AR500 User Guide

The AR500 features DSM2™ technology and is compatible with all Spektrum™ and JR® aircraft radios that support DSM2 technology, like the 12X, X9303, DX7, DX6i, and DX5e, and Module Systems

Note: The AR500 receiver is not compatible with the DX6 parkflyer radio system.

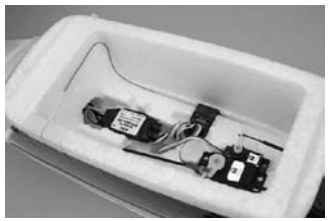
Features

- **Full Range**
- **Dual Aileron Channels**
- **QuickConnect with Brownou Detection**

Specifications:

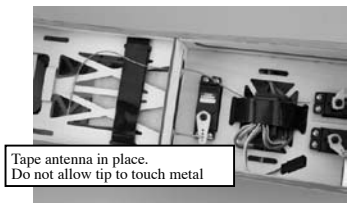
Type: Full Range Sport Receiver
Channels: 5
Modulation: DSM2
Dimension (WxLxH): 21.6 x 30.1 x 12.3mm
Weight: 7.0 Grams
Input Voltage Range: 3.5–9.6V
Resolution: 1024
Compatibility: All DSM2 Aircraft Transmitters

Receiver Installation



Example of AR500 installed in E-flite® Apprentice

Though in general it is non-critical, optimum installation of the antennas is to orient the tip of the long antenna perpendicular to the short antenna. The tip on the long antenna should be a least 2" from the short antenna.



Example of AR500 installed in Hangar 9® Pulse XT 60

Important: Y-Harnesses and Servo Extensions

When using a Y-harness or servo extensions in your installation, it's important to use standard non-amplified Y-harnesses and servo extensions as this can/will cause the servos to operate erratically or not function at all. Amplified Y-harnesses were developed several years ago to boost the signal for some older PCM systems and should not be used with Spektrum equipment. Note that when converting an existing model to Spektrum be certain that all Amplfied Y-harnesses and or servo extensions are replaced with conventional non-amplified versions.

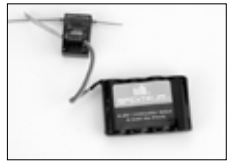
Binding

The AR500 receiver must be bound to the transmitter before it will operate. Binding is the process of teaching the receiver the specific code of the transmitter so it will only connect to that specific transmitter.

1. To bind an AR500 to a DSM2 transmitter, insert the bind plug in the BATT/BIND port on the receiver.

Note: To bind an aircraft with an electronic speed controller that powers the receiver through the throttle channel (ESC/BEC), insert the bind plug into the BATT/BIND port in the receiver and the throttle lead into the throttle (THRO) port. Proceed to Step #2.

2. Power the receiver. Note that the LED on the receiver should be flashing, indicating that the receiver is in bind mode and ready to be bound to the transmitter.



Shown using a separate receiver pack.
(Battery can be plugged into any open port.)

Shown using a ESC/BEC and a flight pack

3. Move the sticks and switches on the transmitter to the desired failsafe positions (low throttle and neutral control positions).

4. Follow the procedures of your specific transmitter to enter Bind Mode, the system will connect within a few seconds. Once connected, the LED on the receiver will go solid indicating the system is connected.
5. Remove the bind plug from the BATT/BIND port on the receiver before you power off the transmitter and store it in a convenient place.
6. After you've set up your model, it's important to rebind the system so the true low throttle and neutral control surface positions are set.

IMPORTANT: Remove the bind plug to prevent the system from entering bind mode the next time the power is turned on.

AR500 Failsafe

- Prevents unintentional electric motor response on start-up.
- Establishes low-throttle failsafe if the RF signal is lost.
- The AR500 removes servo output pulses to all channels except the throttle channel during failsafe.
- The AR500 throttle failsafe position is stored via the throttle stick position on the transmitter during binding.

HOW AR500 FAILSAFE WORKS

Receiver Power Only

- In electric aircraft, when the receiver only is turned on (no transmitter signal is present), the throttle channel has no output, to avoid operating or arming the electronic speed control.
- In glow-powered models, the throttle servo receives no input so it remains in its current position.

Note: Some analog servos may coast slightly even though no signal is present. This is normal.

- All other channels will move to the positions set during binding.

After Connection

- When the transmitter is turned on, and after the receiver connects to the transmitter, normal control of all channels occurs.
- After the system makes a connection, if loss of signal occurs, the AR500 Failsafe drives the throttle servo only to its preset failsafe position (low throttle) that was set during binding.
- All other channels receive no output pulses/commands, and are not active during failsafe.

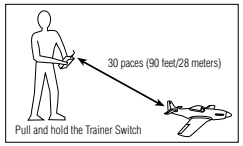
Plugging in the Leads

Plug the servo leads in the appropriate servo ports in the receiver noting the polarity of the servo connector.

Note: The AR500 features dual aileron channels (channel 2 & 6) making it convenient when using aircraft with two separate aileron servos, no Y-Harness or mixing will be needed.

Range Testing

Before each flying session and especially with a new model, it is important to perform a range check. All Spektrum aircraft transmitters incorporate a range testing system which, when activated, reduces the output power, allowing a range check.



1. With the model restrained on the ground, stand 30 paces (approx. 90 feet/28 meters) away from the model.
2. Face the model with the transmitter in your normal flying position and Place your transmitter into range check mode.
3. You should have total control of the model with the button depressed at 30 paces (90 feet/28 meters).
4. If control issues exist, call the Spektrum Service Center in the U.S. at 1-877-504-0233 for further assistance. In the UK or Germany use one of the following addresses.

Horizon Hobby UK
Units 1-4 Ploytern Rd
Staple Tye, Harlow
Essex CM18 7NS
United Kingdom

Please call +44 (0) 1279 641 097 or
sales@horizonhobby.co.uk
with any questions or concerns regarding
this product or warranty.

Horizon Technischer Service
Otto Hahn Str. 9a
25337 Elmshorn
Germany

Please call +49 4121 46199 66 or
service@horizonhobby.de
with any questions or concerns regarding
this product or warranty.

Receiver Power System Requirements

Inadequate power systems that are unable to provide the necessary minimum voltage to the receiver during flight have become the number one cause of in flight failures. Some of the power system components that affect the ability to properly deliver adequate power include:

- Receiver battery pack (number of cells, capacity, cell type, state of charge),
- The ESC's capability to deliver current to the receiver in electric aircraft.
- The switch harness, battery leads, servo leads, regulators etc.

The AR500 has a minimum operational voltage of 3.5 volts; it is highly recommended the power system be tested per the guidelines below.

Recommended power system test guidelines:

If a questionable power system is being used (i.e. small or old battery, ESC that may not have a BEC that will support high current draw, etc.) it is recommended that a volt-meter be used to perform the following tests.

Note: The Hangar 9 Digital Servo & Rx Current Meter (HAN172) or the Spektrum Flight Log (SPM9540) are the perfect tools to perform the test below.

Plug the volt-meter in an open channel port in the receiver and with the system on, load the control surfaces (apply pressure with your hand) while monitoring the voltage at the receiver. The voltage should remain above 4.8 volts even when all servos are heavily loaded.

Note: The latest generations of Nickel Metal Hydride batteries incorporate a new chemistry mandated to be more environmentally friendly. These batteries when charged with peak detection fast chargers have tendencies to false peak (not fully charge) repeatedly. These include all brands of NiMH batteries. If using NiMH packs be especially cautious when charging making absolutely sure that the battery is fully charged. It is recommended to use a charger that can display total charge capacity. Note the number of mAh put into a discharged pack to verify it has been charged to full capacity.

QuickConnect with Brownout Detection

Your AR500 features QuickConnect with Brownout Detection.

- Should an interruption of power occur (brownout), the system will reconnect immediately when power is restored (QuickConnect).
- The LED on the receiver will flash slowly indicating a power interruption (brownout) has occurred.
- Brownouts can be caused by an inadequate power supply (weak battery or regulator), a loose connector, a bad switch, an inadequate BEC when using an Electronic speed controller, etc.
- Brownouts occur when the receiver voltage drops below 3.5 volts thus interrupting control as the servos and receiver require a minimum of 3.5 volts to operate.

How QuickConnect with Brownout Detection works

- When the receiver voltage drops below 3.5 volts the system drops out (ceases to operate).
- When power is restored the receiver immediately attempts to reconnect to the last two frequencies that it was connected to.
- If the two frequencies are present (the transmitter was left on) the system reconnects typically about 4/100 of a second.

QuickConnect with Brownout Detection is designed to allow you to fly safely through most short duration power interruptions however the root cause of these interruptions must be corrected before the next flight to prevent catastrophic safety issues.

Note: If a brownout occurs in flight it is vital that the cause of the brownout be determined and corrected.

Antenna Polarization

For optimum RF link performance it's important that the antennas be mounted in an orientation that allows for the best possible signal reception when the aircraft is in all possible attitudes and positions. This is known as antenna polarization. The antennas should be oriented perpendicular to each other; typically one vertical and one horizontal (see Receiver Installation). The long antenna can be mounted in a position perpendicular at least 2" away from the short antenna using tape.

Tips on Using Spektrum 2.4GHz

ModelMatch™

Some Spektrum and JR transmitters offer a patented feature called ModelMatch. ModelMatch prevents the possibility of operating a model using the wrong model memory, potentially preventing a crash. With ModelMatch each model memory has its own unique code (GUID) and during the binding process the code is programmed into the receiver. Later, when the system is turned on, the receiver will only connect to the transmitter if the corresponding model memory is programmed on screen.

Note: If at any time you turn on the system and it fails to connect, check to be sure the correct model memory is selected in the transmitter. Please note that the DX5e and Aircraft Modules do not have model match.

While your DSM equipped 2.4GHz system is intuitive to operate, functioning nearly identically to 72MHz systems, following are a few common questions from customers:

1. Q: Which do I turn on first, the transmitter of the receiver?

A: *If the receiver is turned of first*—all servos except for the throttle will be driven to their preset failsafe positions set during binding. At this time the throttle channel doesn't output a pulse position preventing the arming of electronic speed controllers or in the case of an engine powered aircraft the throttle servo remain in it current position. When the transmitter is then turned on the transmitter scans the 2.4GHz band and acquires two open channels. Then the receiver that was previously bound to the transmitter scans the band and finds the GUID (Globally Unique Identifier code) stored during binding. The system then connects and operates normally.

If the transmitter is turned on first—the transmitter scans the 2.4GHz band and acquires two open channels. When the receiver is then turned on for a short period (the time it takes to connect) all servos except for the throttle are driven to their preset failsafe positions while the throttle has no output pulse. The receiver scans the 2.4GHz band looking for the previously stored GUID and when it locates the specific GUID code and confirms uncorrupted repeatable packet information the system connects and normal operation takes place. Typically this takes 2 to 6 seconds.

2. Q: Sometime the system takes longer to connect and sometimes it doesn't connect at all?

A: In order for the system to connect (after the receiver is bound) the receiver must receive a large number of consecutive uninterrupted perfect packets from the transmitter in order to connect. This process is purposely critical of the environment ensuring that it's safe to fly when the system does connect. If the transmitter is to close to the receiver (less that 4 ft.) or if the transmitter is located near metal objects (metal TX case, the bed of a truck, the top of a metal work bench, etc.) connection will take longer and in some cases connection will not occur as the system is receiving reflected 2.4GHz energy from itself and is interpreting this as unfriendly noise. Moving the system away from metal objects or moving the transmitter away from the receiver and powering the system again will cause a connection to occur. This only happens during the initial connection. Once connected the system is locked in and should a loss of signal occur (failsafe) the system connects immediately (4ms) when signal is regained.

3. Q: I've heard that the DSM system is less tolerant of low voltage. Is the correct?

A: All DSM receivers have an operational voltage range of 3.5 to 9 volts. With most system this is not a problem as in fact most servos cease to operate at around 3.8 volts. When using multiply high current draw servos with a single or inadequate battery/ power source, heavy momentary loads can cause the voltage to dip below this 3.5 volt threshold thus causing the entire system (servos and receiver) to brown out. When the voltage drops below the low voltage threshold (3.5 volts) the DSM receiver must reboot (go through the start up process of scanning the band and finding the transmitter) and this can take several seconds. Please read the receiver power requirement section as this explains how to test for and prevent this occurrence.

4. Q: Sometimes my receiver looses its bind and won't connect requiring rebinding. What happens if the bind is lost in flight?

A: The receiver will never loose its bind unless it's instructed to. It's important to understand that during the binding process the receiver not only learns the GUID (code) of the transmitter but the transmitter learns and stores the type of receiver that it's bound to. If the transmitter is placed into bind mode, the transmitter looks for the binding protocol signal from a receiver. If no signal is present, the transmitter no longer has the correct information to connect to a specific receiver and in essence the transmitter has been "unbound" from the receiver. We've had several DX7 customers that use transmitter stands or trays that unknowingly depress the bind button and the system is then turned on losing the necessary information to allow the connection to take place. We've also had DX7 customers that didn't fully understand the range test process and pushed the bind button before turning on the transmitter also causing the system to "lose its bind".