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HYPERION DSMX COMPATIBLE SATELLITE RECEIVER W/DIVERSITY

This DSMX compatible diversity satellite receiver will extend your range and increase your radio link robustness. Just in case the antennae on your main receiver cannot receive a signal due to its orientation or airframe shadow (due to carbon fiber), this satellite will use one of its two antennae to receive your radio signal (diversity), vastly improving the chance that you receive proper commands from the transmitter.

Hyperion DSMX compatible satellites offer the latest generation with its Spread-Spectrum DSMX-style compatibility. Hyperion receivers only use high-quality original components, and with state of the art automation. Every HP-DSMXSATD is manufactured using impedance matched PCBs to provide stability and signal strength that exceeds any of the previous generation DSM2 compatible receivers.

This Satellite receiver works perfectly with most flight controllers that offer a SAT port, so that it can take place of the traditional type of receivers, giving you more space on your multirotor board. Please see manual on how to configure.

Compatible Transmitters: - Spektrum-style DSMX-type Transmitters

Compatible Receivers: - Hyperion DSMX Compatible only receivers: HP-DSMX6RX, HP-DSMX6RXD, HP-DSMX7RXSTAB, HP-DSMX7RXDPPM

Compatible Flight Controllers: - Naze32, CC3D, KK2, MultiWii, APM(2.0 and up)

Features:

- Diversity Antenna
- Channels: ~
- Input voltage: 3.3v (via the Satellite Port)
- Compact design

Specifications:

- Frequency: 2.4Ghz DSMX (compatible)
- Compatible with DSMX™ Aircraft radio and module systems. DSM2™, and DSMX™ are registered trademarks of Horizon Hobbies LLC.

Always use DSMX® Satellite receivers with DSMX main receivers.

The Distinction between DSM2 and DSMX

Hyperion RX makes both DSM2-compatible and DSMX-compatible receivers, though increasingly their range of products emphasizes DSMX compatibility. The DSMX protocol developed by Spektrum includes frequency hopping for more reliable operation in areas of high potential interference from other 2.4GHz transmitters, but receivers using the older DSM2 protocol, also by Spektrum continue to work well in all but the most demanding conditions.

Hyperion **"DSMX-compatible"** receivers work with any DSMX-compatible transmitter and are backward compatible with older DSM2-type transmitters.

Hyperion **"DSM2 compatible"** receivers work with either a DSM2-compatibletransmitter or a DSMX-compatible transmitter operating on DSM2. Most recent Spektrum DSMX transmitters support both modes and will automatically detect a DSM2 receiver at bind time *(No longer true in the EU – see below).*

***EU Update**. A significant change of regulations in the European Union requires that transmitters sold there after January 1, 2015 NOT include DSM2*

modulation. Consequently, new DSMX transmitters now sold in the EU support only DSMX-type receivers. Transmitters sold previously that include DSM2 capability will continue to be fully legal for use.

DXe Update. *The EU requirements do not directly affect other parts of the world, but the new (2015) low-cost Spektrum DXe transmitter supports only DSMX, wherever it is sold in the world. Other Spektrum transmitters, including new ones released in early 2016, continue to support both DSMX and DSM2 except in the EU.*

Binding

Binding is the process of "locking" the receiver to its own transmitter (and, where relevant, to a particular model memory within the transmitter) so that it ignores any others. Binding is the first step in setting up any receiver. Ensure the transmitter and receiver are separated by 3-6ft/1-2m or the transmitter may "swamp" the receiver. Occasionally, it may be necessary to have as much as 10ft/3m separation to achieve binding. Generally you should only need to bind once and, after binding, normal link-up should not require more than a couple of feet of separation.

Connecting new Satellite Receivers

Step 1. Power up the receiver in bind mode

For most receivers: put the bind plug on to the bind pins. For 6-channel Ultra-Light and Micro Light receivers, press and hold in the bind button.

Connect a suitable power source to the receiver throttle servo pins. This can be:

- A receiver pack battery (generally 3.45 – 7.2v)*; or
- A stand-alone BEC; or
- The throttle connection from your speed controller (ESC) with inbuilt BEC (if the ESC is in a model, disconnect the motor or remove the propeller).

The red LED on the receiver will flash rapidly to indicate bind mode. If it doesn't, you have a problem (such as reversed power connector). Make absolutely sure the LED is flashing rapidly before going any further.

Step 2. Turn on transmitter in bind mode

On some transmitters bind mode is activated by holding the Trainer button/ switch or bind button while powering up. Others require going into a menu to enable bind mode. If in doubt, read the manual.

Where appropriate, continue to hold the switch/button until the receiver LED stops its rapid flashing. Release it at that point and the bind process will complete. A solid light on the LED indicates successful bind.

* Check individual specifications as some receivers may work within a different voltage range.

Some transmitters will display on screen or announce the type of bind (DSM2 or DSMX) and the frame rate (normally 22mS).

Step 3. Power down and test

Remove power from the receiver, **remove the bind plug** (very important!) and switch the transmitter off.

Turn the transmitter back on, then apply power to the receiver to check that the receiver operates properly and servos respond to the transmitter controls.

NOTES:

1. If a satellite is used, it must match the main receiver; that is, a DSM2compatible receiver should have a DSM2-compatible satellite, and likewise for DSMX-compatible units.
2. If your receiver uses a satellite then binding MUST be done with the satellite connected. Both receiver and satellite LEDs should flash rapidly at the beginning of the bind process, then become solid.
3. Binding can be done with or without servos. Servos plugged in the wrong way round may prevent binding, so check this if you have difficulty.
4. If you experience difficulty getting a DSM2-only receiver to bind with a DSMX transmitter, try forcing the transmitter into DSM2 mode (if the option is available).
5. Always perform a range check after binding, using the range check function on your transmitter. This attenuates transmitter power so that range is reduced by a factor of about 30. With Spektrum transmitters, full control in range-check mode at 30 yards/25m (roughly 30 paces for many adults) indicates ample range for normal visual flying. It is good practice to perform a range check at the beginning of every day's flying to ensure everything is working properly.

What the LEDs Mean

All Hyperion receivers and satellites have a red LED. A **rapidly flashing red LED** indicates the receiver is in Bind mode

1. A **solid red LED** indicates normal radio link between receiver and transmitter.
2. **No red LED** means there is no radio link.
3. A **slowly flashing red LED on a receiver in DSM2 compatible mode** indicates that there has at some stage since it was powered up been a power loss or significant voltage drop (however brief), often called a "brownout". The flashing may indicate an inadequate receiver power supply or it may mean simply that the operator failed to turn off the transmitter when powering down the receiver. It does not indicate a range or signal loss issue. Receivers in DSMX-compatible mode do not provide this "brownout warning".

On receivers equipped with a failsafe button, a **solid green LED** indicates that user-defined (preset) failsafe has been set. No green LED on these receivers indicates that failsafe is in the default mode, in which loss of signal triggers removal of all pulses from the output.

Antennas and Satellites

All Hyperion receivers are "full range". In practice Hyperion receivers match, or better, the range of comparable Spektrum DSM2/DSMX and other DSM2/DSMX-compatible receivers under the same conditions. However the range of any receiver is affected by the number of antennas (aerials) and their orientation, as well as by the installation in the model, making comparisons difficult.

Some Hyperion receivers and satellites have one short active antenna wire, while others also have a second identical "reflector" wire. Some come with longer twin diversity antennas or have them as an option. For the strongest and most reliable reception there are a number of good practices to follow.

For receivers and satellites with short wire antennas:

1. The wire(s) should stick reasonably straight out from the receiver/ satellite; where there are two, they should be in an approximately straight line. Antennas that are bent along the receiver/satellite board may have range reduced by 10-15%.
2. If a satellite is connected, it should be located as far as possible from the main receiver, not right next to it.
3. If a satellite is connected, most reliable reception is obtained when the satellite antenna and main receiver antenna are at right angles.

The larger non-diversity receivers (e.g., 7, 8- and 10-channel) do not have a second short antenna wire, as the circuit board serves the reflector function.

A small receiver with only a single antenna wire (including satellite-enabled receivers when operated without a satellite) will generally have less range by about 10-15% than an equivalent twin short antenna wire version. This is still ample range for normal flying.

For receivers and satellites with diversity antennas:

Receivers and satellites with diversity have two antennas made of coaxial cable with the last 32mm of outer insulation and conductive sheath removed to create a white or silver active portion (the antenna proper).

The antenna cables are connected to an electronic switch that selects the one currently with the stronger available signal. The receiver will switch antennas very quickly if the signal from the one it is using starts to drop in strength below the signal from the other antenna. The switching occurs within 300mS and no signal is lost during the switching period. This antenna-switching strategy is commonly called "diversity" in the RC world.

Some receivers also have a connector to allow the use of a satellite for additional signal robustness through another form of diversity. The satellite may be either a short antenna type or one with diversity antennas, but the protocols of receiver and satellite (DSM2 or DSMX) must match.

A satellite does not significantly increase the maximum possible range. Rather, as a separate stand-alone receiver it increases the probability that a reliable signal will be obtained at all times no matter the orientation of the model. The main receiver selects the stronger of its own best signal or that of the satellite. Note that if both the receiver and the satellite have diversity antennas this gives up to four separate signal sources for the receiver/satellite combination.

The antennas we use for radio control radiate (and receive) in all directions, but the signal is much weaker off the ends of the antenna (the active portion of the cable) than "broadside" to it. Think of an ancient naval battle where the ships had very little firepower fore and aft because most of their cannon were pointed out the sides.

To achieve the most reliable possible link to the model, therefore, what we want to avoid are situations in which the transmitter and receiver antennas are end on to each other.

For the transmitter, the advice to the pilot is simple: don't point the antenna at the model. For the receiver, things are more complicated because the model is constantly changing its orientation relative to the transmitter. A single receiver antenna will inevitably be pointed at the transmitter some of the time and thus in a relatively weak orientation for reception.

This is where diversity comes in. If the receiver has two active antennas positioned at right angles to each other, they can never both be pointed at the transmitter simultaneously. The receiver just has to select the antenna that is giving the better signal right now. That's what diversity switching does.

Diversity improves the reliability of the RF link in other ways. If the two receiver antennas are well separated, at least one should have a clear view of the transmitter, minimizing the risk of signal blanking by conductive materials on board the model. As well, with antennas at right angles, one of them should be somewhere near parallel to the transmitter antenna, thus roughly aligning polarization for a stronger signal.

Conductive materials such as foil coverings, batteries, metal components and carbon fiber can absorb and shield the incoming radio signal. Radio systems on 2.4GHz have a very short wave length and are susceptible to this. Receiver antennas need to be placed so that this effect is minimized.

* Some Spektrum transmitters overcome this issue by incorporating dual diversity antennas oriented at right angles. The DX9 and 2016 version of the DX6 are examples.

In summary

What all this means for the installation of a receiver is simple. If the receiver has dual diversity antennas, make sure the active tip portions are separated as far as practical from each other and from conductive stuff like battery, wiring

and carbon fiber. Align these portions so they are at right angles to each other and reasonably straight. The coax cable portion of the antennas can be curved to achieve this but must not be sharply bent.

If a satellite is connected, it should be well away from the main receiver, not right next to it. Align it so the satellite antenna(s) and at least one main receiver antenna are roughly at right angles.

Take all this seriously but don't get paranoid. The installation doesn't have to be perfect to support an adequately strong RF link. Our modern receivers do a remarkable job of picking up the signal, even with just a simple single antenna. Diversity is not essential in most cases but can be thought of as extra security for when the going gets tough.

And, as always, **range testing is essential**. It should be done very thoroughly before the first flight of a new installation, with reception tested from all directions by walking around the model. If control becomes erratic from any direction at 25m range it's time to review and improve the installation. Once the setup is proven, a quick range check at 30 paces before the first flight of the day is all that's needed to check that things are working as they should.

Product Note:

- This is not a Horizon Hobbies DSM2™, DSMX™ product, and is not m by Horizon Hobbies USA. DSM2, and DSMX™ are registered trademark USA.

- Accepted by the MAAA in Australia, see the MAAA MOP58 for guidance

*Helicopters, multicopters and gliders that use lots of metal or carbon fiber construction require particular care in locating receivers and satellites to ensure that at least one antenna receives a clear signal regardless of orientation.