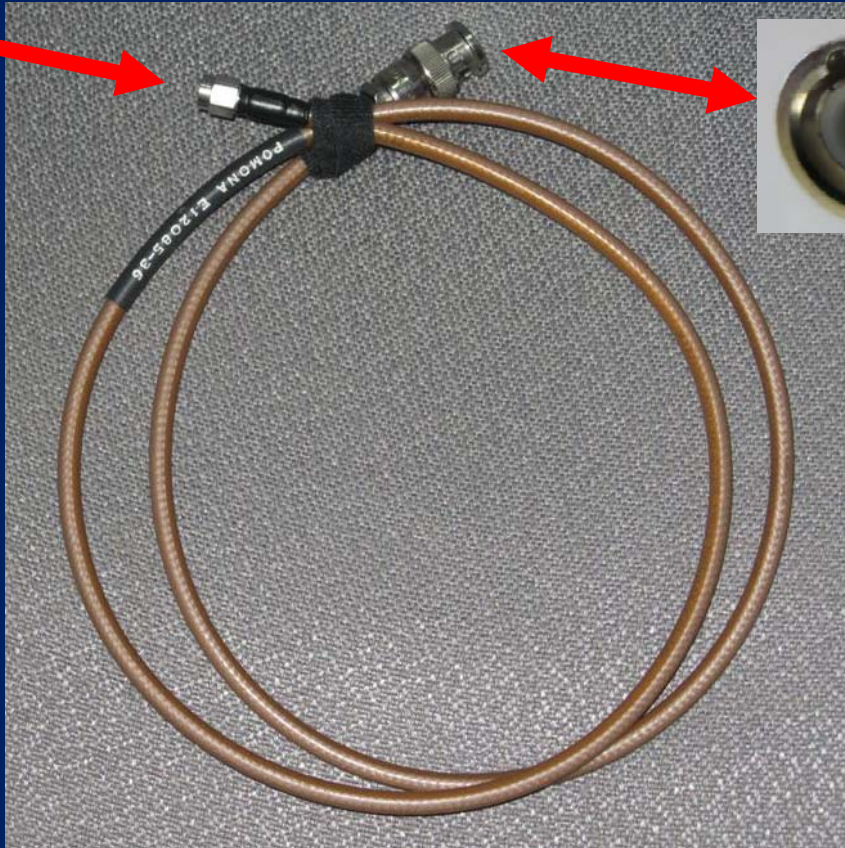


The pigtail can take stress / strain off the SMA fitting on the radio.

The SMA male / SO-239 pigtail has an SO-239 fitting (a socket) to match the center pin of the PL-259 on the coax



The pigtail begins an SMA male fitting on radio end of the pigtail and a BNC female fitting to connect to the BNC male fitting on the antenna coax.



Pigtails come in a variety of lengths and connectors to suit your needs. When it comes to pigtails, follow the Goldilocks rule: not too long, not too short, but just right.



The mount and whip have a combined height of 51 cm / 20 inches. This is a compact antenna to take of a business trip and mount on the roof of a rental car. These antennas often use a BNC male fitting.



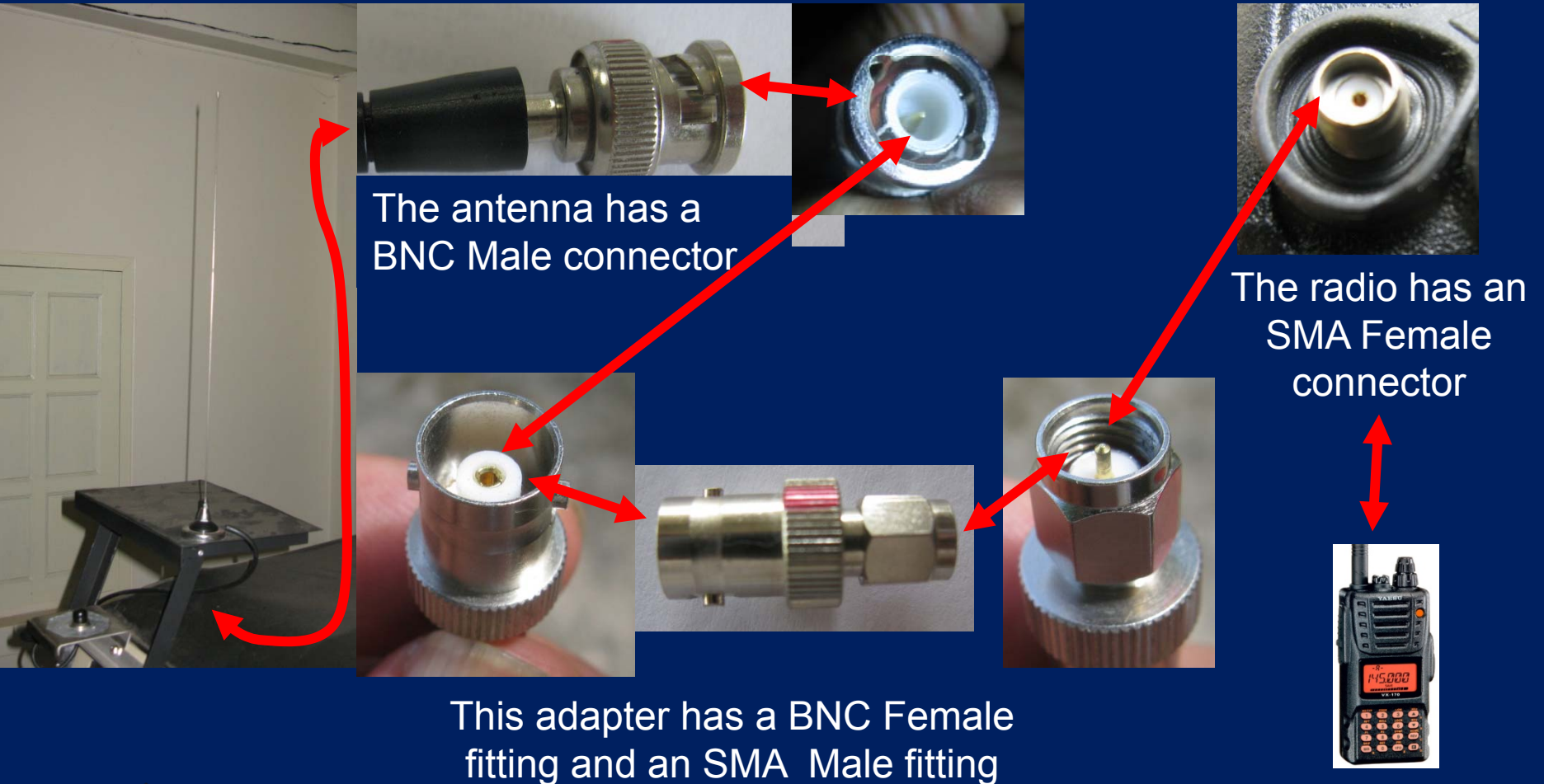
This requires an SMA /
BNC female adapter.



HT Sky Hooks

SMA to BNC Sequence

This adapter lets me connect my HT to the “button” $\frac{1}{4} \lambda$ magnetic mounted antenna on Sparky, the “Batt-mobile”



*Get the appropriate connectors for your needs AS YOU NEED them.
It doesn't make sense to buy adapters / connectors that you won't be using.*



The mount and whip have a combined height of 133 cm / 52 ¼ inches. Magnetic mounts do not require drilling holes in your car. These antennas often use a PL-259 fitting.

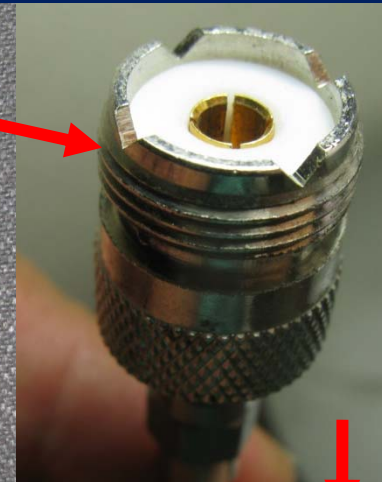
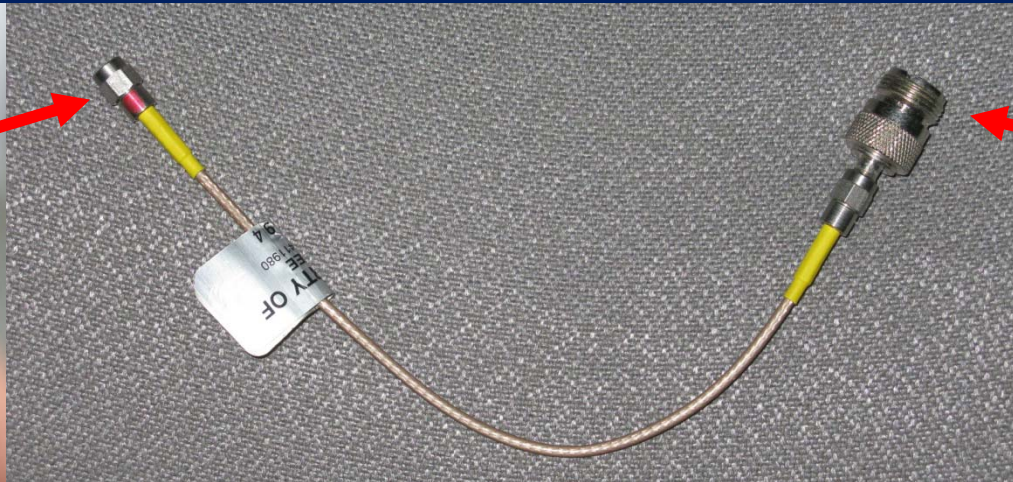


This requires an SMA / SO-239 adapter.





SMA Male to fit SMA Female on Radio



SO-239 fits PL-259 on Coax



This “Pigtail” lets me connect my HT to other larger antennas that use regular RG8 and RG8X coax feed lines I carry on Sparky, the “Batt-mobile”.

Photos courtesy of RTC-TH



A side by side view of the magnet surface areas of the Button and NMO Mag Mount.

Both magnets hold their respective antennas securely in place and require an effort to remove them.



The Button magnet total surface area: 19.63 sq cm / 3.14 sq in.



The NMO magnet total surface area: 86.59 sq cm / 15.9 sq in.

It takes a tremendous amount of 2-handed effort for me to remove the NMO magnet mount from the roof of our pick up truck.

No matter how strong the magnet is, they can detach in a crash and become deadly missiles moving at tremendous velocities.



HT Sky Hooks

Measuring SWR

As the distance between the radio and the antenna increases, the transmitted signal may get weaker before it actually leaves the antenna system. SWR (standing wave ratio) is an indication of how well your signal is getting out to the world.



Photo courtesy of RTC-TH

This SWR meter is for VHF/UHF only. To test my 2m VHF antenna, I set the Frequency / Power selector to 144 MHz in the 30 Watt range. My HT is transmitting in the 144 MHz region at a power of 5 watts.

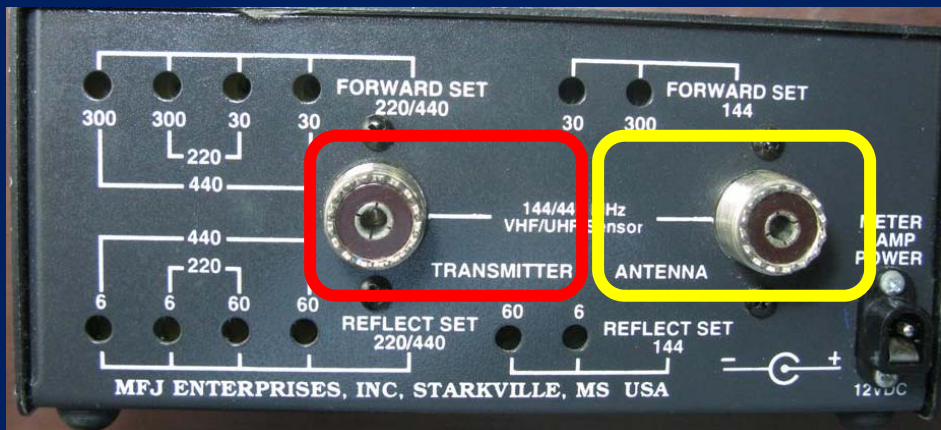
One advantage of being in a radio club is the potential of sharing in the cost of various test equipment. This can keep the co\$t\$\$ down when you are first starting off. “Elmers” (more experienced Hams who mentor “newbies”) are another option.



HT Sky Hooks

Measuring SWR

You will need a short coax jumper cable to connect your HT to the SO-239 connector marked **“Transmitter”** on the back of the SWR meter. The coax from the antenna goes to the SO-239 marked **“Antenna”**.



Coax to HT

Coax to Antenna

One advantage of being in a radio club is the potential of sharing in the cost of various test equipment. This can keep the co\$t\$ down when you are first starting off. “Elmers” (more experienced Hams who mentor “newbies”) are another option.



HT Sky Hooks

Measuring SWR

So here's the basic set up for the SWR test of my HT and the $\frac{1}{4} \lambda$ button whip mag mount on Sparky



[Note: Please ignore the garage wall and pretend we are outdoors for the test. Let's just call it "artistic license" among friends ok? Cut me some slack for gosh sakes!]



HT Sky Hooks

Measuring SWR

Turn on the radio. Use a low power setting. Listen for a clear frequency. I key the mic and say “HSØZHM, monitoring”. At the same time, I watch the SWR meter dial very carefully.



Read the meter where the 2 red needles cross each other. This reading is showing about 1.1 : 1 SWR.

Photo courtesy of RTC-TH

It doesn't get much better than that folks!! Readings of 1.5 : 1 are considered good. Some folks operate fine at 2 : 1. At 3 : 1 you could damage your radio.



HT Sky Hooks

Measuring SWR

Note: This was a very simplistic overview of one of the most misunderstood topics of Ham radio. The actual SWR measuring process can get very involved and includes calibrating the meter

and making several back and forth measurements, adjustments, re-measurements to the antenna to get a good result.



Photo courtesy of RTC-TH

To learn more about SWR, a good starting article can be found here:

www.hamuniverse.com/testingswr.html



Protect your coax connectors from dirt and grime by making slip on dust caps.

These were made using 15 mm / 5/8th inch I.D. tubing, a heavy duty staple, and nylon thread to tether the dust cap from being lost



Photo courtesy of RTC-TH

Dust, dirt , grime, moisture and oxidation all serve to degrade the performance of your connectors. Keeping things clean goes a long way toward good performance.





Photos courtesy of RTC-TH

Using different adapters gives me flexibility to use my HT with a variety of antennas for different purposes. The cost of adapters and antennas can be less than another radio!

HT Sky Hooks

RTC-TH HT Goes Portable



I use the “Pigtail” with an SO-239 fitting to connect my HT to the VHF antenna switch in Sparky. I can then switch between the 2m Slingshot beam (left) and the 2m 450Ω ladderline Slim Jim vertical antenna .

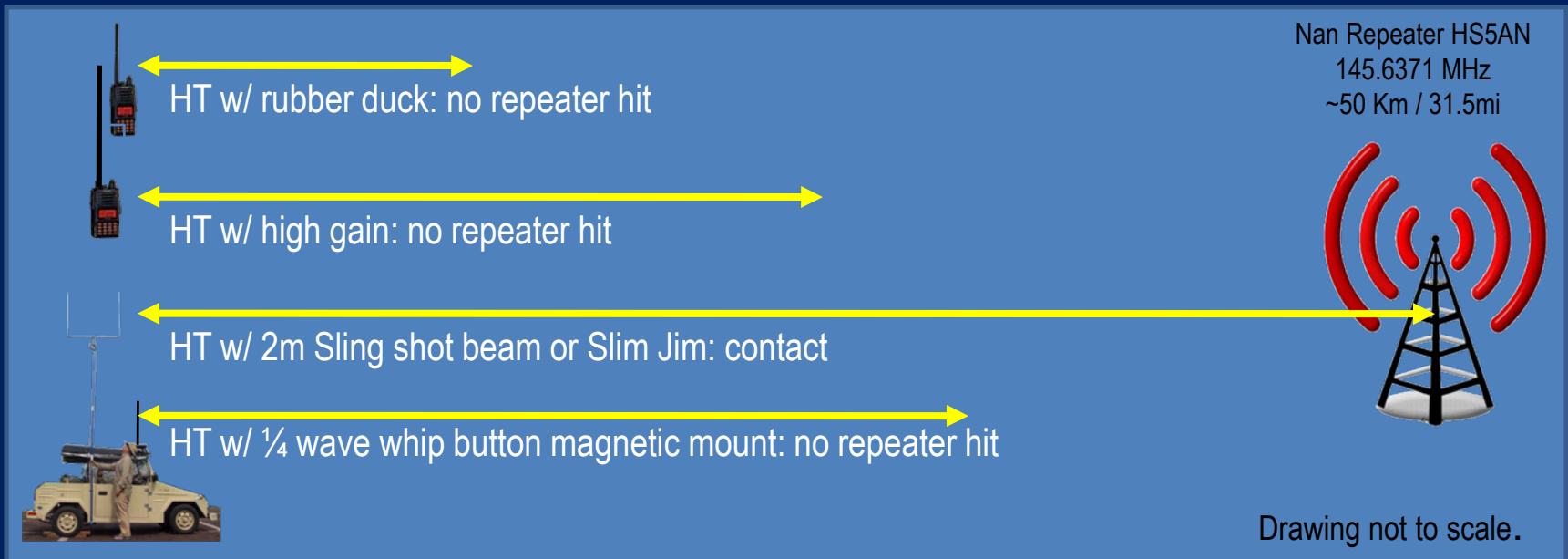
Photos courtesy of RTC-TH



The operational flexibility to have a directional beam antenna and an omni-directional vertical antenna increases our chances to operate successfully in an emergency situation.



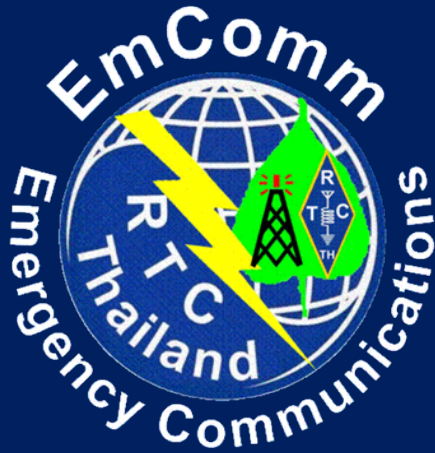
Relative performance of various antennas I use with my HT.



The antenna size, type and height above the ground affects the range of your transmission (along with terrain and other factors). This diagram shows the effective difference in range due to the antenna. In all cases, the same HT was used at 5 watt power setting from the same geographic location.



Community-based Education for the Amateur Radio and Emergency Communications



The End

(of this lesson; the beginning of more amateur radio adventures)

For other lessons in the series visit

www.neighborhoodlink.com/org/rtcth

www.neighborhoodlink.com/org/gerc

