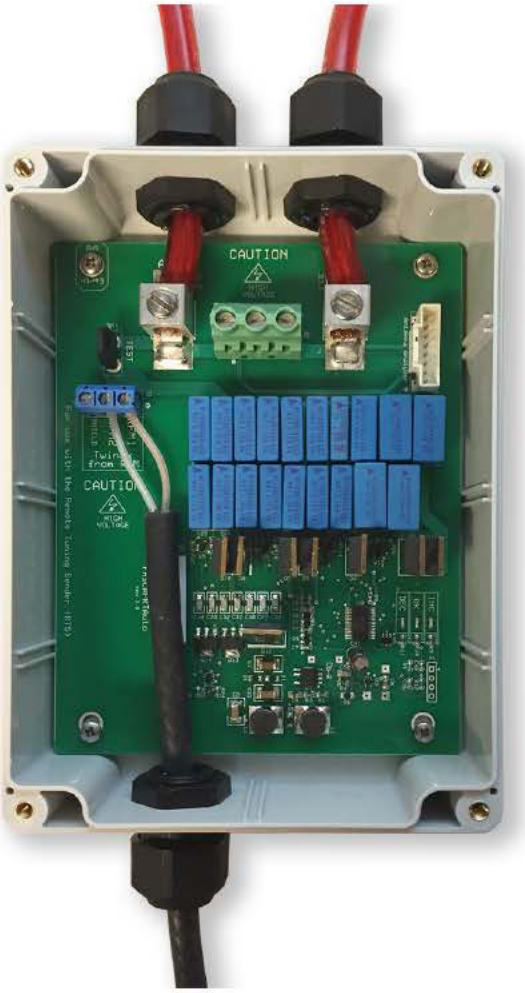
Oregon RFID



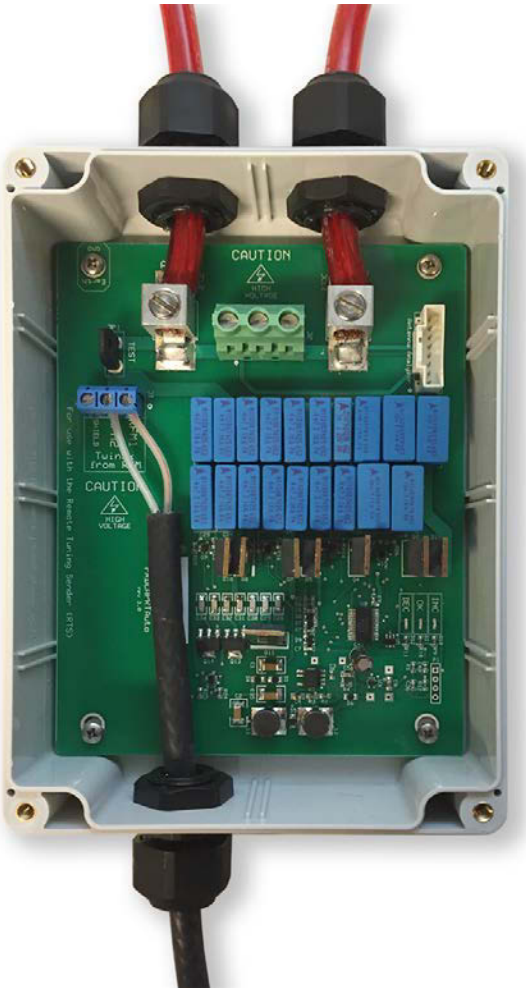
ATC Autotuner Guide

CONTENTS

INTRODUCTION

The ATC Auto Tuner and the RTS Tuning Indicator/Sender automatically tune antennas for our HDX Single Antenna, Multiple Antenna and Backpack readers.

Commands are sent by the RTS Tuning Indicator/Sender over the twinax feedline to adjust the ATC Auto Tuner over an inductance range of 24 to 102 µH.



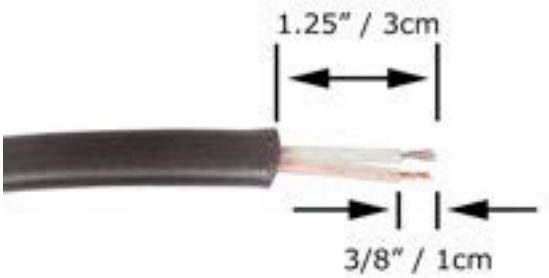
WIRING

The tuner box contains capacitors that attach to the ends of the antenna loop to form a resonant circuit.

Connect the antenna cables to the two large terminals. Pass them through the grip holes first, then tighten to make a watertight seal.

Twinax cable connects the tuner box to the reader. A single antenna reader can be up to 130 meters from the antenna. The multiple antenna reader with up to 4 antennas can each be up to a distance of 30 meters away.

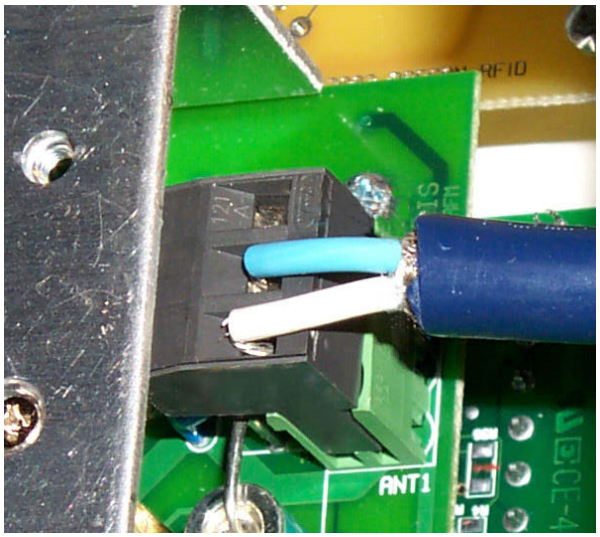
Cut off 1.25” from the outer sheath, removing the metal shield layer completely. Then cut 0.375” from the end of the two wires.



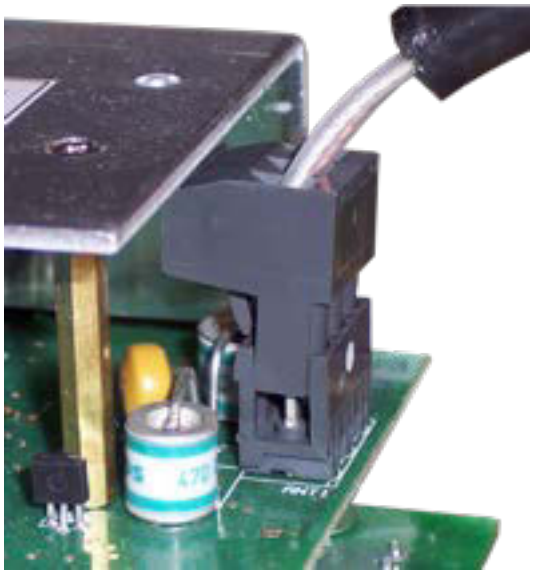
Pass the twinax through the grip and tighten. Attach the wires to the terminals marked RFM1 and RFM2 on the circuit board. The polarity is not significant; it doesn’t matter which wire is connected to RFM1 or RFM2.

WIRING A SINGLE ANTENNA READER

The twinax from the tuner box is attached to the antenna connector on the reader board as shown in the photographs. The third terminal on the connector is for the ground and is usually left open.



Make sure the connector is properly plugged in and seated firmly. Look at the side of the connector as in the photo and press down until it is completely seated. Make sure the two plastic fingers on the underside of the connector clip around the bottom ridge.

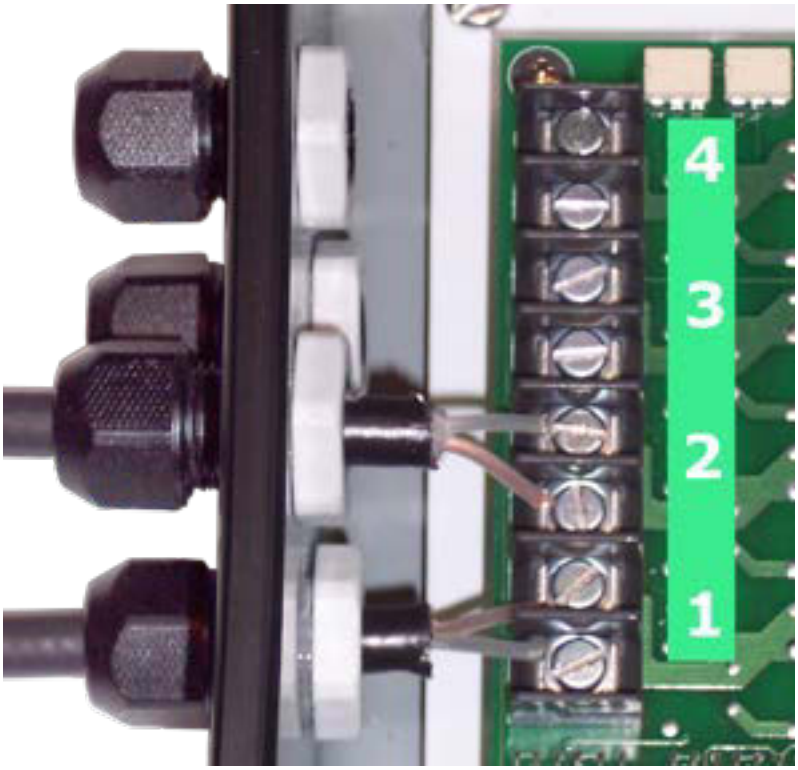


Align connector and press all the way down

WIRING A MULTIPLE ANTENNA READER

The twinax from up to four tuner boxes is attached to the terminal strip on the antenna multiplexer board as shown below.

The sequence for a new reader is configured before shipping to read only antenna number 1. You must change the multiplexer sequence using the CGA command to enable the other channels.



TUNING

Once the antenna, tuner, and reader are wired correctly, insert the RTS Tuning Indicator/Sender into the reader as shown below, with the flat top of the ribbon cable extending away from the RFM board. If using the Multiple Antenna reader, select one channel with with the MX command. Within moments, the green OK LED on the tuning indicator will light, and should remain lit. Inside the tuner box itself, the small green OK light will flash rapidly about 20 times, followed by a few simultaneous flashes of the INC and DEC lights on either side of it. This will indicate that the antenna is in tune and the tuning settings have been saved the the EEPROM on the tuner. The RTS Tuning Indicator/Sender may be removed.

ALWAYS REMOVE THE TUNING INDICATOR IMMEDIATELY AFTER TUNING.

TROUBLESHOOTING

Occasionally, a customer will encounter an unfamiliar light pattern or behavior while tuning with the ATC Autotuner. Use this guide to troubleshoot the pattern or behavior.

Early Model Reset (for tuners manufactured in 2015)

An early model of the Autotuner (2015) had trouble tuning when used on an antenna with an inductance near one end of the accepted range, after being used to tune an antenna with an inductance near the opposite end of the accepted range. Essentially, the capacitance for the earlier antenna would save to the tuner's flash memory, and would be recalled on startup when attached to the later antenna. This would cause the tuner to be very far out of tune from the beginning of the tuning process, without the power necessary to start the circuit.

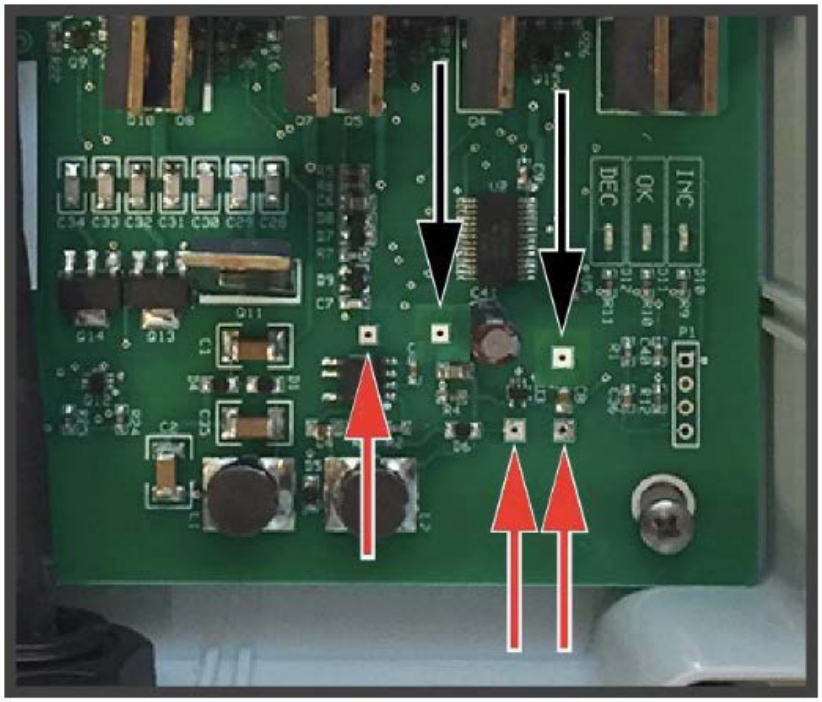
To work around this, reset instructions were created. It is becoming increasingly rare that this problem is encountered. However, if it is, follow the reset instructions on the following page to correct it.

Early Model Reset (for tuners manufactured in 2015)

Locate the two gold pads indicated by the black arrows in the photograph. Connect them together with an insulated wire to protect your fingers from shock.

Turn the reader off for 10 seconds and disconnect the tuning indicator. Turn the reader on for a a couple of charge cycles (a couple of seconds). The INC and DEC LEDs will flash once at the same time to indicate that the tuner has been reset.

Turn off the reader, remove the wire, connect the indicator, and re-tune the antenna.



Pattern: indicator displays rapidly flashing IN and OUT lights, does not display OK light

There are two main causes of this light pattern:

1. The antenna has a narrow OK range.

   The new tuning indicator is much more precise than its predecessor, meaning that the range for “in-tune” can sometimes be narrow, and there is a chance that the antenna will fall into a narrow gap in capacitance. In this case, the flash between IN and OUT may be ignored. Remove the indicator and test the read range with a tag. If it is acceptable, no further action is required. To move the antenna out of the gap in capacitance, consider slightly changing the shape or design of the antenna. This, in turn, will slightly change the registered inductance.

2. Tuning has been attempted on a multiple antenna reader without selecting only one channel first.

   The tuning indicator will only work on one antenna at a time. If more than one channel is active on a reader and tuning is attempted, the indicator will bounce between IN and OUT, as the multiplexer board is switching between live channels. To select one channel at a time, type MXn, where n represents the channel to be tuned. Once that channel is tuned, use the MX command to select the next channel.

Pattern: indicator displays a solid IN or OUT light

There are two main causes of this light pattern:

1. The antenna's inductance is out of range for the tuner.

   The Autotuner is built to work with an antenna that has an inductance measuring between 24 and 102 μH. However, it is important to note that capacitors are not precise, and the recommended range is usually between 30 and 60 μH. Inductance values that are lower or higher than this risk failed tuning, not to mention possible strain or damage for the reader. If the indicator is stuck on IN or OUT, measure the antenna's inductance to be sure that it is within the recommended range.

2. Something has been wired incorrectly.

   The autotuning process will not work if the antenna, tuner, reader, or indicator are mis-wired. Refer to the wiring section of this guide to verify that everything is correctly wired, then try tuning again.

Pattern: indicator displays flashing RXSS light

In most cases, the RXSS light may be ignored. It is used for wireless synchronization of multiple readers, and does not pertain to the tuning process.

Behavior: antenna is suddenly out of tune

There are two main causes for this behavior:

1. The tuner was not given sufficient time to save the tuning settings to its physical memory.

   It is easy to see that the indicator's OK light has lit and to quickly remove the indicator after this happens. However, it is important to allow the tuner sufficient time to save the settings to memory. Otherwise, the settings could be lost. To ensure that the settings have been saved, wait for the INC and DEC light pattern described on page 7.

2. The antenna was in tune, but put too great a load on the reader, and has damaged the board or channel in the process.

   There is a known limitation in terms of antenna size and inductance for the current multiplexer board. If an antenna with too high an inductance, too thick a wire, or too large a design is connected to the multiplexer board, there is a chance that it will damage the board, the channel, or both, causing a sudden loss of functionality. It could take some time for the antenna to cause the damage, which means that the antenna could tune well at first, and then suddenly fail. To avoid this, verify with Oregon RFID support that the proposed antenna is appropriate for a multiple antenna reader.

Behavior: indicator displays OK light, but antenna has a very short read range

There are three main causes for this behavior:

1. The tuning indicator has not been removed.

   The tuning indicator greatly decreases read range while it is attached to the RFM. It is important to remember to remove the indicator after tuning and before testing the read range.

2. There are looped, coiled, bunched, or loose antenna lead wires or twinax wires.

   Any unnecessary slack, irregularity of shape, or looping or coiling of wire can negatively impact tuning and read range. To avoid this, make sure that the antenna lead wires are as straight and short as possible, given the setup of the site, and make sure that they are twisted or braided around each other up until the point of entry into the tuner box. Likewise, make sure that the twinax forms as short and direct a line as possible between the tuner and the reader.

3. The channel has been damaged.

   When damage such as that described on page 12 occurs, it may still be possible to perform the tuning process (that is, to get a false green OK light on the indicator). However, the antenna will not be able to draw power through the channel. To determine whether the channel has been damaged, execute the AD command and look at the channel's amperage (listed under the corresponding TX heading). If it is erratic, too low, or too high, then the channel has likely been damaged.

Oregon RFID manufactures equipment for tracking fish and wildlife (and rocks!) using low frequency passive RFID tags and readers. Our products are used worldwide for scientific research and commercial operations.

We provide toll-free technical support by phone or email to help you design and build your monitoring system.

(866) 484-3174 toll free
(503) 788-4380 international
support@oregonrfid.com

2421 SE 11th Ave
Portland OR 97214

Portland Oregon is in the
Pacific Standard Time Zone, GMT-8
(summer GMT-7)