

2.4 GHz Radio Systems / RMG Winches Observed Problems, Causes and Prevention

By: David Ramos
Chesapeake Performance Models

As most of you are aware the last two EC12 meter regattas Sun City and the EC12 Worlds were rife with radio problems causing a number of very good sailor's considerable problems. What will follow is information gathered by David Ramos and Bob Dudinsky from Futaba, Spektrum and RMG to try and provide some light as to what is happening, how to diagnose it and hopefully prevent it in the future.

The information to follow is not meant to be the absolute last word on the possible causes of all the problems we have been seeing, it is the best information we have been able to gather and assemble.

Futaba which accounted for the majority of problems was less then forthcoming as to the possible causes that we have been seeing. While our discussions with them were helpful their solution was to ship the problem system back for a check up at the service center. Some of you have modified your Tx to accommodate a twist knob for jib trim and while this would not prevent them looking at the radios but it was implied that there would be a fee for the service. It was also implied that modification of the system might be the cause of the problem. I do not believe this personally and it was also seen for the most part as a waste of time because on returning home the offending systems worked fine.

Spektrum (Horizon Hobbies) was a little bit more helpful in providing and confirming that the Rx-Tx lock can be inhibited in a system that has become exposed to moisture or very high humidity. It was also stated that rebinding the Rx at the field can be problematic with a large number of 2.4GHz radios turned on at the time of attempted rebinding. They also stated that low voltage caused by a depleted or faulty Rx battery would prevent or provide intermittent system lock. Horizon currently is the only Mfg to have a Spektrum Rx intended for the marine environment. It is a 3CH Rx with dual rudder & throttle, single Aux configuration. A feature in the Spektrum systems (DX5e, DX6i, DX7) that is undocumented is that if for any reason the Rx loses lock with the Tx and then reestablishes lock that the LED on the Rx will flash indicating that the lock had been lost. This would also apply if the Rx was turned off and the Tx is left on then the Rx is turned back on. The Rx would assume that the Tx had not in fact been turned off but that the it had lost lock for some other reason. The Rx will function correctly in every way with the exception of the flashing lock LED.

Both Futaba and Horizon felt that the excessive run times that we routinely experience should not effect or over heat the system in any way.

With the advent of cordless phones and other electronic devices using the 2.4GHz band it has been suggested that it is possible that these devices could possible interfere with the locking function of the radios. Both Futaba and Horizon felt that this while possible was unlikely due to the digital nature of the interface between the Tx and Rx.

The observed problems can be summed up with the following. –

- Failure of the Rx to lock with the Tx on power up after working fine for a good part of the day.

Both Futaba and Horizon state that their systems are not designed for the marine environment and that Horizon recommended that the new Marine Rx be used in place of the standard Rx that comes with the systems. As to the intermittent failure to lock they offered no explanation other than to check the Rx battery for low voltage.

- Attempted rebinding of the Rx at the pond resulting in cross binding with another skipper's Tx.

This was only seen in the Futaba system and it should be mentioned that you should never attempt to rebind a Futaba system at the pond while other Futaba radios are present and turned on. Basically more than one radio is now bound to the same Rx and the Rx cannot decide which Tx is in control. Rebinding free of other Tx is required to fix this problem.

- Attempted and failed rebinding at the pond.

Because the Futaba radio system only has the Rx enter into the bind mode if there are a number of active Futaba Tx's in the area the Rx can and has been seen to have trouble picking out which Tx it is to bind with causing the Rx to fail to bind altogether. Rebinding free of other Tx is required to fix this problem.

- Successful rebinding of the system only to have the system fail to lock after power down and power up.

Futaba could not shed any light on this problem other than to say that high humidity may be a contributing factor. We really do not have a firm answer as to this problem but attempting to rebind the Rx at the field only seems to cause more problems.

- Failure of the RMG to respond to inputs from the Tx but the Rudder servo and jib trim servos work fine (this is usually accompanied with a beeping from the winch)

This is not a Tx/Rx Problem and is more than likely a winch problem. The beeping of the winch indicates that the winch is not getting positional information from the Rx or the Potentiometer (pot) for the winch to lock onto and move the winch to the desired position. The beeping is a warning that a feature of the winch to help prevent the winch from overrunning and possibly damaging the sheeting system has been activated. Three causes are possible for this situation.

- 1) The channel responsible for the winch (throttle) is dead on the Rx.

Replace the Rx with a new already bound Rx.

- 2) The spur gear on the pot shaft for the winch is loose and slipping.

A simple fix is to put a drop of CA on the spur gear at the intersection of the Pot shaft and the spur gear opposite the Pot housing. Be VERY careful here.

- 3) The Pot on the winch has failed.

This is not something that can be fixed at the pond.

- Failure of the winch resulting in overrun of the winch sometimes resulting in breakage of the control line or sheets.

This is most likely caused by the spur gear slipping on the Pot shaft and the winch overrunning. The winch can turn up to 360 degrees before the system realizes that it is not getting information from the pot and drops into fail safe mode and starts beeping. Repeated attempts to get the winch to activate will slowly run the winch control line in until the control line jams and fails.

As stated above a drop of CA glue can help reattach the spur gear to the Pot shaft. To help determine if the gear is slipping on the shaft a drop of “white out” on the spur gear and a matching drop of “white out” on the pot shaft will allow an easily identifiable visual reference.

Prevention and steps to take BEFORE you travel to the Pond

Read and become familiar with the binding procedure for your radio system.

Futaba also suggested that we try to put the Rx antenna in vertical and as high as possible since the RF signal is a straight line. Also in the instruction manual is to keep the Tx antenna vertical at all times

If you have a spare Rx bind it at home and test it at home.

Never bind a Rx at the pond.

Check and keep track of your rechargeable batteries capacity and change to a fresh battery if the conditions are very windy. Label your batteries and extra gear so that you can keep track of everything.

Check all battery and servo plugs for corrosion and replace if necessary

If possible have a spare radio system on hand ready to switch to in the event of trouble that cannot easily be diagnosed. Even if it is an older system that you have not used in years if you have room bring it. You never know when it might save your regatta.

Mark your RMG winch pot shaft and pot spur gear with a dot of “white out”

General Prevention tips

Make sure your rudder servo installation will allow the servo to be easily and quickly replaced at the pond if necessary.

Check your winch bungee cord for excessive stretch and replace if needed.

Check your sheet lines for wear and chaffing.

Inspect your rig stays turnbuckles and fittings for problems

Remove check and grease the rudder shaft