

Tuning Mobile One Antennas

Although each Mobile One Antenna is pre-tuned at the factory, neither we nor anyone else, can simulate all installation possibilities, therefore most antennas may need slight adjustments. Also, the addition of springs and or quick disconnects will make your antenna electrically longer and tuning may become necessary. In any case, take all SWR measurements with the antenna in its final mounting position including all accessories, then, adjust as necessary.

Mobile One UHF Antenna Range (S474, S474B, M474, M476, RF470, FDW470, BNCHW, ETC)

All Mobile One UHF Antennas do not need to be tuned as they are extremely broad band and will always have a SWR below 1.5 to 1 if installed correctly.

Mobile One Pretuned Antenna Range (DX125CD, DX140CD, DX148CD, DX160CD, DX170CD)

These antennas have been made using 1/4" constant diameter fibreglass rods that are always identical in diameter. They have been wound using our computer operated winding machines which ensures that each one has been made identically to the last one. The helical wind in these antennas is designed to be as broad band as possible. The end result is a SWR below 1.5 to 1 on almost any part of a vehicle as long as they have been installed properly with a sufficient ground plane area. However you should always check your SWR after installation in all cases.

The Base and Cable Assembly

The Base should always be suitable for the frequency it is to operate on, for example, with the frequency range of 0-100MHz any good base is suitable (Base A, Base B, Base UL, Dipole Base, etc) but the frequency range of 100-1200MHz is sensitive to loss so it is very important that you use a base that is suitable such as (Base UL, Dipole Base, etc). The Cable should always be a multiple of 1/2 wave length of the frequency. ie: For 27MHz the length should be either 12', 24', 36' or 48' etc. In the case of UHF CB it is not important as the vast majority of UHF antennas are broad band and do not need to be tuned. The Connector is usually a PL259 or a BNC in either case it is important that you ensure that there is proper connectivity and no shorts in the connector, PL259's are known to give problems if the coax is loose in the barrel. With BNC connectors it is common that the pin in the centre has fallen in and is not making proper contact, also BNC's are known for their short circuits, as they can be difficult to assemble. \

The Installation

When installing any Base & Lead Assembly it is important that the Base is properly earthed to the vehicle. The earth is the braid or the outer part of the coax and is connected to the base plate of the base. This base plate is usually the part that earths to the underside of the Vehicle body. It is important that there is no short circuit between the base plate and the base bolt that the antenna is connected to. It is a good idea that if you are installing a Base & Lead Assembly through the inside of a vehicles motor you keep the cable as far away from the electrical system such as ignition coils as possible as this will help to reduce noise. After installing the Base & Lead Assembly, using a multimeter, check for continuity between the collar of the connector and any metal part of the vehicle, also check for short circuit on the collar end. If you have excess coax and have no other choice but to coil it then try to run it up and down some way. If you coil coax you may create inductance and this may lead to problems.

The SWR Meter

It is important that the SWR Meter should be of good quality and cover the frequency that you wish to test and that the lead that goes from the SWR meter to the transceiver be as short as possible.

SWR Readings INITIAL TEST

It is important that the antenna has a tip on it during all SWR measurements. Tests made without antenna tip in place will produce a false inaccurate reading. Your goal is to achieve the lowest REF SWR reading possible but NOTE SWR readings lower than 1.5 to 1 are quite acceptable and if your antenna is within that range it is not necessary to tune it. After installing the SWR meter the first thing to do is measure the SWR reading on channel one then measure the SWR reading on channel 40. If the SWR is better on Ch 1 then on Ch 40 then the antenna is too long and will need to be tuned, however if the SWR is better on Ch 40 than on Ch 1 the antenna is too short and cannot easily be adjusted any better if this is so see below.

DIFFERENT ANTENNAS DIFFERENT READINGS

At this point, depending on the type and most important the length of the antenna, you will see different results. The longer the antenna the more broad band the antenna is. ie In the case of 27MHz CB if the antenna is more than 1 metre long the antenna's SWR after tuning should fall between Ch1 - Ch40 under 1.5 to 1. However, the shorter the antenna the more narrow band it is. ie In the case for 27MHz CB antennas that are shorter than 500mm long the antenna's SWR after tuning will not cover all the 40 channels below 1.5 to 1 SWR, For example a short CB antenna such as a Rubber Ducky will only have a SWR reading of better than 1.5 to 1 on a few channels, so it may be necessary in this case to decide which particular channels you wish to operate on. So the shorter the antenna, the more quickly it reacts to adjustments, extreme care should be taken when tuning antennas less than long as even a cut of 3mm may make a big difference.

The Readings In A Nut Shell

A: If SWR readings are 1.5:1 or below on all frequencies throughout the frequency spectrum of your transceiver, then no adjustments are required.

B: If the SWR FAVOURS the lowest frequency and SWR on the highest frequency of your transceiver is above 1.5:1, then your antenna appears LONG on your system, and may be CUT TO TUNE.

C: If SWR FAVOURS the highest frequency on your transceiver and the SWR readings on the lowest frequency are above 1.5:1, then your antenna cannot easily be adjusted.

D: If the antenna is longer than 40" long and the SWR is worse than 2 to 1 on Ch 1 then check for open circuit or short circuit in coax.

E: If the antenna is shorter than 40" longer and the SWR is worse than 2 to 1 or even in the red don't be concerned but check coax then proceed to tune.

F: Small antennas work best on small ground plane areas eg: Rubber Ducky's work best on gutter mounts and 5' antennas work best in the center of the roof of the Vehicle.

G: Most importantly, always test antennas away from any metal obstacles such as garage doors, fences or metal tanks, a good distance to use is 20 feet.

Tuning The Antenna

1. Set your transceiver to the lowest operating frequency or Channel.
2. Remove TIP from top of the antenna, remember that the TIP makes a difference, it lowers the frequency slightly so remember to replace the tip when measuring SWR.
3. Using a razor blade, knife or side cutter, carefully cut 1/4" off the top, then replace tip, then measure SWR readings on Ch 1 and Ch 40 the SWR will improve on Ch1 quicker than on Ch 40.
4. Continue to cut the antenna as the antenna lowers in SWR you need to achieve a SWR of better than 1.5 to 1 on Ch 1 to Ch 40 with the best reading on Ch 20 **CAUTION:** As SWR reaches it's lowest point, cut only small amounts of wire off antennas to avoid over trimming.
5. Once you have tuned the antenna it is a good idea to glue the tip on to prevent water, moisture or loss of tip.

If you encounter problems see "Problems" or "Antenna Too Short" below or you can contact Mobile One Australia Mon to Fri 9am to 5pm.

Problems

- * Broken, shorted, pinched or kinked coax.
- * Low grade coax cable, there is a lot of it about.
- * Poor ground connections or shorted mounts.
- * Improper coax all CB systems use 50 ohm coax.
- * Excess coax wound into coil less than 10" in diameter to use up slack (This forms an induction coil which can hinder tuning and performance).
- * When checking SWR, do so in an open area, any SWR readings that are inside a building or near other objects or antennas can cause reflection which will give false readings.
- * Insufficient ground plane area under antenna.
- * Antenna tip not in place.
- * Side mounts installed too far below the top edge of the vehicle (a minimum of 2/3 the length of the antenna should be above the roof-line. Portions of the antenna, which are below roof-line and close to metal will absorb reflected signals that bounce off of the vehicle.
- * Faulty test meters or static charges on meters with plastic face covers.
- * Amplifiers installed out of phase with respect to the 1/2 wave coax rule (minor coax reaction will be greatly increased if signal enters amp out of phase).

Antenna Too Short?

For 27MHz CB Antennas over 40" long

- * Replace tip with a longer one will lower the frequency but only very slightly.
- * Cut heatshrink off the top and solder wire to top and rewind then re-heatshrink

Note: heatshrink is available from some Electronic stores or from Mobile One.

- * Call Mobile One for help.

For 27MHz CB Antennas under 40" long

- * Replace the tip with a longer one will lower the frequency.
- * A spring or a quick release mount will lower the frequency.
- * Cut heatshrink off the top then solder some wire then wind a loose wound coil on top then re-heatshrink. Note heatshrink is available from some Dick Smith Electronic stores or from Mobile One.
- * Call Mobile One for help.

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