

HEATH TECH INC.

High Sierra AntennAs



Sidekick

Professional Antennas for the Amateur™

HIGH SIERRA ANTENNAS

Heath Tech Inc., High Sierra AntennAs is located in the foothills of the Sierra Nevada Mountains in Northern California near Grass Valley and Nevada City. Production of antennas and accessories began in this beautiful and historic part of California in 1993. This is an area with experienced engineers, sophisticated computerized machine shops, metal shops with state of the art laser cutting equipment and high end powder coating companies.

In the last 11 years, antennas and accessories have been manufactured and sold to a wide variety of customers including Mercedes Benz, Ford, Hyundai, the Army Corp of Engineers, the U.S. Army, the U.S. Coast Guard, C.I.A., the F. B. I., the U.S. Customs Service, Kenwood, Icom, embassies, utilities and amateur radio operators around the world.

Heath Tech Inc. which owns **High Sierra AntennAs** has worked hard to produce the highest quality products at the best possible price. As with our first antennas, others will copy our products but none will have the same high quality. Thank you for purchasing a **High Sierra Antenna**.

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Overview

Please don't call it a screwdriver antenna!

And, please do read this manual.

Congratulations on your purchase of our new, compact continuous coverage motorized **Sidekick**. This new version has several improvements over previous models (HS-750 & HS-900). The major improvement is our new motor. For years **High Sierra** has manufactured its own motors. The new *Black Hawk Motor*TM is a quantum leap forward.

The new *Black Hawk Motor*TM is all metal. It has a very smooth operation due to its bearings. It is also very, very quiet. When the voltage is removed, this motor stops instantly. You can hear, see and even feel the difference.

Parts for our antennas are manufactured using state of the art computer controller equipment. Because of that equipment, we can turn out large quantities to precision standards.



Installing an HF motorized antenna system is very different from a VHF or UHF antenna. A good grounding system, counterpoise or radials is absolutely essential.



Operating this antenna without radials or a counterpoise can cause damage to the main coil. The main coil is tightly wound in order to get coverage from 75 to 6 meters. Operating without a counterpoise will cause high voltage to develop on the main coil which can cause an arc.

Tests with ohmmeters will likely provide misleading information. Antenna analyzers can give incorrect or false information. You should use the transceiver and its built-in SWR meter. Field strength meters may also be used.

Keep in mind that it is very possible to have a high SWR and greater field strength with a properly installed and properly tuned system. For example, many antennas can have a 50 ohm impedance with a corresponding low SWR. But, they are very inefficient as radiators. They have a low SWR but don't radiate very well. A low SWR is not the goal. A strong signal is the goal. So, read the manual, follow the instructions and do the maintenance. You will be very happy with the performance of your **High Sierra Antenna**.

If you have some questions, please try to find the answers in the manual first. There is a troubleshooting section and an index. If you can't find the answers, please go to the website at www.hamcq.com and use the 'contact' us box. Please do not call our 888 order line with technical questions.

Here are some things to keep in mind:

- Use the transceiver's built-in SWR meter to tune the antenna.
- We do not recommend the use of antenna analyzers or ohmmeters. You'll be using a transceiver to transmit not an analyzer or ohmmeter.
- An SWR of less than 2:1 is good. A lower SWR reading will not result in improved performance. In others words, when the antenna system has achieved an SWR of 2:1 or less you can stop. There is no reason for you to seek an SWR that is lower.



Maintenance

High Sierra Antennas has learned over the years that good maintenance is the key to good performance. That's why we are discussing maintenance even before installation of the system

Routine maintenance includes doing the following items:

1. Frequently clean the antenna and check for loose screws.
2. Once a year, wax the powder coated aluminum tube with any brand of car wax. Doing that will maintain the shine of the enameled surface.
3. You can keep the weathershield in good shape by frequently cleaning it with a glass cleaner. We make the plastic parts here at **High Sierra Antennas** with materials that are UV resistant. However, over time, the plastic will crack or fade. Replacement weathershields are always available.
4. Once each year, you should replace the contact spring. That stainless steel spring is subjected to vibration. While many have had the spring last for three or four years, it is prudent to just replace the spring each year. To replace the spring, remove the whip, and weathershield from the antenna. Loosen the three set screws in the collar. Remove the collar. Remove the spring from the collar. If the spring has become deformed, it must be replaced. You can clean the groove that holds the



spring with sandpaper. Do not use steel wool. Fibers from the steel wool can contaminate the main coil. One shorted turn on the main coil can cause it to no longer function! Replacement springs are always available here at **High Sierra**.

5. Make certain that the large washer supplied with the antenna is tightly secured between the top cap of the weathershield and the whip or quick disconnect. Otherwise, water will leak into the antenna and cause damage.
6. If you are using a quick disconnect, clean it frequently.
7. Frequently check all connections for corrosion. Corrosion will change the SWR and lower the performance of the antenna system. Frequently check for loose connections.
8. We get calls from customers because they hear a click in the receiver or the SWR changes rapidly. Both of those are caused by loose connections and not something inside the antenna. **There are no connections inside the antenna's tube.**

In order for the warranty to be honored, the above items must be done. It just makes good sense to maintain the antenna system.

Installation

The first step is to unpack the box

Carefully check all shipping boxes for contents since material is often packed in layers, put in plastic bags and **taped to the inside of the box**. If purchased from **HIGH SIERRA AntennAs**, email immediately if you feel any item is missing. We maintain a packing record for each box and can verify what went into each order.

- **Before you call to say something is missing, please check the entire package. Dump all the pieces out of the box. Almost every week someone calls to say something is missing, when in fact, the item is in the box. If you feel something is missing, email from the website using the contact us form on the website at www.cq73.com.**

If you purchased from a dealer, please contact that dealer if something is missing.

Installing the manual control box.

The control box should be mounted in a convenient location since it will be used to tune the antenna.

The control box is prewired. Simply put the cigarette lighter plug into an outlet. If you do not want the cigarette lighter plug or if it does not fit your outlet, just cut it off. The cable is supplied with a 2 amp fuse. The *Black Hawk Motor*TM draws about 300 ma. when running and about 1 amp at stall. We recommend that the fuse be no larger than 2 amperes.



We have provided the plug for the wires to the motor. You can simply use butt connectors to make the connection to the wires that go to the antenna's motor.

The *Black Hawk Motor*[™] will operate from 9 to 24 volts DC. For home or base use, power supplies are available from **High Sierra**.

The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. The lens on the light assembly may be red or green. It does not matter.

Here are some things to keep in mind:

- You will need to supply 9 to 24 volts DC to the control box.
- The supply needs to provide about 1 amp maximum.
- If the cigarette lighter plug is not needed or does not fit, cut it off.
- Do use a 2 amp fuse.

Installing the i-Box.

The control box should be mounted in a convenient location since it will be used to tune the antenna.

We have provided the plug for the wires to the motor. You can simply use butt connectors to make the connection to the wires that go to the antenna's motor.

Turn off your Icom[™] transceiver. Plug the 4 pin connector into the AH-4 tuner jack on the back of your Icom[™] transceiver. When the transceiver is powered-up, a signal from the I-TENNA control box tells the transceiver that the antenna is connected.



Operation of the i-Box, Powered by Icom

Think of the switch in the control box as having an extra set of contacts that close when the switch is rocked up or down. Each time you rock the switch the motor is turned on and the transceiver will transmit a carrier with reduced power. After the switch is released, the transceiver will continue to transmit for a few seconds giving you extra time to observe the built-in SWR meter. When rocking the switch, tune for an SWR of less than 2:1 and release the switch. The antenna is tuned. It is just that simple.

For Icom transceivers with a built-in antenna tuner, there is a slightly different process. Press and hold the tuner button on the face of the transceiver for about 1 second. When you hear a tone from the speaker, then rock the switch to tune the antenna. As you rock the switch, the transmit indicator on the transceiver will light indicating that the transceiver is transmitting in the tune mode at 10 watts. For practice, do this process a few times.

The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. This is normal and expected. The lens on the light assembly may be red or green. It does not matter.

The i-Box will not function properly with the IC-7000. Please see the next section for information on the i-Box 7000 that is specifically manufactured for the 7000.

Installing the i-Box:-7000

The control box should be mounted in a convenient location since it will be used to tune the antenna.

We have provided the plug for the wires to the motor. You can simply use butt connectors to make the connection to the wires that go to the antenna's motor.



Turn off your Icom™ transceiver. Plug the 13 pin din connector into matching din jack on the rear of the IC-7000. When the transceiver is powered-up, the i-Box 7000 will get the voltage for the motor from the IC-7000 and cause it to transmit when the switch it rocked.

Operation of the i-Box 7000

Because of the firmware inside the IC-7000, it does not have a functioning SWR meter when the transceiver is in the tune mode. That is very different from other Icom transceivers.

In order for the transceiver to indicate an SWR, it cannot be in the tune mode but must be transmitting in RTTY, FM or AM.

So, in order to tune the antenna, push the 'Mode' switch until the IC-7000 is in the AM mode. If you are in SSB, that will take 3 pushes of the switch. Putting the transceiver into AM will reduce power to about 35-40 watts. Think of the switch in the control box as having an extra set of contacts that close when the switch is rocked up or down. Each time you rock the switch the motor is turned on and the transceiver will transmit an AM carrier and the SWR meter will indicate the SWR at the final transistors as it should. When you have obtained an SWR of less than 2:1, release the rocker switch and push the 'Mode' button 1 more time to get back to SSB.



The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. This is normal and expected. The lens on the light assembly may be red or green. It does not matter.

Installing the k-Box:

The k-Box controller should be mounted in a convenient location since it will be used to tune the antenna.

The controller is prewired. Simply plug the 6 pin connector into the back of your Kenwood™ transceiver's tuner jack while it turned off. Power for the motor comes through that jack.

We have provided the plug for the wires to the motor. You can simply use butt connectors to make the connection to the wires that go to the antenna's motor.



Turn off your Kenwood™ transceiver. Plug the 6 pin connector into the tuner jack on the back of your Kenwood™ transceiver. When the transceiver is powered-up, a signal from the k-Box Controller tells the transceiver that an antenna tuner is connected.

Operation of the k-box.

The k-Box controller works a little differently from the i-Box due to the internal circuitry of the Kenwood transceivers. If you are using the Kenwood TS-480HS, please see the paragraph at the bottom of this section. The k-Box handshakes with the transceiver so that it thinks there is an antenna tuner connected. To tune, you first press the 'AT' button on the front of the transceiver. The transceiver will transmit a carrier with reduced power (about 10-15 watts). When the rocker switch is moved, the motor is turned on and the coil will move either up or down. To take the transceiver out of the tune mode, you can press the 'AT' switch again or wait for the transceiver to 'time out.' Most Kenwood transceivers have a tuning time of just under one minute.

When rocking the switch while in the tune mode, watch the transceiver's built-in SWR meter. Tune for an SWR of less than 2:1 and release the switch. The antenna is tuned. It is just that simple.

The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. The lens on the light assembly may be red or green. It does not matter.

For the Kenwood TS-480HX, we have constructed a special control box. The reason for that is that the 200 watt version of the TS-480 will only transmit 100 watts when an antenna tuner is connected. As a result, our special control box for the Kenwood TS-480HX does not communicate with the transceiver. That is, the 480HX will not think that there is an antenna tuner connected and reduce power. Only the voltage for the motor will be taken from the transceiver. We recommend that you program the PF key to be the 'tune' key for the transceiver. It is a simple process discussed in the 480 instruction manual to program the PF key. To tune the antenna with the PF programmed to be the tune key, you will press the PF key and then rock the up/down switch. Watch the transceiver's SWR meter and tune for an SWR of less than 2:1. When the SWR is less than 2:1, the antenna is tuned. The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. The lens on the light assembly may be red or green. It does not matter.

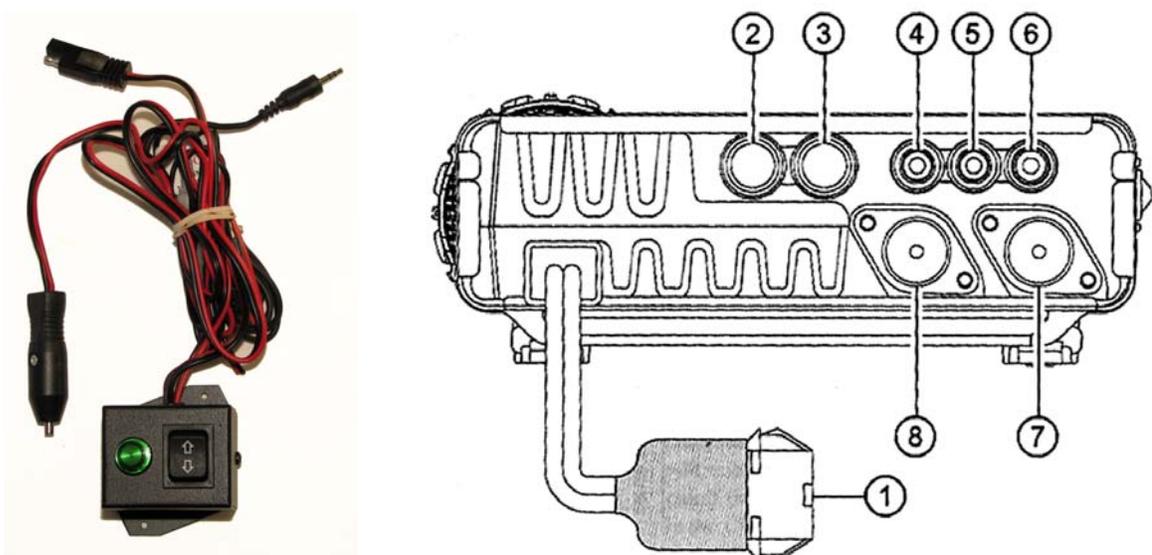
Installing the Universal y-Box, EZ-Tune Controller.

The Universal y-Box Controller should be mounted in a convenient location since it will be used to tune the antenna.

The controller is prewired. Turn off the transceiver. There are three cables coming from the box. One has a cigarette lighter plug. That is connected to your power supply. If you don't need the cigarette lighter plug, then simply cut it off.

The molded black plug with the red/black wires is connected to the matching plug on the antenna. We have provided pig tail connector to help with the wiring.

The third cable coming out of the controller has a three conductor 1/8 inch plug. That is a standard stereo plug. That plugs into the ACC Jack on the back of your FT-857 or FT-897. In your instructions, it is likely labeled number 4 as shown in the picture below.



Think of the switch in the control box as having an extra set of contacts that close when the switch is rocked up or down. Each time you rock the switch the motor is turned on and the transceiver will transmit a carrier. After the switch is released, the transceiver will continue to transmit for a few seconds giving you extra time to observe the built-in SWR meter. When rocking the switch, tune for an SWR of less than 2:1 and release the switch. The antenna is tuned.

The light on the control box will illuminate when the antenna's coil is fully extended or fully retracted. The light may also blink when the antenna's motor is started. This is normal and expected. The lens on the light assembly may be red or green. It does not matter.

Installing the antenna

Make certain that the mount you have purchased is capable of supporting the antenna. Whether the antenna is to be used on a vehicle or at a home/base, the ground, radials or counterpoise must be connected very close to the coax connector. All of those connections should have one point of connection close to the coax connector on your mount.

The all important ground, counterpoise or radial connection

Since the **Sidekick** is electrically a quarter-wave antenna, a good vehicle grounding system, counterpoise or radials is absolutely essential so that there will not be damaging voltages on the main coil. Also, any resistance introduced into the system impacts performance and can also cause high SWR readings. Long ground leads must be avoided.

If the SWR is higher than 2:1, the problem is likely the ground, counterpoise or radial system that you have employed. It is not the result of something inside the antenna.

You **must** use wide, flat strap for vehicle ground leads. **We do not recommend the use of braid.** A counterpoise or radials **must** be connected directly to the mount next to the coax connector.

Here are some things to keep in mind:

- For a ground strap to work, it must be at least one inch wide. You can use the specially designed **HS-GS** ground strap from **High Sierra**.
- **Wire and round cables generally will not work for a ground conductor.** Don't use them!
- Don't use braid. It will corrode over time and affect the SWR of the system. Some braid has a high resistance path to ground. Pinching the braid to put it into a solder lug reduces its effectiveness. Half inch wide braid is roughly equal to #12 wire. In other words, braid is almost useless.
- For a vehicle installation, connect the ground strap to the *sheet metal*. Connecting the ground strap to the frame may not be adequate.
- More than one ground strap may be necessary. That is especially true on 10 and 6 meters.

- The ground strap **must be connected to a screw on your mounting bracket** that is adjacent to the coax connector.
- For home or base use, the counterpoise or radials **must be connected to a screw on your mounting bracket** that is adjacent to the coax connector.
- Not having a ground, radials or counterpoise will cause damage to the antenna.

RF Filter Assembly

The RF filter assembly helps isolate the motor wires from the antenna. This RF filter or choke also helps with noise generated by the motor's brushes. The wires should loop through the bead 2 times. The ferrite bead is brittle and can be broken. So, be careful. We recommend that you mount the filter close to the antenna.



Here are some things to keep in mind:

- The RF filter needs to be close to the antenna.
- The color of the wires through the bead does not matter.
- If you drop the bead, it will crack.

Vehicle Installation

Our experience is that the antenna can function well in several locations on a vehicle. The length of the ground strap should be kept to less than three feet long (from a screw on the mounting bracket to the vehicle body/frame). Sometimes it's a good idea to test the location first.

The ground strap should first be connected to the sheet metal of the vehicle. If the SWR on 20 meters or 15 meters is above 2:1, another strap to the frame may also be necessary.

Use at least 15 feet of coax. Short runs of coax can affect the SWR reading at the transceiver.

Long supports below the antenna can cause matching problems. If you must use a long support, try grounding it first. If the antenna will not tune on one or two bands, try isolating the support from ground.

Ladders on recreational vehicles are also problematic. While many have had very successful installation on ladders, others have had difficulty. Some have found that running a ground strap from the mounting bracket to the metal framing of the RV is all that is needed. Others have had to run one or two radials on the top of the RV. Some have found that metal trim and luggage racks are all that is needed. In other words, some experimenting is necessary for installation on an RV.

If you pull a trailer and plan to mount the antenna on the towing vehicle, make sure there is a good RF connection between the towing vehicle and the trailer. If this is not done, you may soon discover your antenna system has an intermittent connection. The problem is caused by loose (intermittent) coupling between the vehicles through the trailer hitch. A simple jumper cable across the hitch corrects the problem.

The mag mount shown in the picture below will work. **The 'T' type of mag mount that has aluminum strips between the magnets will not work.** With the 'I' type of mount of there is a real poor connection to the shield of the coax. In addition, there is very little coupling to the vehicle.



Trunk lip mounts are available from High Sierra Antennas. Please call for information. Comet and Diamond trunk lip mounts will work when the mount is properly grounded.

In addition to planning where you will mount the antenna, also consider how the cables will be routed. Be especially careful to keep cables and wires away from exhaust pipes, catalytic converters, other bundles of wires and computers.

Note: Your number one concern with installing any antenna is safety. Use extreme care installing and using this antenna.

Another location consideration is the overall height of the antenna system. You risk hitting bridges and over-passes when the antenna height exceeds 13 feet/4m. There are safety considerations as well. **You are responsible for antenna safety.**



Here are some things to keep in mind:

- **You are responsible for safety, safety, safety and more safety.**
- The ground strap should be less than three feet.
- Keep the total antenna height less than 13 feet above the ground.
- Use at least 15 feet of coax between the antenna and the transceiver.
- Some experimenting may be needed.
- Don't drive while tuning!! It's just not worth it.

Base Installation

For a base installation, the radials or counterpoise must be connected to a screw on your mount adjacent to the coax connector. The radials can be as simple as wire that is cut to a quarter wavelength. We have found that wires 32, 16, 11 and 8 feet long will provide continuous coverage from 3.5 to 30MHz. You can also use 8 wires that are 10 feet long. The radials should be spread out like spokes on a wheel.

Generally speaking, burying of radials increases ground losses. So, having the radials on the top of the ground will increase performance.

Like most HF antennas, generally speaking higher is better. However, most of us must compromise. So, if you can put it up on the roof, that is better. If you cannot use the roof, then install the antenna on the ground.

Here are some things to keep in mind:

- **You are responsible for safety, safety, safety.**
- Higher is better. But for some, the antenna must be low.
- Radials or a counterpoise must be used.
- A driven ground stake or grounding rod is probably useless.
- The radials or counterpoise **must** be connected to a screw next to the coax connector.

No matter where you install the antenna, here are some things to keep in mind

- **Think about safety, safety, and more about safety!** Your first concern is making sure that neither you nor anyone else will be injured. Adding a db to the signal strength won't matter if someone is injured.
- **Don't use braid.** Typically, braid is not much better than a small diameter wire. Either use our **HS-GS** ground strap or a flat wide strap of sheet metal. Plumber's tape or pipe strap sold in hardware stores is a very good ground strap. Please don't call to say the antenna won't tune if you have used braid.
- The connection of the ground strap ***must*** be made to a screw near the coax connector.
- Try not to re-engineer the antenna design. With over 10,000 antennas in use around the world, we have worked very hard to make this antenna the best possible.
- A long whip will add signal strength on 40 and 80 meters. The antenna was designed so that whips up to about 9 feet long and capacity hats may be used. However, the antenna will become too long for resonance on 10 meters and perhaps lower frequencies.
- We strongly recommend that there be at least 15 feet of coax between the antenna and the transceiver. \
- Don't DWT (driving while tuning)!

Operation of the Antenna

The ups and downs of the antenna

The following assumes that there is a three foot whip attached to the top of the antenna:

Adjust the control switch so that about 1.5 inch of the coil winding is above the collar. Set the transceiver to a mode that produces a steady-state carrier (AM, RTTY, CW or FM). Generally speaking, you cannot tune the antenna for minimum SWR while in the SSB mode. Set the transceiver to 7200 KHz and reduce power to 10 to 20 watts. Watch the SWR meter and continue to increase the inductance by moving the coil up until a sharp dip in the SWR occurs. Adjust for lowest reading by moving the control switch back and forth. You are now tuned to 7200 KHz. Increase the power to approximately 100 watts and recheck for resonance. Due to the design of the SWR meter, a minor adjustment to the antenna will likely be needed when the power is increased. SWR meters do change readings when the power level is changed.

If your transceiver does not have an SWR meter, you can use the power output meter. Just tune for maximum output which will occur at minimum SWR. It does not matter whether or not you use maximum out watts or minimum SWR. Either reading will result in a properly tuned antenna at a frequency.

The highest frequency occurs at the minimum inductance position. Tuning will be sharp. So watch carefully for the dip in the SWR or the increase in output power. On some installations, the lowest frequency may occur above 3.5 MHz. On some installations, the highest frequency may occur below 6 meters. It is also possible for the spring contact to run off the bottom end of the coil.

Here are some *approximate* positions of the main coil. The measurement shown is from the top turn on the main coil to the top of the collar.

75 Meters 5 3/8 inches

40 Meters 1 7/8 inches

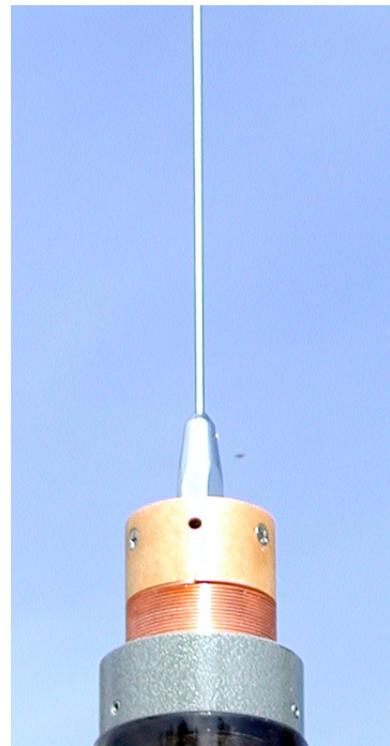
20 Meters 5/8 inch

15 Meters 1/4 inch

10 Meters 1/8 inch

Due to the variables in any given installation, the position of the coil can be different from the dimensions shown above. The above assumes that there is a three foot long whip or its equivalent connected to the top of the antenna. In other words, if you attach a fiberglass CB whip to the antenna, it will not tune the same way.

For added efficiency, a longer whip may be used. The antenna is constructed so that an eight foot whip may be used.



Weathershield removed for discussion only.

Troubleshooting, Questions and Answers

Here are some of the typical questions that we get

Q: *How long is the three foot whip?*

A: **The whip is 36 inches long.**

Q: *I was driving down the road and decided to tune the antenna. I looked down at the transceiver's SWR meter to tune the antenna and my car crashed into a tree. The SWR is now really high. Why did that happen?*

A: **You are not supposed to be DWT (driving while tuning). This is no joke.**

Q: *My antenna on the car has a high SWR on 10 meters. The SWR is 3:1. What's wrong?*

A: **You need to improve the ground connection or add a second ground strap.**

Q: *My SWR is really high. It's 1.9:1. What can I do about that?*

A: **Don't worry about it. An SWR of 1.9:1 is terrific. Did you know that an SWR of 5:1 results in only a 1/6 of an S unit decrease in signal strength? If the SWR is less than 2:1, most transceivers will not roll back power.**

Q: *The SWR on 20 meters is higher than all of the other bands. Why? I ran braid to the frame of the car.*

A: **Well likely there is an inadequate ground connection. First of all, don't use braid. Second, use a flat wide strap. I would add a second ground strap to the sheet metal of the vehicle. You should also try another length of coax.**

Q: *I hooked up the antenna and the SWR is very high. I think the antenna is shorted out. Is that possible?*

A: No, it is not possible for the antenna to *short out*. Replace the coax with some known to be good that already has the connectors installed. The coax should be at least 15 feet long.

Q: *I think something is loose inside my new antenna. When I turn it upside down, I hear a rattle. Should I send the antenna back?*

A: No. What you are hearing are the stainless steel washers on the lead screw sliding down its length. That is a normal sound to hear.

Q: *The coil spins when I try to move it up or down. What's wrong?*

A: The coil cannot spin if the weathershield is tight. The key on the outside of the aluminum tube and keyway in the weathershield keep the coil from spinning. You need to tighten the whip or quick disconnect.

Q: *The main coil won't go up and down. What's wrong?*

A: You first need to check the spring that makes contact with the coil. To do that, remove the whip and quick disconnect. Remove the two screws in the top or bottom cap of the weathershield. Lower or remove the weathershield. Loosen the three set screws in the collar that holds the spring. Remove the collar. Remove the contact spring from the collar. If the spring is not uniform, it must be replaced.

Q: *The spring wore out or is deformed. Why did that happen?*

A: Well, the contact spring is subjected to a lot of vibration. It is made from stainless steel and is a patented device. Over time, it will wear out. We recommend that the spring be replaced about once a year. We tried fingerstock and found that it wore out very quickly and required that the antenna be returned for repair. Fingerstock contains Beryllium which is an extremely hazardous material. We don't want our employees or you to be exposed to Beryllium. The spring is stainless steel, relatively inexpensive and very simple to replace. In addition, it is impossible for the spring to lose contact with the coil. Fingerstock cannot maintain contact over time.

Q: *My SWR is 1:6. What's wrong?*

A: Well first, the SWR is expressed as X:1. So, if you mean the SWR is 6:1, I would check the coax connectors for a short or an open. The best way to do that is to replace the coax with new

10 Year Limited Warranty

High Sierra Antennas have a 10 year limited warranty

High Sierra Antennas and Heath Tech Inc. warrants to the original purchaser of the antenna and accessories are free from defects in material and workmanship for a period of one year from the date of original purchase when used in compliance with the instructions and maintained as shown in this instruction manual.

The *Black Hawk Motor*[™] has a ten year limited warranty. The main coil also has a ten year limited warranty.

In no event shall **High Sierra Antennas** or Heath Tech Inc. be responsible for incidental or consequential damages, nor damage due to misuse or the use of any unauthorized attachment(s).

Damage to the product resulting from accident, abuse, neglect, negligence, alterations, unapproved attachments, alterations or other causes unrelated to problems with material or workmanship are not covered by this warranty.

In the case of manufacturer defects in material or workmanship, High Sierra Antennas agrees to repair or remedy a defect without charge. The purchaser must obtain a return authorization number from **High Sierra Antennas** email using the 'contact us' form on the website at www.cq73.com. The product must be shipped insured via UPS or FedEx with the return authorization number clearly written on the outside of the box. Unauthorized returns will not be accepted.

The returned product must be clean. The product must be properly boxed and protected. Damage as the result of shipping is not covered by this warranty.

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Revised on April 22, 2004. There were a lot of mistakes.