



DSM::SYSTEM
2.4 GHz Spread Spectrum Technology

Introduction

Spektrum's Digital Spectrum Modulation (DSM) system offers the ultimate in radio link security. No longer do you have to worry about transmitters on your frequency unintentionally being turned on, waiting for the frequency clip to practice or interference caused from noisy motors, speed controllers or other interfering sources. The DSM system utilizes Digital Spread Spectrum technology providing an impenetrable radio link.

Operating within the ultra high frequency 2.4GHz worldwide ISM band, each individual module is programmed at the factory with its own unique serial code called GUID (Globally Unique Identification code). Once a receiver is programmed to a specific module (called binding), the receiver will only recognize that module, ignoring signals from any other sources. And with over 4 billion possible GUID codes, it's virtually impossible for a receiver to listen to anything other than its bound transmitter.

The DSM system is telemetry-ready for optional telemetry modules (purchased separately). Engine temperature, speed, rpm, signal strength, battery voltage and even lap times are displayed in real time via Spektrum's handheld display or via a PC. Telemetry options will be updated periodically to include a wide variety of popular functions.

Benefits

- Eliminates the possibility of interference from an unintentional turn-on
- Impervious to model-generated RF interference (like noisy motors, speed controllers, metal-to-metal noise, etc.)
- Robust interference from any outside sources like other transmitters, cell phones, pagers, WiFi systems, etc.
- No more waiting for an open frequency
- Eliminates the need for a frequency board and frequency clips
- Fail-safe drives the servos to a preset position (usually full brakes) in the unlikely event of signal loss
- No need to impound transmitters at events
- The DSM system is available for all popular module-based 3-channel transmitters
- 2.4GHz worldwide band allows international use
- Short 8.5" receiver antenna is easy to mount
- Telemetry-ready— optional modules allow real time monitoring of head temperature, rpm, speed, battery voltage, lap times, etc.
- No maintenance or tuning required (always stays in tune)
- No need for crystals
- Up to 79 users can simultaneously operate DSM systems with no interference
- FCC, UKCC, ROAR, NORCCA and ETSI approved

DSM Digital Spread Spectrum Modulation

The DSM system operates in the 2.4GHz band (that's 2400MHz). This high frequency offers a significant advantage as it's well out of the range of model-generated radio interference (like motor and ESC noise). All the complex issues that now exist using 27 and 75MHz radios with model-generated interfering noise are eliminated with this system. The DSM system uses Direct Sequence Spread Spectrum modulation to generate a wide signal on a single frequency. The FCC requires that these systems be "smart"—incorporating collision avoidance such that when a system is turned on, it scans the 2.4GHz band and selects a channel that is not being used, then begins transmitting on that unused channel. 79 channels are available and the odds of one DSS spread spectrum system interfering with another are astronomically remote. The 2.4GHz spectrum has a capacity of 79 channels. In the unlikely event that the spectrum is full, the 80th system will not connect or cause any interference, going into hold scan until a channel is free.

Installation Instructions

During first installation, the receiver(s) must be bound to the transmitter module. Binding is necessary to program the receiver(s) to distinguish its corresponding transmitter from others. Also fail-safe positions are transferred from the transmitter to the receiver during binding. See binding below for more details.

Installing the Transmitter Module

1. Make sure that the transmitter is switched off.



2. Remove the
current RF
module from
the transmitter.



3. Carefully insert
the DSM module
noting the
orientation of the
connector pins.

Installing the Transmitter Module (continued)



4. Rotate and angle the antenna on the module to vertical.

5. If the transmitter is PPM and PCM compatible, make sure the transmitter is programmed to PPM modulation mode. If necessary, see the instructions included with your radio system for details.

Note: When using the Futaba 3PK, it's necessary to use the standard PPM mode and not the HRS mode.

Installing the Receiver



1. Using double-sided foam tape, mount the receiver in the position recommended in your vehicle's instructions.
2. At 8.5 inches in length, the receiver antenna is significantly shorter than conventional antennas. The receiver has provisions that allow the antenna to exit the top of the receiver or at the end of the receiver. To switch antenna positions, it's necessary to open the case to change the antenna exit position. Like all antennas, it's important to mount the antenna vertically. In most cases the antenna can be mounted inside the body with no loss of range. Mount the receiver antenna as recommended by the manufacturer of the vehicle, however, it may be necessary to trim the plastic antenna tube (included with your vehicle) to allow the antenna to extend at least 1/2" past the tip of the tube.

Installing the Receiver (continued)

Note: If desired, the antenna can be shortened (cut) to exactly 3.6" with negligible loss of range and in some applications the short 3.6" length will make installation easier.



3. Connect the servo and ESC leads per the chart below. The connections are compatible with Airtronics Z, JR®, Futaba, Hitec, and KO servos.

Channel Assignments

Receiver Channel Usage

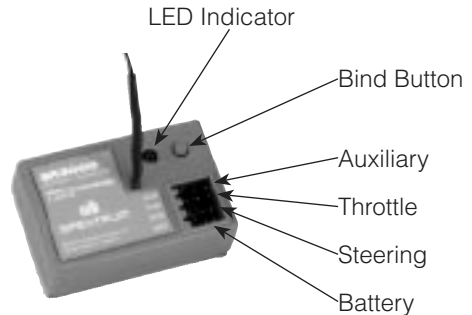
Port 1 – Battery and telemetry options

Port 2 – CH1 Steering

Port 3 – CH2 Throttle

Port 4 – CH3 Auxiliary channel or personal transponder

Note: Align the servo leads so the black wire is towards the outside edge of the receiver case.



Binding It's necessary to program the receiver to a specific module so that the receiver will only recognize that module, ignoring signals from any other sources. If the receiver is not bound to a module, the system will not operate. Also during the binding process the servo fail-safe positions are set.

It is only necessary to bind the receiver to the module during first installation and is recommended when the receiver is moved from one vehicle to another. Receivers can be re-bound to the same module or to other modules an infinite number of times. Also an unlimited number of receivers can be bound to a single transmitter module, common when using one transmitter to operate several models.

- Binding Process**
1. Make sure the transmitter and receiver are turned off.
 2. With the receiver off, press and hold the bind button on the receiver.
 3. Turn on the receiver while holding the bind button.
 4. Release the bind button when the LED flashes green.



**Binding Process
(continued)**

5. With the transmitter off, place the transmitter sticks and auxiliary channels in their desired fail-safe positions, normally brake and straight ahead steering.

- 6. Press and hold the bind button on the transmitter module.
- 7. Turn on the transmitter while holding the bind button.
- 8. Release the bind button after the green LED flashes.



Observe that after several seconds the LED on the receiver and the LED on the transmitter will quit flashing and remain solid, indicating that the binding process was successful. Once binding is complete, the system will automatically connect. Only bound receivers and modules can connect. During power-up, the transmitter scans for a free channel while the receiver scans for its bound transmitter. During scanning, the LEDs on both transmitter and receiver flash rapidly. After successful binding is achieved, the LED remains on continuously.

Loss of Link / Fail Safe

In the unlikely event that the link is lost during use, the receiver will drive the servos to their fail-safe positions that were preset during the binding process. If the receiver is turned on prior to turning on the transmitter, the receiver will enter the fail-safe mode driving the servos to their preset fail-safe position. When the transmitter is turned on, normal control is resumed.

Note: The fail-safe positions can be checked by turning the power off on the transmitter. The green LED on the receiver will go out and the servo/ESC will be driven to their stored fail-safe positions.

Specifications

Specification	Range	Units
Frequency Band	2.400–2.4835	GHz
Channels	79	
Channel Spacing	1	MHz
Chips/Bits	64	
DSSS Coding Gain	18	dB
Bitrate	15.625	kbps
Range	3000	Ft
Latency	5.6	ms
Resolution/Channel	4096	Bits

Specifications (continued)

	Specification	Range	Units
Transmitter	Output Power	10	mW
	Antenna	2	dBi
	Modulation	Digital GFSK 160kHz dF	
Receiver	Sensitivity	-98	dBm BER 1E-3
	RC Channels	3	
	Power	40	mA @ 4.8V
	Weight	11	grams

FCC Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

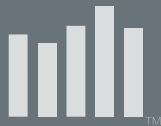
Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This product contains a radio transmitter with wireless technology which has been tested and found to be compliant with the applicable regulations governing a radio transmitter in the 2.400GHz to 2.4835GHz frequency range.

The associated regulatory agencies of the following countries recognize the noted certifications for this product as authorized for sale and use:

USA	Canada	Belgium
Denmark	France	Finland
Germany	Italy	Netherlands
Spain	Sweden	UK

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