

HIGH SIERRA AntennAs

Instruction Manual
for the
Model HS-1500MKII
Continuous Coverage
Motor Driven
HF Antenna



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Table of Contents

Unpacking.....	2
Assembly.....	2
Installation.....	2
Mounting Bracket	3
Making the Ground Connection.....	14
Matching the HS-1500MKII.....	15
Remote Control Panel	16
RF filter assembly.....	17
Preliminary checks.....	17
Antenna Checkout.....	17
Fine tuning the system	18
Long whips.....	19
Operation.....	19
Precautions	19
Maintenance of the HS-1500MKII	19

**Congratulations on your purchase of the finest *continuous coverage*
HF antenna!**

The HS-1500MKII's superior design and craftsmanship will give you years of service. In order to get the maximum from your new antenna, we recommend you read the entire manual first. However, we know that you are excited about your new antenna and want to install it as fast as possible. So, below are the quick steps to installing the HS-1500MKII.



- Unpack the antenna from the shipping carton.
- Install the mounting bracket making sure that it is well grounded to the vehicle using a short wide ground strap (less than 18 inches long and **at least 1 inch wide**). **We do not recommend the use of braid.**
- Install the antenna in the mounting bracket. Make sure that the insulator is under the stainless steel strap.
- Install the 72 inch whip.
- Connect the coax to the bottom of the mounting bracket.
- Install the remote control panel.
- Connect the control cables to the control panel and to the antenna.
- Test the antenna using 10 watts or less.
- Enjoy the finest *continuous coverage motor driven* HF antenna!

Unpacking

Carefully check all shipping boxes for contents since material is often packed in layers and in plastic bags. Call **HIGH SIERRA AntennAs** 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 everyday some calls to say something is missing, when in fact, it is in the box. If you feel something is missing, please call 530-273-3415.

Assembly

Note: the HS-1500MKII has a long threaded shaft with washers. It is okay to hear the sound of the washers sliding down the shaft when the antenna is inverted.

The HS-1500MKII antenna is shipped fully assembled. See 'Antenna checkout' on page 16 for more information.

Installation

Since the HS-1500MKII is electrically a quarter-wave antenna on most frequencies, a good grounding system is absolutely essential for best performance. Since the total impedance of the antenna at 4 MHz (including losses) is approximately 15 ohms, any resistance introduced into the system (even one ohm) impacts performance. Always try to keep the distance between the base of the mounting bracket (with its associated matching network) as close to the vehicle body/frame (ground) as possible. Long ground paths become a significant portion of a wavelength above 10MHz and will impact the impedance matching system. If the SWR is higher than 2:1 on a band higher than 10MHz, the problem is likely the ground system that you have employed. We recommend a ground strap that is flat and wide. Do not use braid. Braid over time corrodes and will cause problems.

Our experience is that the antenna can function well in several locations on a vehicle. While it has always been good practice to mount an antenna as high and in the clear as possible: unfortunately, higher usually means farther from a good RF (radio frequency) ground. When an antenna must be located more than a few feet from a good RF ground, it's always best to test the location first by temporarily placing the antenna in its mount and positioning the assembly at the selected location.

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

In addition to planning where you will mount the antenna, also consider how the cables will be routed. Be especially careful to keep coax cable away from exhaust pipes and catalytic converters where temperatures can exceed the melting point of the cable. It is

usually possible to route cables under the trunk lid's gasket by drilling a hole through the sheet metal used to support the gasket. With this technique the cable does not need to ride on top of the gasket where it will be pinched when the lid is closed.

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.

Don't forget to remove the whip antenna when entering garages and drive-thru's. We also sell the **HIGH SIERRA Antenna's** 'quick-disconnect' device that allows the whip to be removed in seconds.

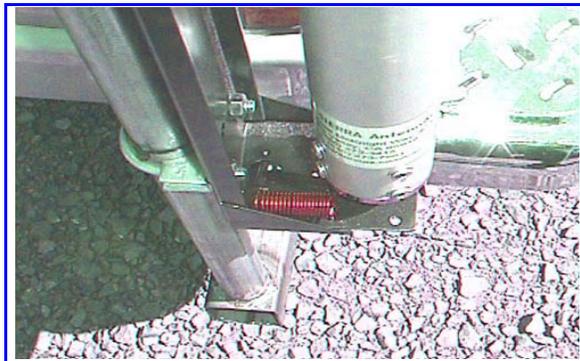
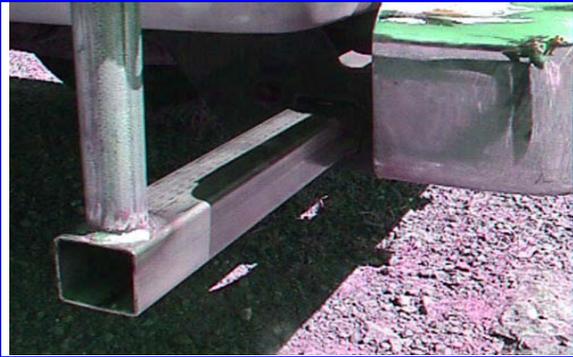


Mounting Bracket

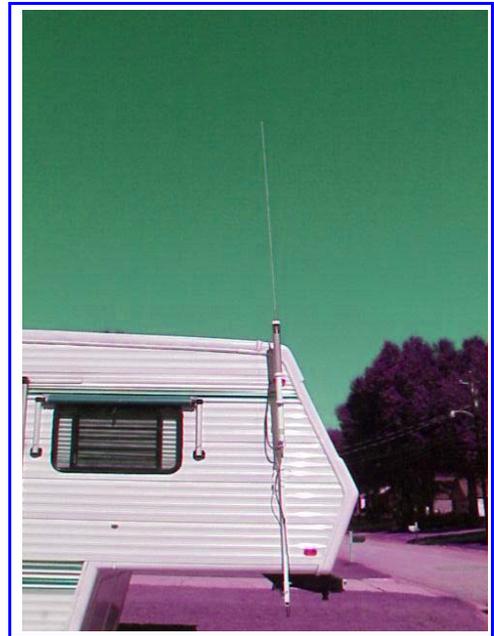
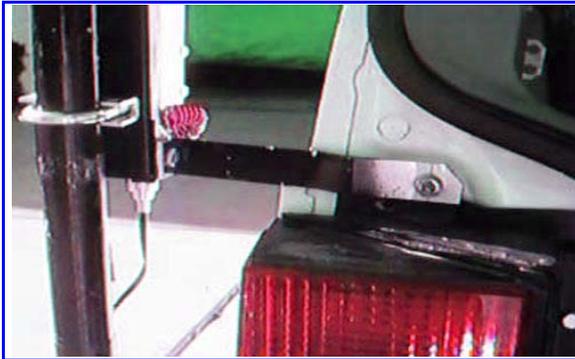
If you want to install an **HS-1500MKII** on a pickup truck, sport utility vehicle, recreational vehicle, family car, balcony, roof, tower or a stake in the backyard, we have the answer! It's the **HS-201C 'Universal Mount'**. It can be adapted to many different installations. There are six holes in the mount. Two holes are on the center line about 12 inches apart. There are four other holes that can be used with the provided u-bolts and saddles so that the mount can be attached to a pipe with a maximum outside diameter of 1 ¼ inches. This very popular mount provides all the support needed for the **HS-1500MKII Continuous Coverage Motor Driven HF Antenna**. The **HS-201C** also has our exclusive 'Easy-Off' tapered brass stud, coax connector and conjugate matching system. The stainless steel clamp at the top of the 'Universal Mount' securely holds the antenna in place. When that is loosened, the antenna can be lifted from the mount.

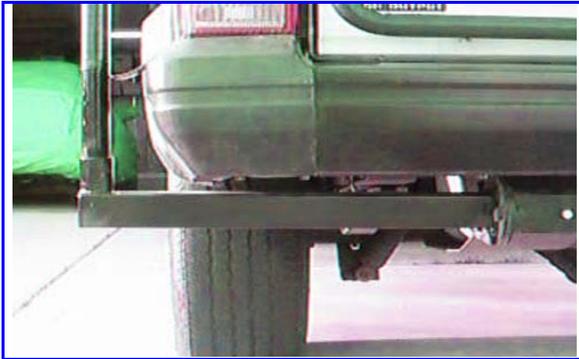


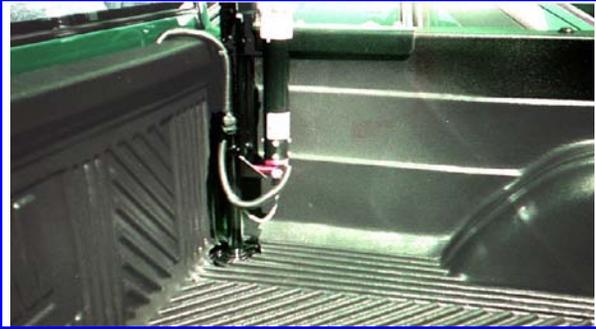
If your vehicle has a 2 inch by 2 inch receiver hitch or the 1.25 inch by 1.25 inch receiver hitch the HS-201C can be combined one of our adapters to provide another method to install your antenna. Some adapters can be folded down to allow for opening the rear door or tail gate.

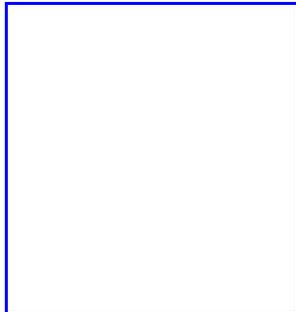
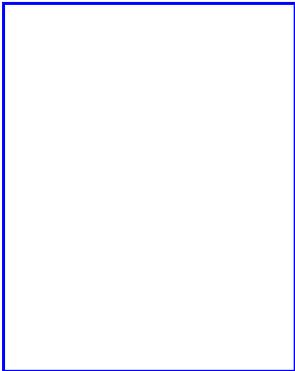


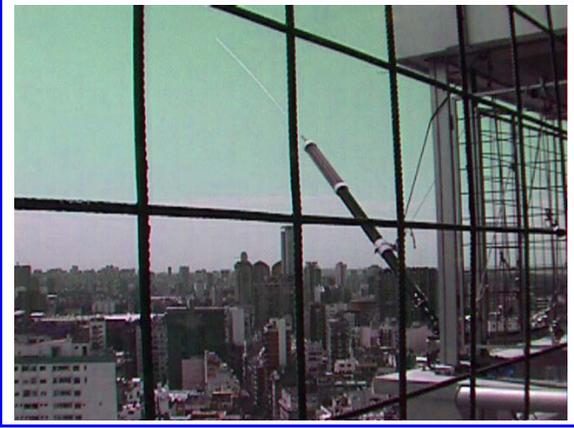


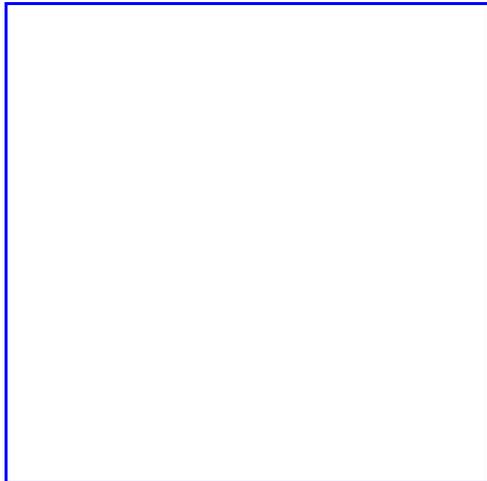
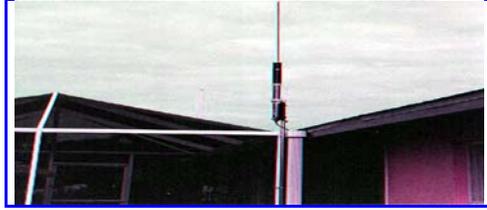


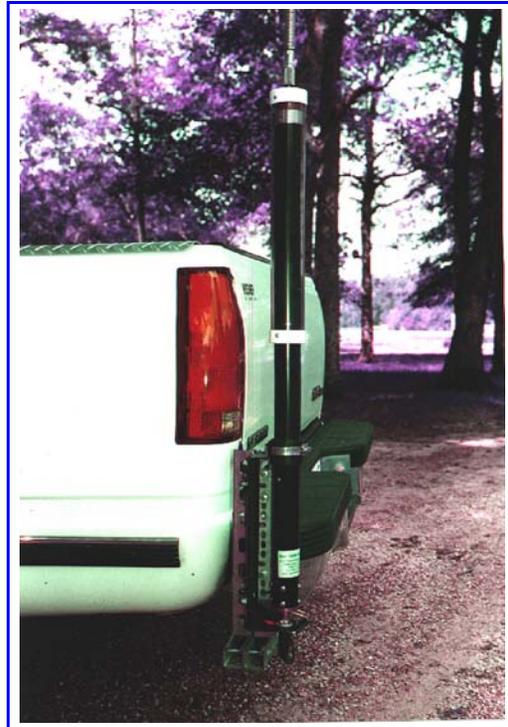


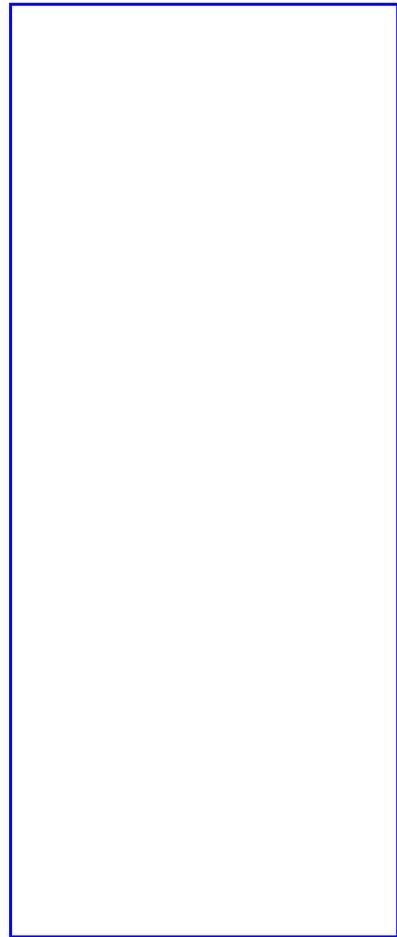
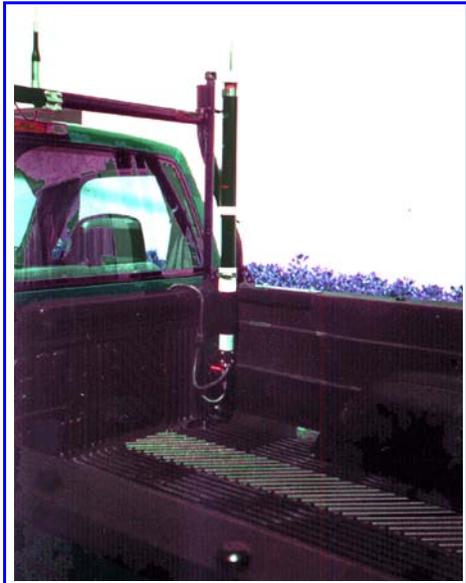
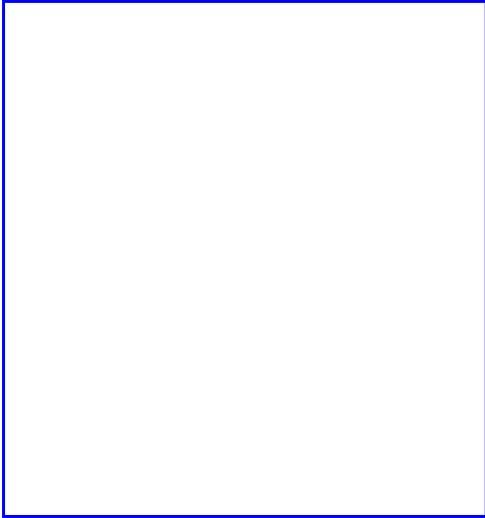












Making the Ground Connection

Whether the antenna is to be used on a vehicle or at a base, the ground connection *reference point* is the shield of the coax cable at the antenna end of the cable. From a practical point, grounding straps can be connected to a point within a few inches of the base of the antenna. On the **Universal Mounting Bracket**, you should connect the ground strap to bottom of the mounting bracket using the stainless steel ¼ x 20 by 1 inch long screw provided. Make sure there is a good RF connection between the strap and the bottom of the mounting bracket.

As previously discussed, mounting the antenna high is generally desirable if the ground connections can be kept short. In the case of fiberglass motor-homes, the only real ground point is the frame which is often a few feet from the rear of the coach. So mounting the base of the antenna low and close to the frame is very good way to get the antenna to tune properly. Do not use braid.

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.

In the case of fiberglass camper shells mounted on pickup trucks, it is often possible to attach a thin piece of sheet metal (such as plumbers tape) to the top rail, under the camper shell.

It's always a good idea to measure the dc resistance of the ground connection. There should only be a few tenths of an ohm between the ground point on the mounting bracket and the frame or chassis. However, keep in mind that #30 wire would also show good continuity but would have a very poor RF ground. So, with good continuity it is possible that the SWR would be high because the connecting material is too small. There must be a flat wide strap.

Don't use braid!

leads must have a large surface area rather than large cross-sectional area.

Brass strips, copper or plumbers' tape can be used.

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 the case, you may soon discover your antenna 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.

Although most hardware supplied with the antenna is stainless steel and should not corrode, some mounting brackets are constructed from steel (stainless steel brackets are available). Some areas of the



mounts are

purposely left unpainted (powder coated) to allow a good electrical connection to be made. Edges of the mounting brackets need to be cleaned and waxed occasionally to keep from rusting.

Matching the HS-1500MKII

HIGH SIERRA Antenna's *Conjugate matching* uses a shunt coil. This device provides smooth, continuous tuning from 3.5MHz to 30MHz if the ground path is short (typically less than 12 inches).

The *conjugate matching* coil is connected from the side of the 'Easy-Off' tapered brass stud and ground. If you are using the 'Single-Bolt' method, the coax and the end of the coil are attached to the head of the bolt.

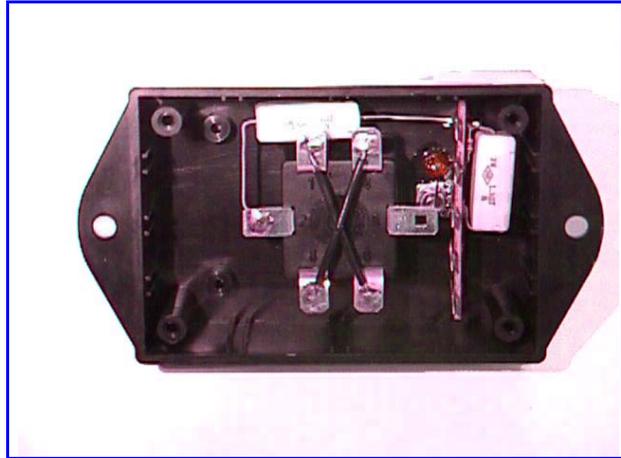
The inductance of the coil is set at the factory at to approximately 1.5 microhenries. The coil can be adjusted for the best match on 40 meters versus 75 meters by spreading or compressing the turns slightly. More inductance favors 75 meters and less inductance favors 40 meters. If, for example, the SWR on 40 is higher than on 80 meters, spread the coil until the SWR on both bands is less than 2:1. If the SWR on 80 meters is higher than 2:1, compress the coil to increase inductance and lower the SWR. You won't damage the coil by moving it.

The coil has little effect above 10 MHz. The SWR will be quite low from 14 MHz to 30MHz, again if ground paths are short.

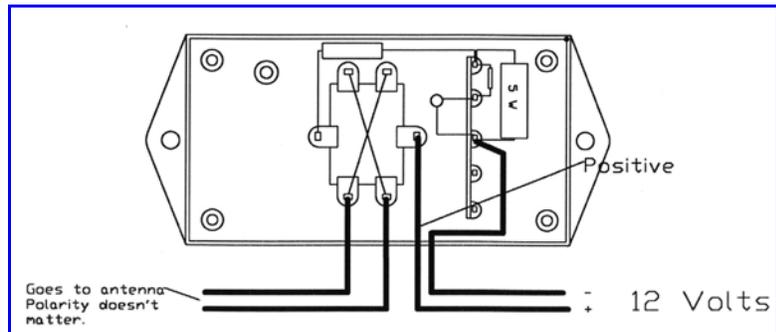
To operate on the 6-meter band simply remove the whip. The HS-1500MKII is a good antenna for 6 meters. It is a top loaded quarter wave length antenna.

Remote Control Panel

The control panel should be mounted in a convenient location since it will be used often. Be sure the 'end of travel LED indicator' can be seen from the operating position. Wire the antenna power connections to terminals 1 and 4, or, 3 and 6 on the switch (top or bottom of the 'X'). Polarity does not matter. The positive dc supply voltage is connected to the terminal on the switch that has no other connection (on the right in the picture). The negative supply is connected to the grounded terminal (third from the top in the picture or middle terminal) on the phenolic terminal strip.



The positive supply lead must be fused for 3 amperes. If a spare automotive fuse is not available, an in-line fuse must be installed in the positive (red) dc lead.

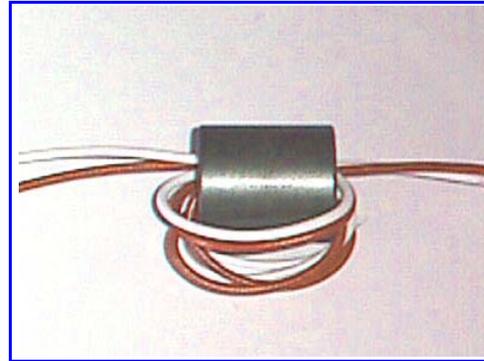


Under no circumstances connect the 12 volt supply wires to the switch. If that is done, 12 volts will be applied directly to the motor and that will permanently damaged it. Such damage is not covered by the warranty.

Note: The filter assembly is most effective when it is located very close to the base of the antenna. It will however function up to a few feet from the base.

RF filter assembly

The filter helps isolate the motor from the antenna and control system. The choke and connector are spliced into the dc cable from the control panel. The dc wires should loop through the choke 3 times. The transformer core is brittle and can be fractured. So, be careful. We recommend that you mount the filter close to the mounting bracket.



Preliminary checks

Connect the coax cable between the antenna and the transceiver. Make sure the connections are tight. Connect the 2-pin dc supply cable to the antenna. Don't worry if the color codes don't match. Polarity doesn't matter.

Check that the dc connections from the remote panel to the antenna are correct and the panel is connected to a fused dc source. Don't forget, it may be necessary to *turn-on* the vehicle ignition switch depending on where the dc connections were made. Operate the control switch and verify the coil moves up and down.

Antenna Checkout

When attaching the whip or the 'quick-disconnect' to the top of the weather shield, be sure to use the provided 1 inch washer to protect the plastic cap. With the antenna fully retracted (10 meter position) you can hold the top cap with one hand while tightening the whip or quick disconnect with the other hand.

Place the antenna in the mounting bracket and connect the dc cable exiting from the base of the antenna to the remote control cable. Control of the antenna should be done only with the **HIGH SIERRA AntennAs** remote control box.

Adjust the control switch so that about 5 inch of the coil winding is above the collar. Set the transceiver to 7200KHz and reduce power to 10 watts. Set the transceiver to a mode that produces a steady-state carrier (AM, RTTY, CW or FM). You cannot tune the antenna for minimum SWR while in the SSB mode. Watch the SWR meter and continue to increase



or decrease inductance until a sharp dip occurs. Adjust for lowest reading by moving the control switch back and forth. You are now tuned to 7200kHz.

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 for a frequency.

To avoid transmitting on a busy frequency, always ask if the frequency is in use first. You can get the antenna close to the proper frequency by simply listening for noise in the receiver. As the antenna goes to the receive frequency, the noise in the receiver will come up and then go down as the antenna's frequency goes past the receiver's frequency.

You can now continue the checkout process by testing each band up. The highest frequency occurs at the minimum inductance position. That is, with the coil fully retracted. Tuning will be sharpest on the 80 meter band and broadest on 10 meters.

Fine tuning the system

Sometimes it is not possible to have a short ground connection to the frame or body of the vehicle. As a result, you may find the maximum frequency to be below 28MHz.

If you are using the RV extension mast, the antenna is too long to be a quarter-wave length. In those situations, you may be able to resonate the antenna on the 3rd harmonic. Start with the antenna set somewhere near the minimum position then adjust the transceiver to produce a steady 5-10 watt carrier at 28.5 MHz. Watch the SWR meter while *increasing* the inductance of the loading coil (moving the coil upwards). Look for a point where the SWR dips sharply and good SWR is achieved. This will now be your 10-meter operating point. You may also be able to resonate the antenna on 10 meters by removing the whip and raising the coil.

SWR tends to be over-emphasized. Typically, an SWR of less than 2:1 is acceptable and will not affect the performance of the antenna. There is not even a db of loss due to a SWR greater than 3:1. An SWR in excess of 2:1 can result in reduced power output due to action of the protective circuits in some transceivers.

Long whips

Use of an 8 foot whip on 75m will produce a *slight* increase in field strength, but not enough difference to be heard. Remember, the longer the whip, the more chance of hitting trees and other overhead obstructions. Also, a longer whip will *lower* the upper frequency limit. A 72 inch whip has proven to be the best overall choice. We manufacture a high quality 72 inch stainless steel whip that is available separately or as part of a “package deal.”

Operation

So, with most of the coil exposed, the antenna is resonant on a low frequency. With very little of the coil exposed, the antenna is resonant on a high frequency. Using an SWR meter is a good way for setting the antenna to resonance on a frequency. However, rough tuning can be accomplished by listening for the increase in *noise level* on received signals as the antenna reaches resonance. That is, the noise level in the receiver should increase as the antenna reaches resonance. A quick check of the SWR should be done.

Note: Always tune the antenna with the transceiver in the low power position. High power can damage the antenna if it is not resonant.

Precautions

The power rating of the antenna adequately covers the popular 500-600 watt PEP linear amplifiers sold for mobile use. Do not exceed the maximum ratings.

The motors used to power the antenna are designed for intermittent use. Be careful of a situation where the motor could accidentally be powered continuously. That could damage the antenna. Exposed steel surfaces will eventually rust. We recommend painting or applying a *thin* coating of a rust preventive.

Maintenance of the HS-1500MKII

The primary maintenance items are the prevention of corrosion and loose connections. Keep the antenna clean and check for loose connections at regular intervals. Frequent cleaning of the antenna is strongly recommended.

Check to see that cable strain-relief protection keeps things from vibrating. The **HIGH SIERRA AntennAs** weather shield is best cleaned with soap and water. Do not use abrasives and be careful with any cleaning agent that might damage the plastic.

Clean the antenna! You've invested a lot of money and time. Cleaning will extend its life.



Over time (and especially in salt water environments) you may find some aluminum oxide build-up under the spring in the 'decoupler.' Simply remove the spring and clean the aluminum surface with steel wool. Put a *small* amount of an antioxidant (such as NO-OX) in the groove before replacing the contact spring. A 'Q-Tip' cotton applicator works well for this purpose.

Some corrosion may also build up in the base of the antenna between tapered brass stud and the mating taper in the base assembly. A wire brush designed for cleaning the inside of 3/4 inch copper fittings works well. The brush can be purchased from a hardware store.

Where salt is used on roads in the winter, be sure to check exposed areas for salt build-up. Wash the antenna immediately with water. When storing the antenna, have it in a vertical position in a warm, dry area to allow any condensation to drain out.

Twice each year, remove the eight stainless steel screws and washers that hold the bottom brass base in place. Remove the brass base. Apply a small

Now enjoy the

finest continuous coverage HF antenna!