HITEC

HITEC OPTIMA Series Receiver Instruction

2.4GHz Telemetric AFHSS
ADAPTIVE FREQUENCY HOPPING SPREAD SPECTRUM

Adaptive Frequency Hopping Spread Spectrum Technology | Telemetry System | Boosted Omni Directional Antenna (BODA) | Supplementary Power Connection (SPC)

CE 0678 ①

2.4GHz~2.4835GHz Band for use in : AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, GB, GR, HU, IE, IT, LT, LU, LV, MT, NL, PL, PT, RO, SE, SI, SK
2.4GHz~2.45GHz Band for use in : FR

Made in the Philippines

Introduction

Thank you for your purchase of the Hitec Adaptive Frequency Hopping Spread Spectrum or AFHSS, 2.4GHz module and receiver system. This manual contains the complete directions on how to use the Optima series receivers. We encourage you to review the entire manual before using these products.

Service & Support

Hitec Customer Service
Help is available from the Hitec office through phone support and e-mail inquiries.
Our US office is generally open Monday thru Friday, 8:00AM to 4:30PM PST. These hours and days may vary by season. Every attempt is made to answer every incoming service call. Should you get voice mail, leave your name and number and a staff member will return your call.

Hitec Web Site
Make plans to visit the Hitec website, **www.hitecrcd.com**, on a regular basis. Not only is it full of specs and other information about the entire Hitec product line, our FAQ pages will eventually hold valuable information and program update about the Spectra 2.4 module and Optima series receivers.

The On-Line Community
One of the benefits of the extensive R/C online community is the vast wealth of archived knowledge available. Hitec sponsors forums on most of the popular R/C web sites where a Hitec staff member or representative tries to answer all manner of product related questions. Bringing together strangers with common interests is proving to be one of the greatest gifts of the internet. If past history is any guide to the future, we are certain forums will be started about the Hitec 2.4 system and several are certain to stand out as valuable archives of information

Warranty and Non-Warranty Service
All Hitec products carry a two year from date of purchase warranty against manufactures defects. Our trained and professional service representative will determine if the item will be repaired or replaced. To provide all the necessary information we need to administrate your repair, visit our website at **www.hitecrcd.com** and download the repair form, fill it out and send in your item for repair.

Hitec Service
12115 Paine St. Poway CA 92064
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E-mail: service@hitecrcd.com

⊗ Warning!

1. For maximum performance it is recommended to position the antenna at a 90 degree angle as shown in the picture shown below.

Recommended Position
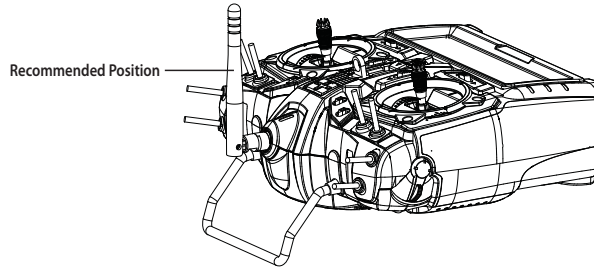
2. The receiver antenna should not be placed near the engine, metal parts, or high current batteries.

3. When using a large number of high-power digital servos in a model, it is highly recommended to use the SPC feature to insure the receiver always gets the power it needs in high load conditions

4. There could be a possible time-delay in receiving telemetry data from the sensor-station- system depending on the conditions in the area you fly.

5. It is strongly recommended to use Hitec "S" Heavy Duty High Channel Switch Harness with Receiver Charger Cord (Stock#. 54407S) for all Optima series receivers.

Optima Series Receiver Specifications & Features

Full Range AFHSS 2.4GHz Receivers

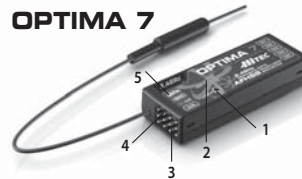| Receiver Model	Size	Weight	Stock Number
Optima 6	1.65 x 0.82 x 0.44in (42 x 21 x 11.4mm)	0.52oz (15g)	28410
Optima 7	2.24 x 0.82 x 0.44in (57 x 21 x 11.4mm)	0.60oz (17g)	28414
Optima 9	1.89 x 1.12 x 0.44in (48 x 28.5 x 10.60mm)	0.77oz (22g)	28425

Operating Voltage : 4.8~7.4V From receiver battery power or speed control (ESC) power.
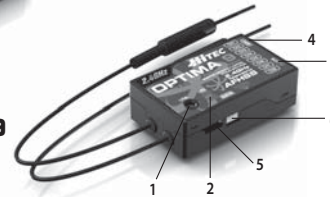4.8~35V Using SPC function.
Max Current Consumption : 190mA

OPTIMA 6
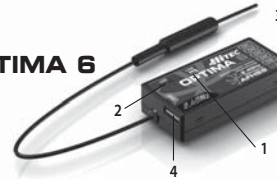
OPTIMA 7

OPTIMA 9

1. Function Button
- Used for binding the receiver to a module or future Hitec 2.4 built-in transmitter, entering the FAIL-SAFE or Hold feature.

2. Dual LED Status Indicator
- Indicates the set-up process codes and use status.

3. Channel Output and Battery Input Ports
- The ports for battery power, servos, gyros and other accessories are located at each end of the streamlined Optima receivers.

4. SPC Supplementary Power Connection
- Power the Optima receiver function with up to a 35V. electric aircraft motor battery. Details about the SPC system can be found in page 2.

5. Telemetry Sensor and System Port
- A three pin servo plug connector port is featured on the Optima 7 and Optima 9. Using the HPP-22 PC interface accessory this port serves to facilitate upgrading the devices software and interfacing the optional onboard sensor station.   *** Optima 6 is not applicable.**

6. External Switch Port
- The port can be used with External Setup Switch, especially when an aircraft fuselage is too big or too complicated to use the function switch.

Compatibility
- The Optima series receivers are compatible with transmitters using the Hitec AFHSS 2.4 system Spectra 2.4P module, Spectra 2.4 module or future dedicated built-in AFHSS 2.4 Hitec transmitters.

Smart Scan Mode Selectable
- Select between Normal and Scan Mode 2.4 signal types. See page 2 for details

FAIL-SAFE Option
- Servos and other accessories may be set with a FAIL-SAFE point if power to the receiver is lost. See page 2 for details.

Low Onboard Battery Warning
Know when the on-board battery is low with a warning alarm from the transmitter while you are flying. Review the Low Battery alarm features that use direct telemetry feedback to your transmitter on page 2.

Jumper
The jumper is installed at the factory and is used when the receiver is powered by an electronic speed control, a commercially available B.E.C. (battery eliminator circuit), dedicated 4.8 to 6V. NiMH battery pack, or regulated Li-Po battery. The jumper is removed when the receiver is powered using the SPC feature as described in more detail on page 2.
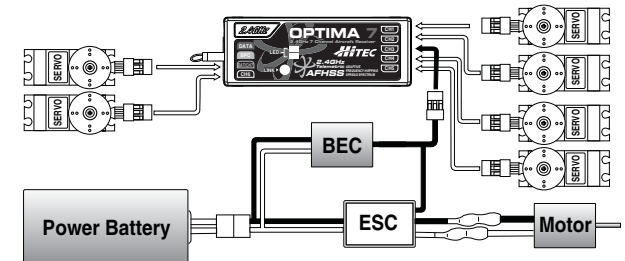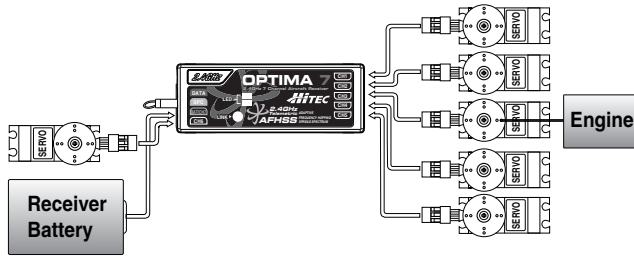
Receiver Connection Diagrams

Note -To see a receiver connection diagram for the SPC feature, see page 2.

Electric powered aircraft with Electronic Speed Control
Use this method on electric planes using ESC's providing power to the receiver and servo functions.

Power Battery — ESC — Motor — BEC

Glow, gas or electric powered aircraft using a separate receiver battery supply.
Follow this connection diagram when using a regulated Li-Po, or 4.8 to 6V. receiver battery,


SPC (Supplementary Power Connection) System

Hitec's exclusive optional receiver power system allows you to directly power the receiver from the main motor power battery of an electric powered aircraft. Up to 35 Volts can be fed directly into the receiver to power JUST THE RECEIVER FUNCTION. It will not power the servos. Almost all servos will burn-up if more than 6 Volts are used over a short period of time.

Note
some Hitec servos are rated to be used at 7.4Volts. You will still need to supply power for your servos with a four or five cell NiMH receiver battery or 2 cell Li-Po and regulator set-up.
The SPC system was partially created to be integrated into future Hitec telemetry system devices.
Check the Hitec web site for more information on the availability of telemetry systems in the future.

SPC Connection Diagram
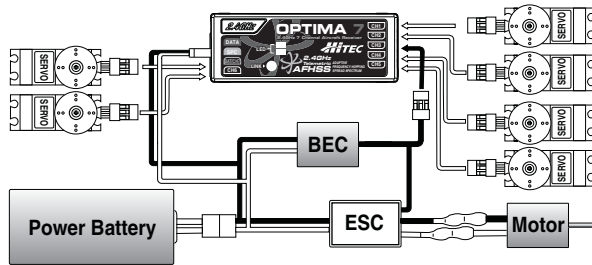
Link (ID-Setting)

Your Hitec AFHSS system uses a communication protocol that links and binds the Optima receiver to your transmitter. Once the receiver and module are "bound", no other transmitter can interfere with your receiver during its operation. In the case of multiple model memory transmitters, you can bind as many Optima receivers to your transmitter, one per model memory as necessary.

Each module and receiver set is paired at the factory in Normal Mode for your convenience. To change the transmitter to Scan Mode see page 2.

Note
- The ScanMode ID code is both red and blue LEDs are "on" both the module and receiver when powered up and bound together. There are also 2 beeps heard when the system is turned on.
- Normal Mode ID codes are that just the red LED is "on" both the module and receiver when powered up and bound together. There are also 4 quick beeps heard when the system is turned on.

Use one of the following binding methods to bind additional Optima receivers to your transmitter.

Scan Mode and Normal Mode Selection

Hitec's Spectra 2.4GHz module and Optima series receivers have two different operational modes to choose from, Normal Mode or Scan Mode.

There are seventy nine 2.4GHz channels that can be used by your Hitec AFHSS 2.4 system.
The following will explain how Normal Mode and Scan Mode use the channels.

Normal Mode
- In this mode the receiver/transmitter uses initial factory default frequency set up.
- The everyday start-up is quicker in the Normal Mode. In 90% of cases the Normal Mode is preferred by users.
- In the Normal mode, if the transmitter or receiver loses power, then power is restored, the system will re-link and function normally.
- The factory default setup is Normal Mode.

Scan Mode
- In Scan Mode the receiver/transmitter will scan all available channels every time you turn it on. It will then choose the cleanest frequencies to use. Scan Mode is preferable to use when flying in a crowded 2.4GHz environment.
- While in Scan Mode if the transmitter loses power it will not be reconnected to the receiver, if the receiver loses power it will take longer to reconnect than when in Normal Mode.
- In all cases the Scan Mode binding function will take longer than in Normal Mode when you boot-up the system

Caution
- System is in Normal Mode if the red LED is on both the module and receiver after binding.
- System is in Scan Mode if the red and blue LEDs are on both the module and receiver after binding.
- It must be used one module and one receiver at a time when they are used in Scan Mode.

Linking(ID-setting) when Transmitter is in Normal Mode

a. After installing the module on the transmitter, press and hold the button on the module, turn on the transmitter, then release the button. Red LED will flash while it is searching for a receiver.
  - For Aurora press and hold the button on the module, turn on the transmitter, then press "Transmit Yes" on the front LCD screen, then release the button.
b. Press and hold the button on the receiver, turn on the receiver, red LED is on solid, release the button on the receiver. Solid red and blue LED emits indicate it is linked with the module.
c. Solid red LED and blinking blue LED on the module indicate when the linking process is completed.
d. Turn off receiver than transmitter.
e. Turn on transmitter, red LED is solid on the module.
f. Turn on receiver, red LED is solid, after a moment, when both module and receiver connected, module will beep 4 times rapidly.
g. You should now have control over the model as the transmitter module and the receiver are linked in Normal Mode.

Linking(ID-setting) when Transmitter is in Scan Mode

a. After installing the module on the transmitter, press and hold the button on the module, turn on the transmitter, then release the button. Red LED will flash while it is searching for a receiver.
  - For Aurora press and hold the button on the module, turn on the transmitter, then press "Transmit Yes" on the front LCD screen, then release the button.
b. Press and hold the button on the receiver, turn on the receiver, red LED is on solid, release the button on the receiver. Solid red and blue LED emits indicate it is linked with the module.
c. Solid red LED and blinking blue LED on the module indicate when the linking process is completed.
d. Turn off receiver than transmitter.
e. Turn on transmitter, red LED is solid, blue LED is blinking on the module.
f. Turn on receiver, red LED is solid, after a moment, the blue LED will also come on, and the module will beep 2 times continuously .
g. You should now have control over the model as the transmitter module and the receiver are linked in Scan Mode.

Note
- Binding must be done within 15ft. of the transmitter and receiver.
- Transmitter and receiver need to be at least 18in. from each other to binding properly.
- In the Scan Mode, if the transmitter or receiver has been shut off or disconnected for more than one second, both module and receiver need to re-boot (turn the power off, and back on).

FAIL-SAFE and Hold Mode

If you use the FAIL-SAFE function, and set it up properly, should the receiver signal somehow be interrupted or interference were to occur, the servos will move to your pre-set FAIL-SAFE point you previously stored in the receiver during the FAIL-SAFE set-up p

If FAIL-SAFE has not been activated, the signal is switched off after the HOLD period of 1 sec. This means that the servos become "soft" and remain in their last commanded position under no load (this may equate to full-throttle!), until a valid signal is picked up again.

In the interests of safety, we recommend that FAIL-SAFE should always be activated, and the FAIL-SAFE settings should be selected so as to bring the model to a non-critical situation (e.g. motor idle / electric motor OFF, control surfaces neutral, airbrakes extended, aero-tow release open, etc.)

FAIL-SAFE Setup
a. Switch on the transmitter, then the receiver, wait for the system to boot and you have control over the model.
b. Press and hold the receiver function button for 6 seconds, release the button. After 2 more seconds both red and blue LEDs blink rapidly.
c. From the moment you release the button, the receiver will count 5 seconds during that time move all the transmitter sticks and other controls to the desired FAIL-SAFE positions (e.g. motor idle, control surfaces neutral), and hold them there.
d. After 5 seconds the system will save the FAIL-SAFE position. Relax all the control sticks.
e. Turn off the receiver, then the transmitter.
f. Turn on the system to use it. FAIL-SAFE is now activated, and the FAIL-SAFE positions are stored. Check it by turning off the transmitter to watch the controls move into their FAIL-SAFE positions.

Testing the FAIL-SAFE Setting
a. Move the sticks to positions other than the FAIL-SAFE settings, and then switch off the transmitter. The servos should now move to the FAIL-SAFE positions previously stored, after the HOLD peri

How to turn FAIL-SAFE Off and reactivate the Hold Mode
a. Switch on the transmitter, then the receiver. Wait for the system to boot and you have control over the model.
b. Press and hold the receiver function button for 6 seconds and release it. After 2 seconds the red and blue LEDs will blink rapidly.
c. Immediately press the button and release it.
d. FAIL-SAFE Mode is now deactivated and HOLD mode is activated.
e. Turn the transmitter off, then the receiver off.
f. Turn the system back on to use it.

Note
- If FAIL-SAFE is deactivated, the FAIL-SAFE position settings are also deleted!
- The FAIL-SAFE settings should be checked every time before you run the engine/motor.

Telemetry System

The Hitec Spectra 2.4 Module and Optima line of Receivers feature full telemetry capabilities and include a Low Receiver Battery Warning as a basic function.

I. Low Battery Warning
When Optima series receiver powered up, it will automatically detect the battery voltage level and recognizes between 4 cell or 5 cell NiMH and NiCd batteries. (4 cell < 5.8V < 5 cell)

- When battery level is safe (4 cell > 4.5V, 5 cell > 5.6V): no changes for LED lights.
- When battery level is low (4 cell < 4.5V, 5 cell < 5.6V): Blue LED glows constantly and the red LED will blink fast. You will hear three-continuous beeping alarm from the module as a low receiver battery warning. Upon hearing the alarm, we advise you to land at once.

Plans are to have many more devices available in the future. Check the Hitec website at **www.hitecrcd.com** for more up-to-date information.

Warning
Low Battery Warning function is only for your references the actual battery level could be different. Especially Battery Memory Effects, also known as Lazy Battery Effect or Battery Memory, could affect Low Battery Warning function to be worked properly.

When 2.4GHz System HV Servos are used together We strongly recommend to use battery Pack higher than 2,000mAh.