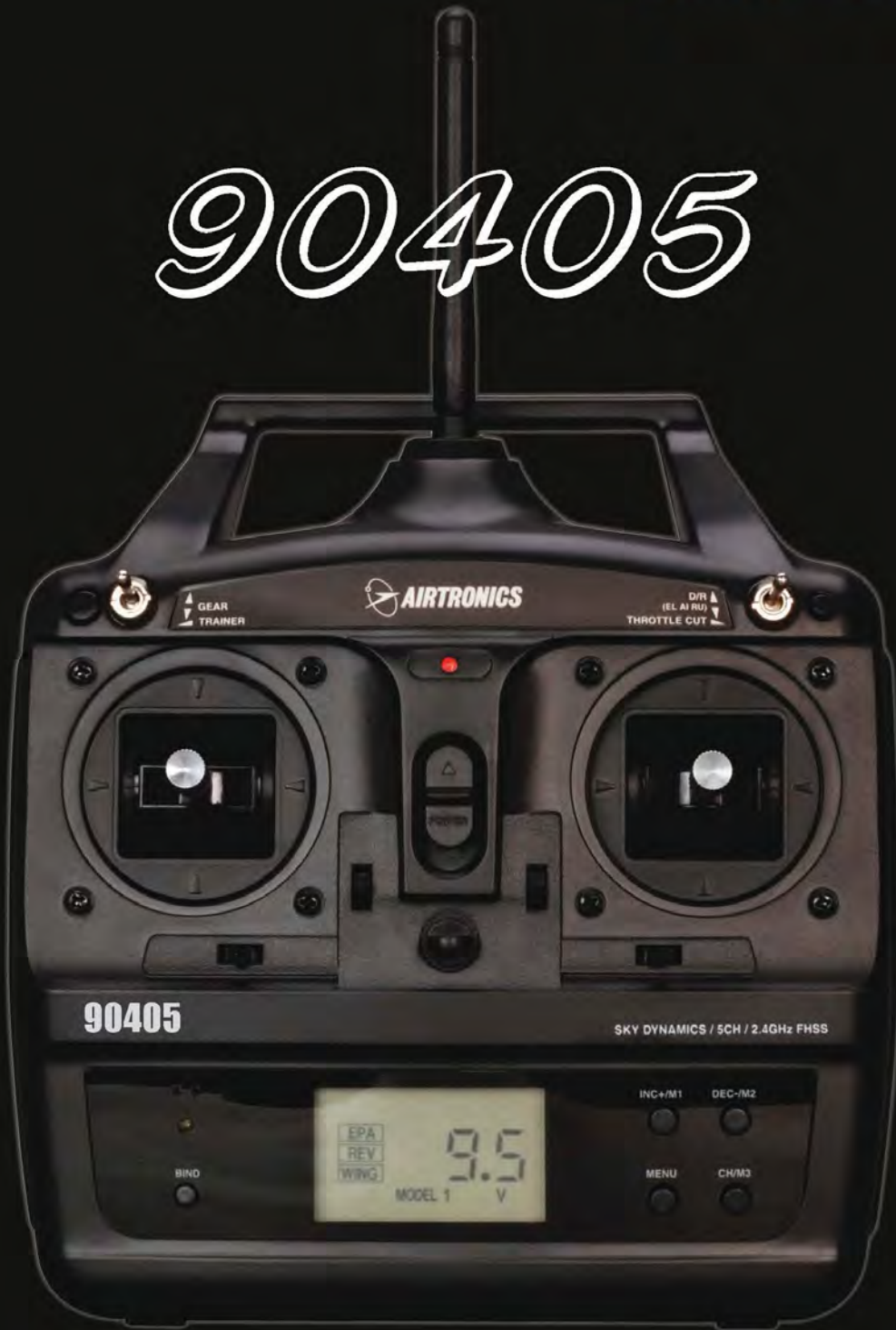


90405




2.4 GHz FHSS-1

OPERATING MANUAL

Spread Spectrum
Technology By **SANWA**

DIGITAL PROPORTIONAL SYSTEM

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PACKAGING

The packaging of your Airtronics 90405 2.4GHz FHSS-1 radio control system has been specially designed for the safe transportation and storage of the radio control system's components. **After unpacking your radio control system, do not discard the packaging materials.** Save the packaging materials for future use if you ever need to send your radio control system to us for service, or to store your radio control system if you don't plan on using it for an extended period of time.

INTRODUCTION

We appreciate your purchase of the Airtronics 90405 2.4GHz FHSS-1 radio control system. This Operating Manual is intended to acquaint you with the features of your new radio control system and how to use these features to get the most from your experience.

The 90405 2.4GHz FHSS-1 radio control system has been designed to be a powerful entry-level digital computer radio control system that is affordable, yet can still be used with more advanced aircraft as you grow in the hobby. Our engineers listened to input from our test-pilots and feedback from our users to design a radio control system that will allow you to extract the maximum performance from your model, while at the same time making the programming process as easy as possible to accomplish.

Please read this Operating Manual carefully so that you may obtain maximum success and enjoyment from the operation of your new 90405 2.4GHz FHSS-1 radio control system. This radio control system has been designed for the utmost in comfort and precise control of your aircraft models. We wish you the best of success and fun with your new purchase.

ADDITIONAL RECEIVER INFORMATION

Additional Airtronics 2.4GHz FHSS-1 receivers can be purchased and paired with the 90405 transmitter through the Binding operation. For more information about the current receivers available, please visit your local Airtronics dealer or our website at <http://www.airtronics.net>.



Please note that due to differences in the implementation of 2.4GHz technology among different manufacturers, only Airtronics brand 2.4GHz FHSS-1 aircraft receivers are compatible with your radio control system.

TRANSMITTER SIGNAL RANGE

This is a high-output full-range radio control system that should well exceed the range needed for any model. For safety, the user should perform a range check at the area of operation to ensure that the radio control system has complete control of the model at the farthest reaches of the operational area. A range check can be accomplished using Low-Power Mode. For more information, see page 15.



This radio control system operates on the 2.4GHz frequency band. The 2.4GHz connection is determined by the transmitter and receiver pair. Unlike ordinary crystal-based systems, your model can be used without frequency control.

FCC COMPLIANCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operating instructions, may cause harmful interference to radio communications, however, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced technician for help.

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. 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.

WARNING: Changes or modifications made to this equipment not expressly approved by Airtronics may void the FCC authorization to operate this equipment.

RF Exposure Statement

The 90405 transmitter has been tested and meets the FCC RF exposure guidelines when used with the Airtronics accessories supplied or designated for this product, and provided at least 20cm separation between the antenna the user's body is maintained. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

SAFETY AND USAGE PRECAUTIONS


In addition to the FCC Compliance section on the previous page, please observe the following Safety and Usage Precautions when installing and using your Airtronics 90405 2.4GHz FHSS-1 radio control system.

GENERAL SAFETY

- Be certain to read this Operating Manual in its entirety.
- 'Safety First' for yourself, for others, and for your equipment.
- Observe all the rules of the flying site or anywhere you operate your radio control equipment.
- If at any time during the operation of your model should you feel or observe erratic operation or abnormality, end your operation as quickly and safely as possible. DO NOT operate your model again until you are certain the problem has been corrected. TAKE NO CHANCES.
- Your model can cause serious damage or injury, so please use caution and courtesy at all times.
- Do not expose the radio control system to water or excessive moisture.
- Please waterproof the receiver and servos by placing them in a water-tight radio box if operating model boats.
- If you have little to no experience operating models, we strongly recommend you seek the assistance of experienced modelers or your local hobby shop for guidance.
- The low voltage alarm will sound when the transmitter battery voltage drops to 6.7 volts. If this occurs, stop using the transmitter as soon as possible, then replace or recharge the transmitter batteries.

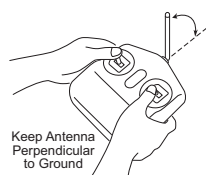
2.4GHZ FREQUENCY BAND PRECAUTIONS

- The 2.4GHz frequency band may be used by other devices, and other devices in the immediate area may cause interference on the same frequency band. Always before use, conduct a bench test to ensure that the servos operate properly. Also, conduct a range check at the area of operation to ensure that the radio control system has complete control of the model at the farthest reaches of the operational area.
- The response speed of the receiver can be affected if used where multiple 2.4GHz radio control systems are being used, therefore, carefully check the area before use. Also, if response seems slow during use, discontinue use as quickly as possible.
- If the 2.4GHz frequency band is saturated (too many transmitters on at once), as a safety precaution, the radio control system may not bind. This ensures that your radio control system does not get hit by interference. Once the frequencies have been cleared, or the saturation level has dropped, your radio control system should be able to bind without any problems.
- Observe any applicable laws and regulations in place at your flying site when using the 2.4GHz radio control system.
- Unlike frequency bands used with earlier radio control systems, reception with this 2.4GHz radio control system can be adversely affected by large obstructions and concrete or steel structures between your model and the transmitter. Also, wire mesh and similar barriers can adversely affect operation. Keep this mind to ensure the safety of your model.

 This radio control system operates on the 2.4GHz frequency band. The 2.4GHz connection is determined by the transmitter and receiver pair. Unlike ordinary crystal-based systems, your model can be used without frequency control.

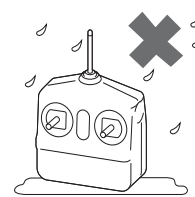
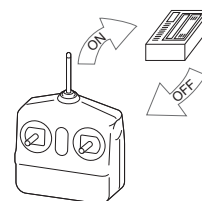
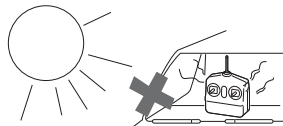
TRANSMITTER PRECAUTIONS

- Turn the transmitter ON first and then turn the receiver ON. After using your model, turn the receiver OFF first, then turn the transmitter OFF. It can be dangerous if you activate the components in reverse order as the servos may start up inadvertently.
- Before use, double-check that the transmitter and receiver batteries have sufficient power.
- Never touch the transmitter antenna during use. Doing so may cause loss of transmitter output, making it impossible to control your model.



- Before use, the transmitter antenna should be rotated and angled so that the antenna is as close to perpendicular to the ground as possible during use. After use, to prevent any chance of damaging the antenna, the antenna should be rotated and moved into the horizontal stowed position.
- Do not expose the transmitter to water or excessive moisture.

- Do not expose the transmitter to excessive heat or direct sunlight. Leaving the transmitter out in direct sunlight can damage the LCD.

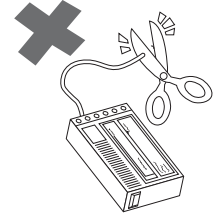


Do Not Expose to Moisture or Direct Sunlight

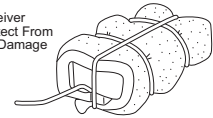
SAFETY AND USAGE PRECAUTIONS

RECEIVER PRECAUTIONS

- The receiver antenna wires consist of two coaxial cables and two reception wires (the thin tip at the end of the coaxial cables). When you mount the receiver antenna wires, do not bend the reception wires. Reception performance decreases if the reception wires are bent.
- The receiver antenna wires are delicate, therefore, handle with care. Do not pull on the receiver antenna wires with force. Do not cut or extend the receiver antenna wires.
- The coaxial cables can be bent into gentle curves, however, do not bend the coaxial cables acutely, or repeatedly bend them, or the antenna cores can be damaged.
- When installed in an electric-powered model, keep the receiver antenna wires as far away as possible from the motor, battery, and electronic speed control (ESC).
- There is a danger of runaway operation if connectors shake loose during use. Make sure that the receiver, servo(s), and switch harness connectors are securely fitted.
- The receiver is susceptible to vibration and moisture. Take appropriate measures to protect against vibration and moisture. The receiver should be wrapped in foam and the foam should be secured around the receiver to hold it in place. The foam should not be secured too tightly or the vibration dampening quality will be reduced. Failure to take appropriate measures could result in damage to the receiver.
- When installing the receiver, the antenna reception wires (the thin tip at the end of the coaxial cables) should not come into contact with any carbon or metal components (conductive components). Aircraft fuselages and helicopter frames may contain conductive components. If mounting the receiver surrounded by conductive materials (for example, a carbon fiber fuselage), mount the receiver so that the antenna reception wires can be extended outside of the model. Reception can be blocked if the antenna reception wires are shielded inside a carbon fiber fuselage.
- The manufacturer disclaims all responsibility for damages resulting from use of components other than genuine Airtronics components.



Wrap Receiver
in Foam to Protect From
Vibration and Damage



It is extremely important to install the receiver and route the receiver antenna wires correctly in your model. This will ensure that your model receives control signals no matter what its posture, attitude, or heading. For more information, see page 14.

AMA INFORMATION

The Academy of Model Aeronautics (AMA) is a national organization representing modelers in the United States. We urge you to examine the benefits of membership, including liability protection in the event of certain injuries. The Academy has adopted simple and sane rules which are especially pertinent for radio controlled flight as the Official AMA National Model Aircraft Safety Code, which we have partially reprinted below:

- I will not fly my model aircraft in sanctioned events, airshows or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
- I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give the right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
- I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
- I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.
- I will perform my initial turn after takeoff away from the pit or spectator areas, unless beyond my control.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
Phone (800) 435-9262
Fax (765) 741-0057
www.modelaircraft.org

FEATURES AND SPECIFICATIONS

SYSTEM FEATURES

- 5-Channel 2.4GHz FHSS-1 Digital Proportional Computer Radio Control System
- Full-Range 6-Channel 2.4GHz FHSS-1 Receiver
- Compatible with All Airtronics 2.4GHz FHSS-1 Aircraft Receivers
- 6 Dry Cell Batteries for Lighter Weight
- Accepts Optional Ni-Cd or Ni-MH Transmitter Batteries
- 3 Model Memory with Direct Model Select
- Easy-to-Read LCD with Digital Voltage Display
- Dual Rate Elevator, Aileron, and Rudder
- Throttle Cut
- Trainer System Compatible with 90405 and SD-10G Transmitters
- Low-Power Range Check Mode
- End Point Adjustment
- Digital Trim
- Audible Low Voltage Alarm
- Programmable Fail Safe
- Normal, V-Tail, and Delta (Elevon) Mixing Options
- Servo Reversing
- Adjustable Control Sticks
- Two-Position Landing Gear and Dual Rate Switches

SYSTEM SPECIFICATIONS

Transmitter

Model: 90405
 Output Power: 100mW
 Operating Voltage: 6.7v~9.6v
 Power Supply: 9.0v (6 Cell Alkaline/Ni-Cd/Ni-MH)
 Current Drain: 140mA~210mA
 Temperature Range: 32°F~122°F (0°C~50°C)
 Pulse Width: 0.9msec~2.1msec
 Weight with Alkaline Batteries: 24.92oz (712gr)
 Frequency/Modulation Type: 2.4GHz/FHSS-1
 Model Memory: 3 (Direct Select)

Receiver

Model: 92224 (RX600)
 Frequency/Modulation Type: 2.4GHz/FHSS-1
 Input Voltage: 4.8v~6.0v (Nominal)
 Weight: 0.27oz (7.8gr) with Case
 Weight: 0.20oz (5.9gr) without Case
 Dimensions: 1.64 x 0.85 x 0.47in (41.7 x 21.5 x 12.0mm)
 Fail Safe Support: Yes (CH 1~CH 4)
 Connector Type: Universal 'Z'

SERVO RECOMMENDATIONS

Although most current brand servos will work with your 90405 2.4GHz FHSS-1 radio control system, we recommend using Airtronics brand servos. For pricing, availability, and more selection, please visit your local Airtronics dealer or our website at <http://www.airtronics.net>.

94102Z Standard Bushing

Torque: 42oz/in (3.0kg/cm @ 4.8v)
 53oz/in (3.8kg/cm @ 6.0v)
 Speed: 0.20 sec/60° @ 4.8v
 0.16 sec/60° @ 6.0v
 Dimensions: 1.54 x 0.79 x 1.42in
 (39.1 x 20.0 x 36.0mm)
 Weight: 1.59oz (45gr)

94091Z Super Micro Bushing

Torque: 18oz/in (1.3kg/cm @ 4.8v)
 23oz/in (1.7kg/cm @ 6.0v)
 Speed: 0.12 sec/60° @ 4.8v
 0.10 sec/60° @ 6.0v
 Dimensions: 0.91 x 0.44 x 0.87in
 (23.0 x 11.2 x 22.1mm)
 Weight: 0.32oz (9gr)

94802 Digital Sub-Micro Dual Ball Bearing

Torque: 22oz/in (1.6kg/cm @ 4.8v)
 26oz/in (1.9kg/cm @ 6.0v)
 Speed: 0.18 sec/60° @ 4.8v
 0.15 sec/60° @ 6.0v
 Dimensions: 0.91 x 0.35 x 0.90in
 (23.0 x 9.0 x 22.8mm)
 Weight: 0.26oz (7.4gr)

94162Z High Torque MG Dual Ball Bearing


Torque: 115oz/in (8.3kg/cm @ 4.8v)
 144oz/in (10.4kg/cm @ 6.0v)
 Speed: 0.23 sec/60° @ 4.8v
 0.18 sec/60° @ 6.0v
 Dimensions: 1.54 x 0.79 x 1.61in
 (39.1 x 20.0 x 40.9mm)
 Weight: 2.36oz (67gr)

94842 Digital Precision Dual Ball Bearing

Torque: 111oz/in (8.0kg/cm @ 4.8v)
 132oz/in (9.5kg/cm @ 6.0v)
 Speed: 0.16 sec/60° @ 4.8v
 0.13 sec/60° @ 6.0v
 Dimensions: 1.57 x 0.77 x 1.56in
 (40.0 x 19.5 x 39.6mm)
 Weight: 1.62oz (45.8gr)

94856 Digital High Speed MG Dual Ball Bearing


Torque: 125oz/in (9.0kg/cm @ 4.8v)
 150oz/in (10.8kg/cm @ 6.0v)
 Speed: 0.14 sec/60° @ 4.8v
 0.11 sec/60° @ 6.0v
 Dimensions: 1.50 x 0.79 x 1.49in
 (38.0 x 20.0 x 37.8mm)
 Weight: 2.04oz (58.0gr)

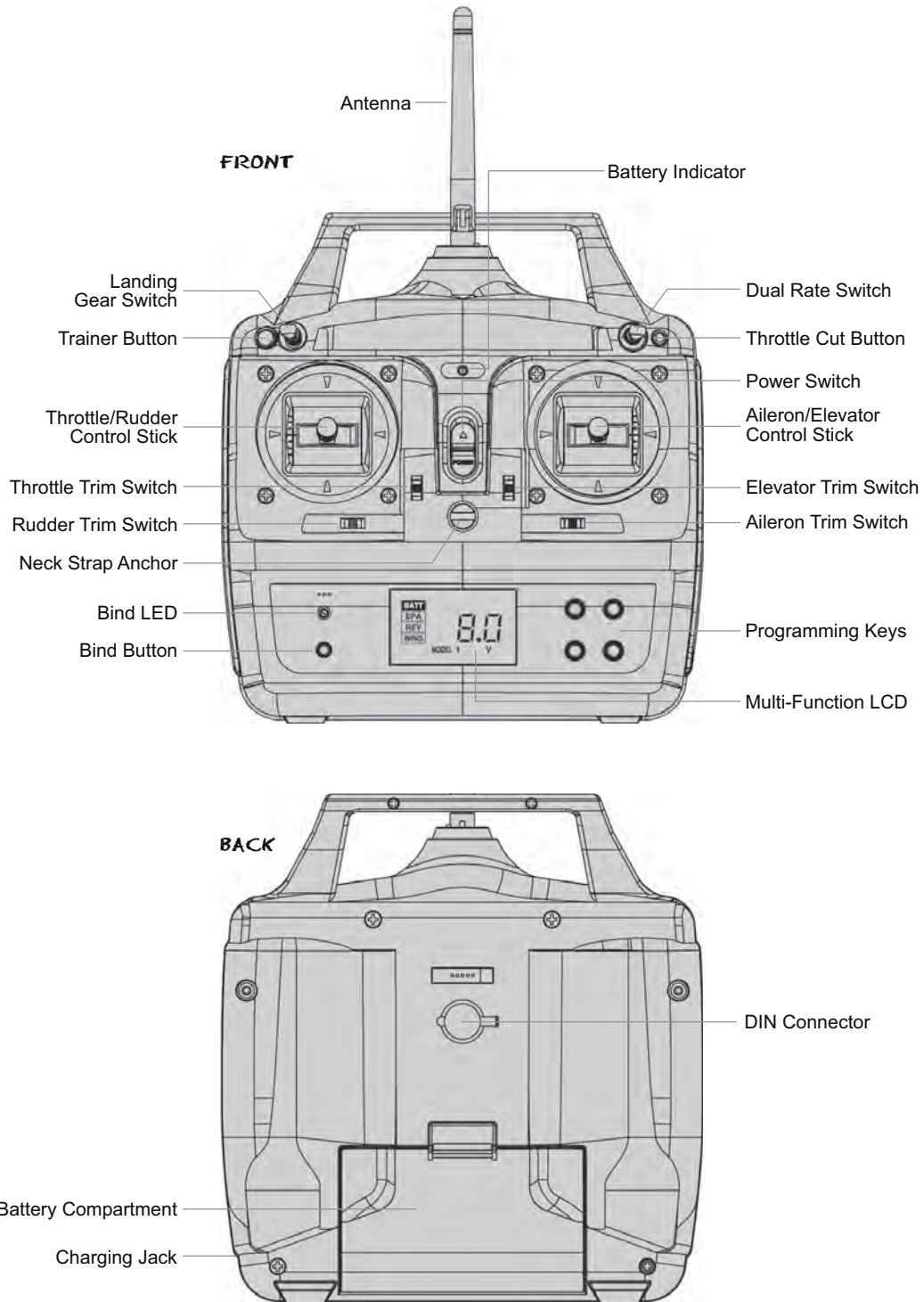
 Both analog and digital servos will work with your 90405 2.4GHz FHSS-1 radio control system. To get the most out of your experience though, we recommend the use of digital servos.

FEATURES FAMILIARIZATION

TRANSMITTER FEATURES DIAGRAM

Use the diagram below to familiarize yourself with the different features of your 90405 2.4GHz FHSS-1 transmitter. Descriptions of these features can be found on pages 8 and 9.

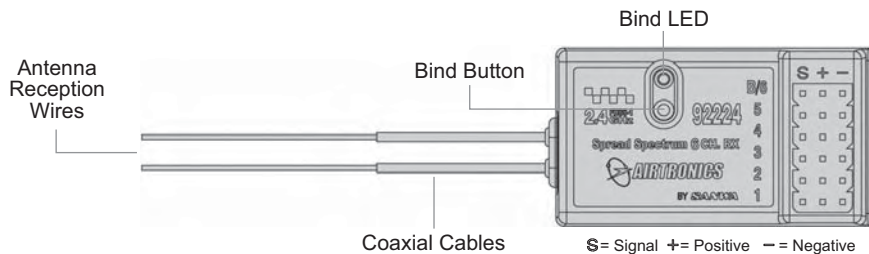
 The transmitter antenna is adjustable. It should be adjusted so that when you're holding the transmitter while you're flying, the antenna is orientated as close to perpendicular to the ground as possible at all times. This provides the best signal between the transmitter and the receiver. You should never point the antenna directly at your aircraft, as this results in a weakened signal. For more information, see page 4.



FEATURES FAMILIARIZATION

RECEIVER FEATURES DIAGRAM

Use the diagram below to familiarize yourself with the 92224 RX600 6-Channel receiver included with your 90405 2.4GHz FHSS-1 radio control system. Descriptions of these features can be found below and on the next page.



CHANNEL SLOT	FUNCTION	CHANNEL SLOT	FUNCTION
Channel Slot 1	Elevator	Channel Slot 4	Rudder
Channel Slot 2	Aileron	Channel Slot 5	Landing Gear
Channel Slot 3	Throttle/ESC	Channel Slot 6*/BATT	Flaps*/Battery

*When used with the 90405 transmitter, this channel slot is used for receiver battery power only. No other channel function is associated with it.

FEATURES DESCRIPTIONS

Aileron/Elevator Control Stick: Controls the Aileron and Elevator axes. The Aileron/Elevator control stick length is adjustable to suit your preference. For more information, see page 15.

Aileron Trim Switch: Used to control the Aileron axis Right and Left trim.

Antenna: Transmits the signal from the transmitter to the receiver in the model. The Antenna should be pivoted into the vertical position during use. When not in use, the Antenna should be collapsed into the horizontal position to prevent damage during handling and transport.

Antenna Reception Wires: The portion of each of the receiver antenna wires that actually receives the transmitter signal.

! The Antenna Reception Wires should never be bent or they could be damaged and limit the range of the receiver.

Battery Compartment: Houses the 6 'AA' Alkaline batteries that power the transmitter. The transmitter uses 6 cells for lighter weight and better feel, while still providing long usage time and high power output. The transmitter can also be powered using optional Ni-Cd or Ni-MH cells (available separately). For more information, see page 11.

Battery Indicator: Indicates that there is power to the transmitter. When the trainer cable (available separately) is plugged in, or when the battery voltage drops to 6.7 volts, the Battery Indicator flashes.

Bind Button: Used to Bind the transmitter and receiver. Also used to enter Low-Power Range Check mode.

Bind LED: Displays the current status of the transmitter and receiver pair.

Charging Jack: Used for onboard charging of the optional Ni-Cd or Ni-MH batteries. An optional Airtronics 95035 110v AC Transmitter and Receiver charger is available separately. For more information, see page 11.

Coaxial Cables: The portion of each antenna wire that extends the Antenna Reception Wires. The Coaxial Cables can be bent into gentle curves, however, do not bend the Coaxial Cables acutely, or repeatedly bend them, or the antenna wire's cores can be damaged. For information on mounting the receiver and orientating the receiver antenna wires, see page 14.

DIN Connector: The DIN Connector is where the trainer cable (available separately) is plugged into. An adapter to use the transmitter with a flight simulator can also be plugged into the DIN Connector.

Dual Rate Switch: Used to control the Dual Rate function. The Dual Rate function allows you to change the control authority of the control surfaces by changing the amount of servo travel. The Dual Rate function reduces the control throw to 75% of the current End Point Adjustment programmed and effects the Elevator, Aileron, and Rudder channels equally at the same time.

FEATURES FAMILIARIZATION

FEATURES DESCRIPTIONS, CONTINUED...

Elevator Trim Switch: Used to control the Elevator axis Up and Down trim.

Landing Gear Switch: Used to control the operation of the Landing Gear channel. This channel is a non-proportional channel, and is ideal for controlling the retractable landing gear or the flaps on your model.

Multi-Function LCD: The heart of the programming and display features of the transmitter. All programming and transmitter display functions are shown on the LCD.

Neck Strap Anchor: Used to attach your neck strap (available separately) to the transmitter.

Power Switch: Turns the transmitter ON and OFF.

Programming Keys: The Programming Keys are used to facilitate transmitter programming and select models stored in memory. The four Programming Keys consist of the INC+/M1 (Increase/Model 1) key, the DEC-/M2 (Decrease/Model 2) key, the CH/M3 (Channel Select/Model 3) key, and the MENU key.

Rudder Trim Switch: Used to control the Rudder axis Right and Left trim.

Throttle/Rudder Control Stick: Controls the Throttle and Rudder axes. The Throttle/Rudder control stick length is adjustable to suit your preference. For more information, see page 15.

Throttle Trim Switch: Used to control the Throttle axis Up and Down trim.


Throttle Cut Button: Used to control the Throttle Cut function. The Throttle Cut function allows you to reduce throttle servo travel by approximately 15% with just a press of the button. The Throttle Cut function is used to shut down your engine after flight.

Trainer Button: Used to control the Trainer function. When the Trainer Button is pressed and held down, the Student's transmitter will have control of the model. When the Trainer Button is released, control of the model instantly returns to the Instructor's transmitter. For more information, see pages 19 and 20.

SERVO CONNECTORS


The 92224 RX600 6-Channel receiver included with your 90405 2.4GHz FHSS-1 radio control system uses universal Airtronics 'Z' connectors which are electronically compatible with the servos of other radio control system manufacturers. The connectors are rugged, but should be handled with care.



 When unplugging the servo connectors, it's best not to pull on the servo wire itself. This could result in damage to the servo wire pins in the plastic plug. Always grasp the plastic connector itself.

LOW VOLTAGE ALARM

The 90405 transmitter is equipped with a Low Voltage Alarm that will sound when the transmitter batteries reach 6.7 volts. If the Low Voltage Alarm sounds while you are flying, you should land immediately, then replace or recharge the transmitter batteries.

 If the Low Voltage Alarm sounds after replacing or recharging the transmitter batteries, there may be a problem with the transmitter. If this occurs, please contact Airtronics Customer Service using the information on the back cover of this Operating Manual.

OPTIONAL ITEMS

The following optional items (available separately) can be used with your 90405 2.4GHz FHSS-1 radio control system. For pricing and availability, please visit your local Airtronics dealer or our website at <http://www.airtronics.net>.

233884	Hi-Energy 1200mAh Ni-MH 'AA' Batteries for Transmitter*	99103	Adjustable Neck Strap	97107	Trainer Cable
233808	Hi-Energy 6.0v 2200mAh Ni-MH Flat Receiver Battery*	978411	Aluminum Carry Case		
95035	110v AC Transmitter and Receiver Charger	97020Z	8" Y-Harness		
96750	Stick Tip Extensions	97011Z	12" Servo Extension		

*Not an Airtronics brand product, however, this product is available through most Airtronics dealers.

SYSTEM CONNECTIONS

TRANSMITTER BATTERY INSTALLATION

- 1) Remove the battery cover on the back of the transmitter by pushing down firmly on the tab in the top of the battery cover and pulling the battery cover out.
- 2) Install six fresh 'AA' Alkaline batteries into the battery tray, making sure that the polarity is correct. The direction that each battery should be installed is molded into the battery tray (+ Positive and - Negative).
- 3) Set the bottom of the battery cover back onto the transmitter and push it firmly until it 'clicks' closed.

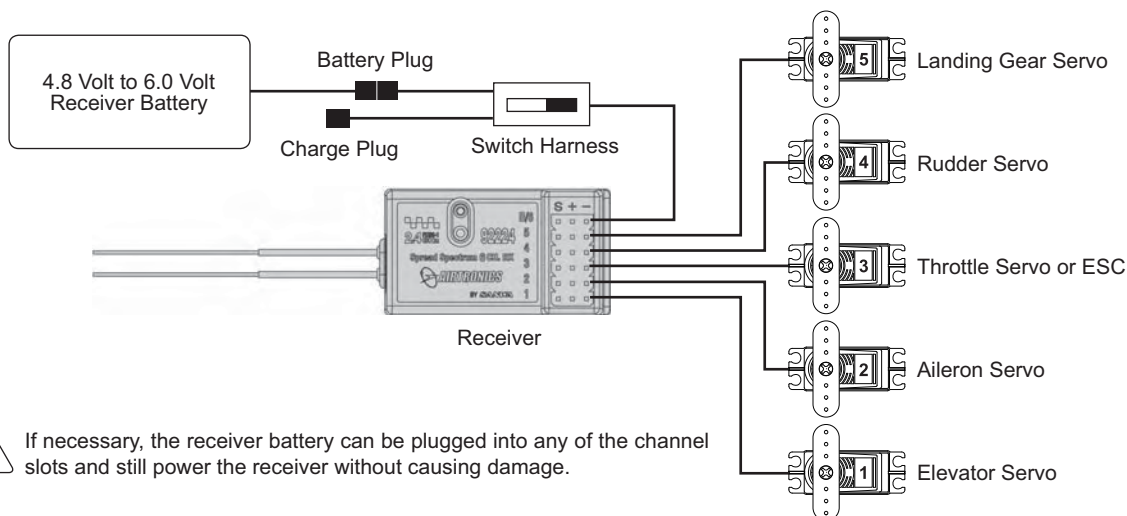
! If you prefer to use rechargeable Ni-Cd or Ni-MH transmitter batteries, please see the options on the next page.

AIRBORNE SYSTEM CONNECTIONS

Use the diagram below to familiarize yourself with how to connect the switch harness, servos (available separately), and receiver battery (available separately) to your 92224 RX600 6-Channel receiver.

! A receiver battery is not included. The receiver can be powered by a 4.8 volt (4 cell) or a 6.0 volt (5 cell) Ni-Cd or Ni-MH battery of desired capacity. The receiver can also be powered by a 2 cell Li-Fe/A123 or a 2 cell Li-Po battery of desired capacity as long as you use a voltage regulator.

WARNING The receiver's nominal input voltage is 4.8 volts to 6.0 volts. If your receiver battery's nominal voltage rating is greater than 6.0 volts, you must use a voltage regulator plugged between the switch harness and the receiver battery to drop your battery's voltage to 6.0 volts. If you do not use a voltage regulator, damage to the receiver could result. We recommend a switching type regulator and it must be able to handle the amperage demands of the servos used in your aircraft.



! If necessary, the receiver battery can be plugged into any of the channel slots and still power the receiver without causing damage.

Using an Li-Fe/A123 or Li-Po Receiver Battery

WARNING The nominal voltage rating of a 2 cell Li-Fe/A123 battery or a 2 cell Li-Po battery is greater than 6.0 volts. Because of the higher voltage, you **MUST** use a voltage regulator plugged between the switch harness and the battery to drop the battery voltage to 6.0 volts. If you do not use a voltage regulator, damage to the receiver will result.

If you decide to power the receiver using a 2 cell Li-Fe/A123 battery or a 2 cell Li-Po battery, please observe the following:

- Use **ONLY** a 2 cell Li-Fe or Li-Po battery of desired capacity with a voltage regulator. **You MUST use a voltage regulator.**
- When changing the plug on your battery to be compatible with the switch harness, please observe correct polarity. Connecting with reverse polarity could damage the switch harness and/or the receiver. See plug polarity diagram above.
- Observe all safety precautions provided with your battery before use, during use, and during the charging process.



SYSTEM CONNECTIONS

TRANSMITTER AND RECEIVER BATTERY OPTIONS

Instead of using Alkaline batteries to power the transmitter, you can use rechargeable Ni-Cd or Ni-MH batteries. This will provide longer usage time and reduced cost in the long run, since you won't need to continuously purchase new Alkaline batteries.

The 90405 transmitter features a Charging Jack, which can be used with the optional Airtronics 95035 110v AC Transmitter and Receiver charger to recharge the batteries without removing them from the transmitter. In addition, this charger can also be used to recharge a 4.8v (4 cell) or 6.0v (5 cell) rechargeable Ni-Cd or Ni-MH receiver battery pack at the same time. We recommend the following:

Hi-Energy 1200mAh Ni-MH 'AA' Rechargeable Batteries (4-Pack) for Transmitter (2 PCS.)

Hi-Energy 6.0v 2200mAh Ni-MH Rechargeable Flat Battery Pack for Receiver (1 PC.)

Airtronics 95035 110v AC Transmitter and Receiver Charger (1 PC.)

- 1) Install the optional 1200mAh Ni-MH rechargeable batteries into the transmitter, following the steps in the Transmitter Battery Installation section on the previous page, then connect your receiver battery using the diagram on the previous page.

Charging the Optional Ni-MH Transmitter and Receiver Batteries

The 90405 transmitter features a Charging Jack located on the right side of the transmitter, allowing you to recharge the optional rechargeable batteries without removing them from the transmitter. Use **ONLY** the recommended optional Airtronics 95035 110v AC Transmitter and Receiver charger or damage to the transmitter and/or batteries could result.

WARNING Do NOT attempt to recharge Alkaline batteries. Do NOT attempt to charge any type of batteries other than those recommended and use ONLY the recommended charger. Do not use the Charging Jack with any other after-market fast charger or Peak-Detection charger or the transmitter could be damaged.

- Always follow the charging procedures described below to ensure the safe and correct use of the rechargeable batteries and charger.
- Before charging the batteries, double-check that both the transmitter and the receiver are turned OFF.
- Overcharging reduces the life of the batteries and can result in overheating and bursting. This may cause personal injury and/or property damage.
- Do not plug the recommended charger into anything other than an AC 110v power outlet. Plugging the charger into anything other than AC 110v outlet may result in smoking, sparks, or fire.
- Do not throw the batteries or abuse them in any manner. Do not dispose of the batteries in the fire or allow it to overheat.
- Do not short-circuit the battery terminals with wire or any other object.

WARNING If you're using a Li-Fe or Li-Po receiver battery, do NOT attempt to charge either of these types of batteries with the optional Airtronics 95035 110v AC Transmitter and Receiver charger. You MUST use a charger that is specifically designed to charge Li-Fe and Li-Po batteries.

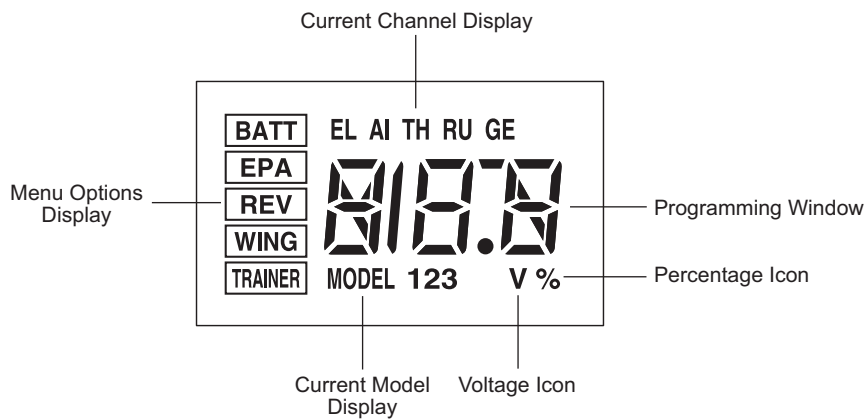
- 1) Plug the Airtronics 95035 110V AC Transmitter and Receiver charger into a 110v AC wall socket.
- 2) Plug the round connector from the charger into the Charging Jack in the transmitter and plug the female connector from the charger into the switch harness charge plug. The charger LEDs will illuminate red, indicating that the charger is charging.
- 3) Both transmitter and receiver charger outputs are 150mAh, therefore, it will take approximately 15 hours to recharge fully-discharged 2200mAh batteries ($2200/150=14.6$). Charge time will vary depending on the mAh capacity of the batteries you're charging. For example, 1200mAh batteries would require an 8 hour charge ($1200/150=8$).

WARNING An after-market peak-detection charger and/or cyclor should NOT be used to charge the optional rechargeable batteries through the transmitter. The circuitry within the transmitter can interfere with the peak-detection charger's normal operation, resulting in over-charging and damaging the batteries, and possibly the transmitter itself. Damage caused by peak-charging or fast-charging the batteries through the transmitter, or using an incorrect battery type, will not be covered under warranty.

LCD AND PROGRAMMING KEYS

The 904052.4GHz FHSS-1 transmitter features four Programming Keys that are used to facilitate transmitter programming. The four Programming Keys consist of the INC+/M1 (Increase/Model 1) key, the DEC-/M2 (Decrease/Model 2) key, the CH/M3 (Channel Select/Model 3) key, and the MENU key. This section summarizes the functions of each of the four Programming Keys, in addition to describing the main areas of the Multi-Function LCD.

MULTI-FUNCTION LCD OVERVIEW



Current Channel Display: Displays the channel that Programming Value changes will effect during programming.

Current Model Display: Displays the model that is currently loaded into memory.






Menu Options Display: Displays the different Menu Options that are available. When a Menu Option is selected it will flash.

Percentage Icon: Displays only when a programming percentage value can be changed within a menu. Indicates the current Programming Value's percentage.

Programming Window: Displays Programming Value information and the Digital Voltage Indicator when the BATT menu is selected.

Voltage Icon: Displays only when the BATT menu is selected. The Voltage Icon indicates that the Digital Voltage Display is Active.


PROGRAMMING KEY FUNCTIONS

PROGRAMMING KEY	NAME	FUNCTION
 INC+/M1	INC+/M1 (Increase/Model 1)	Increases Programming Values and is used to select Model 1, using the Direct Model Select function.
 DEC-/M2	DEC-/M2 (Decrease/Model 2)	Decreases Programming Values and is used to select Model 2, using the Direct Model Select function.
 CH/M3	CH/M3 (Channel Select/Model 3)	Cycles through to select the Channel you would like to make programming changes to and is used to select Model 3, using the Direct Model Select function.
 MENU	MENU (Menu Select)	Cycles through to select the Menu you would like to make programming changes to.
 INC+/M1 DEC-/M2	Default Shortcut	Pressing both keys at the same time within a Programming Menu resets the Programming Value to the Default value.

SYSTEM SETUP AND INSTALLATION

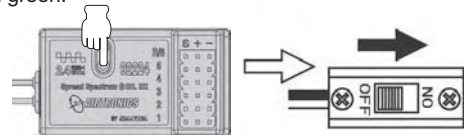
TRANSMITTER AND RECEIVER BINDING

The Binding function allows you to Bind the transmitter and receiver pair. When new, it is necessary to pair the transmitter and receiver to prevent interference from radio controllers operated by other users. This operation is referred to as 'binding'. Once the binding process is complete, the setting is remembered even when the transmitter and receiver are turned OFF. Therefore, this procedure usually only needs to be done once.


 Before beginning the binding process, connect the switch harness, servos, and the receiver battery to your 92224 RX600 6-Channel receiver, using the diagram on page 10. Make sure that both the transmitter and the receiver are turned OFF.

- 1) Ensure that the throttle control stick is in the LOW position (pulled all the way back).
- 2) Turn the transmitter ON. The Bind LED on the transmitter will illuminate solid green.

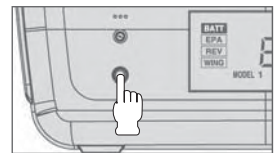
- 3) While holding down the Bind Button on the receiver, turn the receiver ON. The Bind LED on the receiver will flash slowly. After ~2 seconds release the Bind Button. The Bind LED on the receiver will continue to flash slowly.




* * *


 Use the tip of a pencil or a 1.5mm hex wrench to press the Bind Button on the receiver.

- 4) Quickly press the Bind Button on the transmitter. The Bind LED on the receiver will flash rapidly for ~3 seconds, go out momentarily, then illuminate solid blue, indicating the Binding process is complete.




* * * * * ⇨ *

 When the binding procedure is successful, the Bind LED on the receiver will stay solid blue when both the transmitter and receiver are turned ON. If the Bind LED on the receiver is flashing rapidly or not ON at all, the transmitter and receiver are not paired. In this case, turn both the transmitter and receiver OFF, then repeat the binding procedure.

 Under some circumstances, the receiver may not operate after turning the transmitter and receiver ON. If this occurs, perform the binding process again.


FAIL SAFE PROGRAMMING

The Fail Safe function automatically sets the servos to a predetermined position in the event that the signal between the transmitter and the receiver is interrupted, whether due to signal degradation or to a low transmitter battery. For example, the Fail Safe function can be set so that the throttle returns to idle, the elevator moves slightly up, and the ailerons move slightly right or left, to result in a shallow downward decent of your aircraft.

 The Fail Safe function is available on channels 1 through 4 only. We suggest programming the Fail Safe function prior to mounting the receiver into your aircraft if you will be unable to access the receiver's Bind Button after mounting.

Setting Fail Safe Positions

- 1) Turn the transmitter ON, then turn the receiver ON. Move the transmitter control sticks to verify correct servo movement.
- 2) Move the transmitter control sticks to the desired Fail Safe positions. While holding the transmitter control sticks in those positions (generally throttle at idle and a minimal amount of elevator and/or aileron), press and hold the Bind Button on the receiver. After ~2 seconds, the Bind LED will begin to flash slowly. Continue holding the Bind Button until the Bind LED begins to flash rapidly (~2 more seconds). Once the Bind LED begins to flash rapidly, release the Bind Button.
- 3) Turn the transmitter OFF to test the Fail Safe operation. The servos should move to the positions that you set in step 2.

 The Fail Safe settings will be erased if you re-bind the transmitter and receiver pair. If you bind the same transmitter and receiver pair you MUST repeat these procedures to setup the Fail Safe function again.

IMPORTANT If you don't program the Fail Safe function, if the signal between the transmitter and receiver is lost, the servos will stay in the last position they were in when the signal was lost. However, the servos will be free to move under load. They will not be locked in the last position they were in.

Clearing Fail Safe Settings

- 1) To clear the currently programmed Fail Safe settings, re-bind the transmitter and receiver pair.

SYSTEM SETUP AND INSTALLATION

Mounting the Receiver

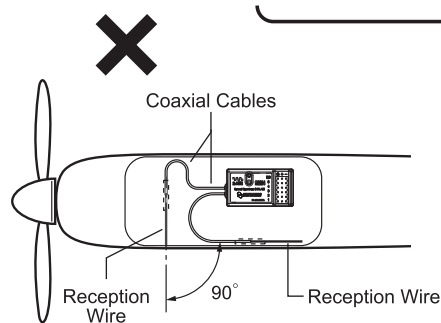
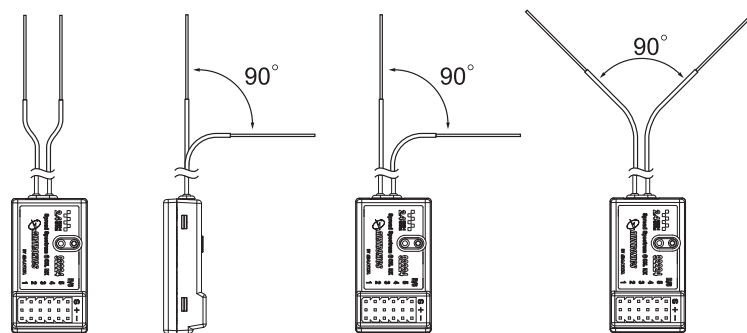
When mounting the receiver into your model, it's important to mount the receiver exactly as described. In addition, the receiver should be wrapped in foam rubber to protect it from vibration. Failure to mount the receiver antenna wires as described can result in poor reception, or in some cases, complete loss of reception.

! We recommend that you bind the transmitter and receiver, and program the Fail Safe function, prior to mounting the receiver into your model, otherwise, it may be difficult or impossible to access the Bind Button on the receiver.

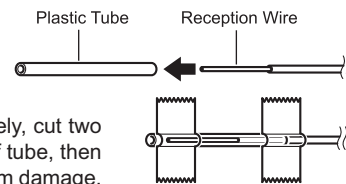
The receiver should be mounted securely in your model and the receiver antenna wires installed per the diagram below. The two receiver antenna wires should be mounted to a wood or plastic non-conductive part of your model and angled so that the reception wires are positioned 90° apart.

WARNING It is extremely important that the receiver antenna wires be mounted as described. This will ensure that your model receives control signals no matter what its posture, attitude, or heading.

! The Coaxial cables can be mounted parallel to each other, but under no circumstances should the antenna reception wires be mounted parallel to each other.



! If mounting inside a carbon fiber fuselage, the antenna reception wires must be run outside of the model as described in the notation below.



! Tape can be used to secure the antenna reception wires to your model. Alternatively, cut two short pieces of plastic tube and slide one antenna reception wire into each piece of tube, then tape or glue the tube to your model. The tubes will protect the antenna reception wires from damage.

- The receiver antenna wires consists of two coaxial cables and two reception wires (the thin tip at the end of the coaxial cables). When you mount the receiver antenna wires, do not bend the reception wires. Reception performance decreases if the reception wires are bent.
- The receiver antenna wires are delicate, therefore, handle with care. Do not pull on the receiver antenna wires with force. Do not cut or extend the receiver antenna wires.
- The coaxial cables (the thicker portion of the receiver antenna wires) can be bent into gentle curves, however, do not bend the coaxial cables acutely, or repeatedly bend them, or the antenna cores can be damaged.
- When installed in an electric-powered model, keep the receiver antenna wires as far away from the motor, battery, and electronic speed control (ESC) as possible.
- When installing the receiver, the antenna reception wires (the thin tip at the end of the coaxial cables) should not come into contact with any carbon or metal components (conductive components). Aircraft fuselages may contain conductive components. If mounting the receiver surrounded by conductive materials (for example, a carbon fiber fuselage), mount the receiver so that the antenna reception wires can be extended outside of the model. Reception can be blocked if the antenna reception wires are shielded inside a carbon fiber fuselage.

SYSTEM SETUP AND INSTALLATION

RANGE CHECKING - LOW-POWER MODE


The Low-Power Mode function lowers the transmitter's RF output level to check radio signal reception (Range Check). Use this function to check radio signal reception on the ground, prior to flight.

IMPORTANT The radio control system should be Range Checked prior to the day's first flight and prior to the first flight after a hard landing or after a repair. This will ensure that the transmitter and receiver are communicating properly prior to flight. This ensures the safety of your aircraft, yourself, and the people around you.

Activating Low-Power Mode


- 1) Press and HOLD the Bind Button on the transmitter, then turn the transmitter ON. The Bind LED will flash.
- 2) Continue to HOLD the Bind Button for approximately 5 seconds. After approximately 5 seconds, the Bind LED will flash rapidly, then go out.
- 3) Release the Bind Button and the Bind LED should begin to flash again. The transmitter is now in Low-Power Mode and you can begin the Range Check process.

POWER MODE	TRANSMITTER STATUS
Low-Power Mode	Bind LED Flashing
Normal Mode	Bind LED Solid

 The transmitter will revert to Normal Mode after approximately 3 minutes. If you haven't completed your Range Check within that time, turn the transmitter OFF, then repeat steps 1 through 3 to re-enter Low-Power Mode.

Range Checking

- 1) Turn the receiver in your aircraft ON.
- 2) With the transmitter in Low-Power Mode (Bind LED flashing), walk approximately 30 paces from your aircraft (approximately 90 feet) and, with the help of another person, check to make sure that the servos move without any problems. If there is a problem with servo movement, try moving to a different position while still maintaining the same distance from your aircraft, then check servo movement again. If there is still a problem, **DO NOT FLY**. Check to make sure that all receiver, servos, switch, and onboard battery connections are correct and secure. Check to ensure that the receiver antenna wires are correctly mounted as described previously.
- 3) When satisfied that the system is operating correctly, turn the transmitter OFF, then back ON to resume use in Normal Mode.

 If, after checking all airborne system components and verifying correct antenna wire mounting, your radio control system still fails the Range Check, **DO NOT FLY**. Please contact Airtronics Customer Service using the information on the back cover of this Operating Manual.

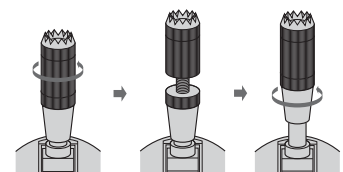
WARNING Do not attempt to fly with the transmitter in Low-Power Mode. You will be unable to control your aircraft once it is a certain distance away from you. **Always verify that the Bind LED is solid prior to flight.**


CONTROL STICK LENGTH ADJUSTMENT

The length of the control sticks can be adjusted to best suit the way you hold them. In general, pilots who place their thumbs on top of the control sticks prefer the control sticks to be shorter, and pilots who grasp the control sticks prefer the control sticks to be longer. In the default configuration, the control sticks are adjusted as short as possible.

Adjusting Control Stick Length

- 1) While holding the base of the control stick, turn the top half of the control stick counter-clockwise to loosen it.
- 2) To lengthen the control stick, turn the top half of the control stick counter-clockwise. To shorten the control stick, turn the top half of the control stick clockwise.
- 3) Once you are satisfied with the length of the control stick, thread the bottom half of the control stick up and tighten it gently against the top half of the control stick.

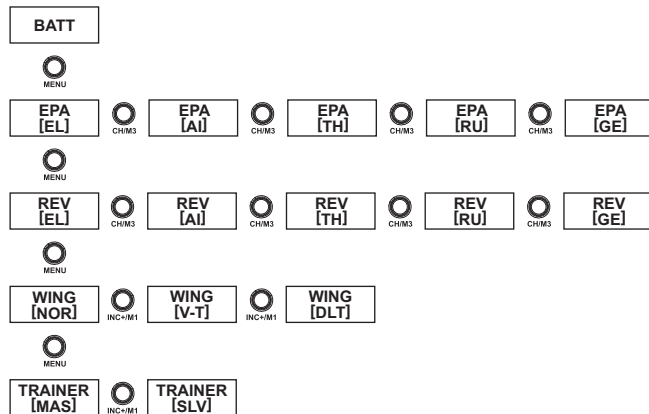


 When lengthening the control sticks, we strongly suggest that you leave at least four threads inside the top half of each control stick. This will ensure that the control sticks maintain optimum mechanical security. If you thread the control sticks out too far, the control sticks might come loose during use.

PROGRAMMING

The Programming menus, along with the Digital Voltage Indicator, are displayed when the transmitter is turned ON. To cycle through the different Programming menus, press the MENU key. The currently selected Programming menu will flash. When you make Programming Value changes, those changes are reflected immediately. There is no need to 'save' your changes. If you turn the transmitter OFF while in a Programming menu the transmitter will always revert to the BATT menu and the Digital Voltage Indicator will be displayed when the transmitter is turned back ON.

PROGRAMMING MENUS FLOW CHART



MENU	MENU NAME	MENU DESCRIPTION
BATT	BATTERY	DISPLAYS THE CURRENT TRANSMITTER VOLTAGE
EPA	END POINT ADJUSTMENT	USED TO ADJUST THE SERVO END POINT TRAVEL OF EACH OF THE FIVE CHANNELS
REV	SERVO REVERSING	USED TO CHANGE THE DIRECTION OF SERVO TRAVEL FOR EACH OF THE FIVE CHANNELS
WING	CHANNEL MIXING	USED TO CHOOSE CHANNEL MIXING OPTIONS
TRAINER	TRAINER FUNCTION*	USED TO CHOOSE MASTER AND SLAVE TRANSMITTER SETUP FOR TRAINER FUNCTION

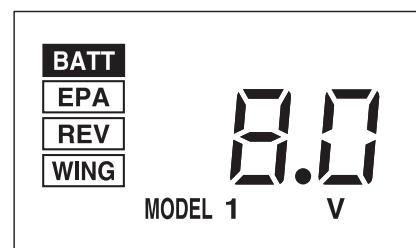
*The Trainer menu option is only displayed when a trainer cable is plugged into the DIN Connector on the back of the 90405 transmitter. For more information, see pages 19 and 20.

BATT - BATTERY

The Battery function displays the current voltage of the transmitter batteries. When the transmitter is turned ON, BATT will flash and the Digital Voltage Indicator will be displayed in the Programming Window. There are no options that can be changed within this menu.

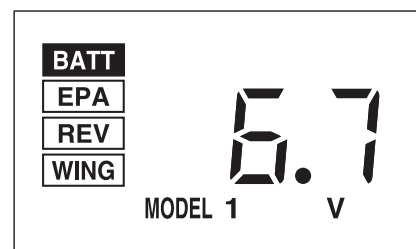
Using the Digital Voltage Indicator

- 1) Press the MENU key to highlight the BATT menu. BATT will flash and the current voltage of the transmitter batteries will be displayed in the Programming Window.



Low Voltage Alarm


The transmitter features a Low Voltage Alarm. When the voltage of the transmitter batteries drops to 6.7 volts, the Digital Voltage Indicator will flash and an audible alarm will sound. In addition, the Battery Indicator will flash. When this occurs, you should land immediately and replace or recharge the transmitter batteries.



PROGRAMMING

EPA - END POINT ADJUSTMENT

The End Point Adjustment function allows you to adjust servo travel in both directions equally. This makes it possible to quickly and easily adjust maximum control surface deflection without the need to physically adjust the control linkages. For example, if you want your elevator to move Up and Down 1", but the elevator moves Up and Down more than 1", you can decrease the End Point Adjustment percentage value to make the elevator move Up and Down 1". The End Point Adjustment percentage value can be adjusted for each of the five channels independently. In addition, throttle channel End Point Adjustment percentage values can be adjusted separately for the High and Low control stick positions. For example, you can use the End Point Adjustment function to adjust your throttle linkage to prevent binding at both the High or Low positions.

 Although the End Point Adjustment function is used to adjust maximum control surface deflection, we suggest adjusting the control linkages first to try to achieve as close to the desired control surface deflection as possible, then use the End Point Adjustment function to make final adjustments. To increase control surface deflection, you can either move the pushrod further out on the servo arm or move the pushrod closer to the control surface. To decrease control surface deflection, you can either move the pushrod closer to the center of the servo arm or move the pushrod further away from the control surface.

Changing End Point Adjustment Percentage Values

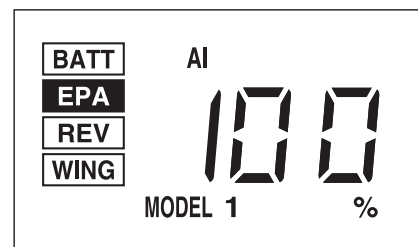
End Point Adjustment percentage values affect servo travel in both directions equally for all channels, except for the throttle channel. To change End Point Adjustment values for the throttle channel see the Changing End Point Adjustment Percentage Values - Throttle Channel section below.

- 1) Press the MENU key to highlight the EPA menu. EPA will flash and EL 100% will be displayed in the Programming Window.



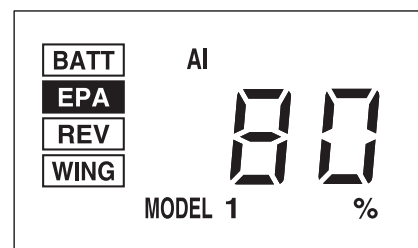
- 2) Press the CH/M3 key to select the channel you would like to change the End Point Adjustment percentage value for.

EPA CH options are EL, AI, TH, RU, and GE



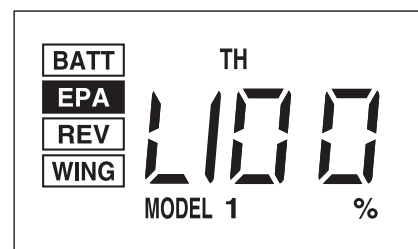
- 3) Press the INC+/M1 or DEC-/M2 keys to increase or decrease the End Point Adjustment percentage value for the selected channel. Increasing the End Point Adjustment percentage value increases servo travel equally in both directions and decreasing the End Point Adjustment percentage value decreases servo travel in both directions.

EPA setting range is 0% to 100%. The default setting is 100%.



Changing End Point Adjustment Percentage Values - Throttle Channel

- 1) From within the EPA menu, press the CH/M3 key to select the throttle channel. TH L100% or TH H100% will be displayed in the Programming Window, depending on the current position of the throttle control stick.

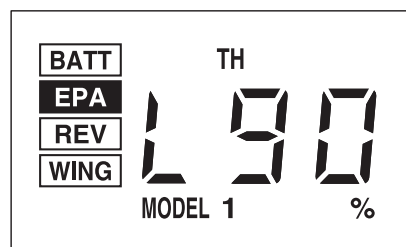


PROGRAMMING

Changing End Point Adjustment Percentage Values - Throttle Channel, Continued....

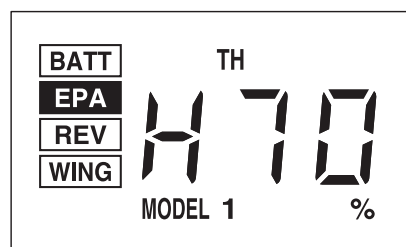
- 2) To set the Throttle Low End Point Adjustment percentage value, pull the throttle control stick all the way back. TH L 100% will be displayed in the Programming Window. Press the INC+/M1 or DEC-/M2 keys to increase or decrease the amount of throttle servo travel in the Throttle Low direction.

EPA TH L setting range is 0% to 100%. The default setting is 100%.



- 3) To set the Throttle High End Point Adjustment percentage value, push the throttle control stick all the way forward. TH H 100% will be displayed. Press the INC+/M1 or DEC-/M2 keys to increase or decrease the amount of throttle servo travel in the Throttle High direction.

EPA TH H setting range is 0% to 100%. The default setting is 100%.

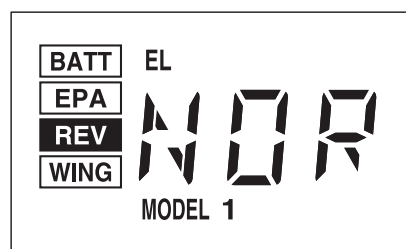


REV - SERVO REVERSING

The Servo Reversing function electronically switches the direction of servo travel. For example, if you pull the elevator control stick back for Up elevator, but your elevator moves Down, you can use the Servo Reversing function to switch the direction of servo travel to make the elevator move Up. The Servo Reversing value can be changed for each of the five channels independently.

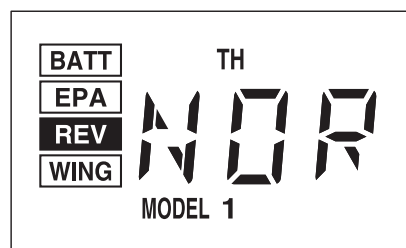
Changing Servo Reversing Values

- 1) Press the MENU key to highlight the REV menu. REV will flash and EL NOR will be displayed in the Programming Window.



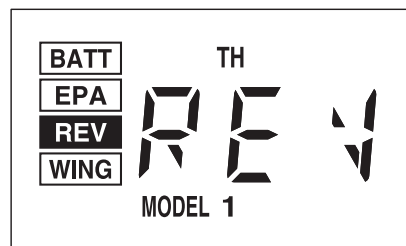
- 2) Press the CH/M3 key to select the channel you would like to change the Servo Reversing value for.

REV CH options are EL, AI, TH, RU, and GE



- 3) Press the INC+/M1 or DEC-/M2 keys to change the Servo Reversing value for the selected channel.

REV setting range is NOR and REV. The default setting is NOR.


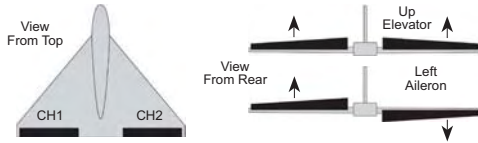


 As a safety precaution, we suggest that you check the movement of your aircraft's control surfaces prior to flight to ensure that they're moving the correct direction.

PROGRAMMING

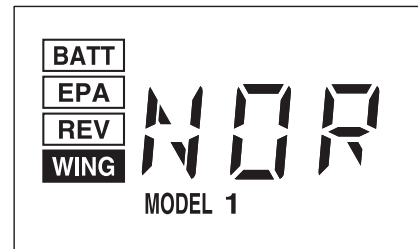
WING - CHANNEL MIXING

The Channel Mixing function allows you to quickly set up the transmitter's low-level mixing based on the type of model you're flying. Templates are included for Normal, Delta (Elevon), and V-Tail. For example, if your setting up an aircraft that uses elevons, you can choose Delta to automatically setup the correct elevator and aileron mixing.

OPTION	OPTION NAME	OPTION DESCRIPTION
NORMAL	NORMAL (No MIXING)	CHANNEL 1 (ELEVATOR), CHANNEL 2 (AILERON), AND CHANNEL 4 (RUDDER) OPERATE INDEPENDENTLY. THIS OPTION IS USED ON AIRCRAFT THAT FEATURE A SEPARATE WING, HORIZONTAL STABILIZER, AND VERTICAL FIN.
V-TAIL	V-TAIL MIXING	 <p>CHANNEL 1 (ELEVATOR) AND CHANNEL 4 (RUDDER) ARE MIXED AND OPERATE TOGETHER.</p>
DELTA	DELTA (ELEVON) MIXING	 <p>CHANNEL 1 (ELEVATOR) AND CHANNEL 2 (AILERON) ARE MIXED AND OPERATE TOGETHER.</p>

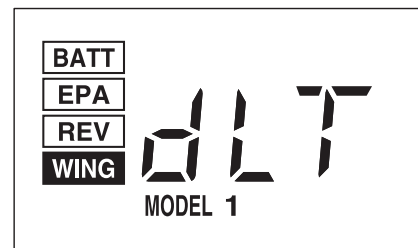
Choosing Wing Type Mixing Options

- 1) Press the MENU key to highlight the WING menu. WING will flash and NOR will be displayed in the Programming Window.



- 2) Press the INC+/M1 or DEC-/M2 keys to choose the desired Wing Channel Mixing option.

WING setting range is NOR, V-T, and DLT. The default setting is NOR.



TRAINER - TRAINER SYSTEM

The 90405 transmitter features a Trainer System that allows you to connect two 90405 transmitters or one 90405 transmitter and one SD-10G transmitter for the purpose of training a new pilot or for training a more experienced pilot on a new model.

During use, one transmitter acts as the Master (Instructor) and the other transmitter acts as the Slave (Student). The Instructor controls the Student's model as long as the Trainer button is released. For example, once the Instructor maneuvers the model to a safe altitude, the Instructor presses and holds the Trainer button to give control of the model to the Student. The Student will have control of the model as long as the Instructor holds the Trainer button. Once the Trainer button is released, the Instructor will have control of the model once again. If at any time the Instructor feels that the Student is in a situation that endangers the model, the Instructor releases the Trainer button and control of the model returns instantly to the Instructor.

IMPORTANT INFORMATION ABOUT THE TRAINER SYSTEM

- The Trainer System is currently compatible ONLY with another 90405 transmitter or an SD-10G transmitter and you **MUST** use the Airtronics 97107 Trainer Cable. See your local Airtronics dealer for more information and availability.
- During use, both the Master transmitter and the Slave transmitter should be turned ON. If using an SD-10G transmitter as the Slave transmitter, to save battery power the transmitter LCD Display can be turned ON, using the DISPLAY key.
- Both transmitters must be programmed identically for the Trainer System to function properly. For example, Servo Reversing, End Point Adjustments, etc. must be identical.

PROGRAMMING

TRAINER - TRAINER SYSTEM, CONTINUED...

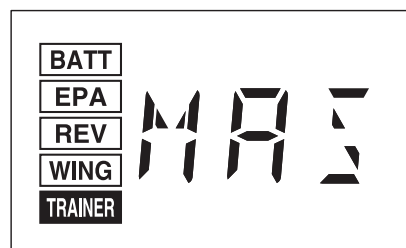
⚠ If using the Trainer System with an Airtronics SD-10G transmitter, please refer the SD-10G transmitter's Operating Manual for more information on the correct setup and use of that transmitter's Trainer function.

Connecting the Master and Slave Transmitters

- 1) Turn both transmitters OFF.
- 2) Plug one end of the Airtronics 97107 Trainer Cable (available separately) into the back of one 90405 transmitter, then plug the other end of the Trainer Cable into the second 90405 transmitter or an SD-10G transmitter.

Activating the Trainer Function - Master (Instructor) Transmitter

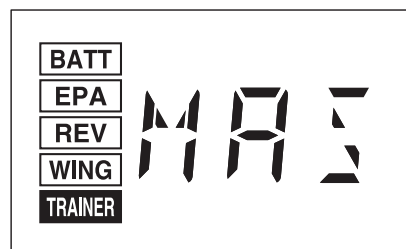
- 1) Turn the Master (Instructor) transmitter ON. The Battery Indicator will flash.
- 2) Press the MENU key to highlight the TRAINER menu. TRAINER will flash and MAS will be displayed in the Programming Window. The Battery Indicator will continue to flash and the Bind LED will be illuminated solid.



⚠ If MAS is not displayed in the Programming Window, press the INC+/M1 or DEC-/M2 keys to display MAS.

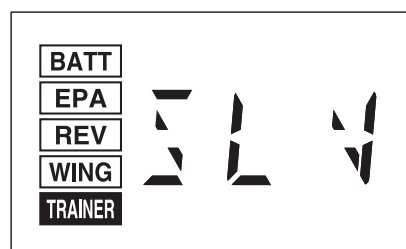
Activating the Trainer Function - Slave (Student) Transmitter

- 1) Turn the Slave (Student) transmitter ON. The Battery Indicator will flash.
- 2) Press the MENU key to highlight the TRAINER menu. TRAINER will flash and MAS will be displayed in the Programming Window.



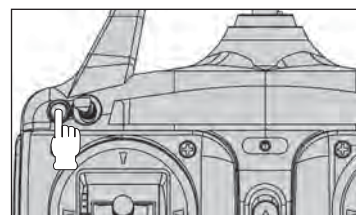
- 3) Press the INC+/M1 or DEC-/M2 keys to choose SLV. The Battery Indicator will continue to flash, but the Bind LED will go out.

TRAINER setting range is MAS and SLV. The default setting is MAS.



Using the Trainer Function

- 1) The Trainer Cable should be connected between the two transmitters and the Trainer function on both transmitters should be Activated as described previously. Both the Master transmitter and the Slave transmitter should be turned ON. If using an SD-10G transmitter as the Slave transmitter, to save battery power the transmitter LCD Display can be turned ON, using the DISPLAY key.
- 2) Turn on the model you're using for training and verify that the Instructor's transmitter controls the model's control surfaces correctly.
- 3) Activate the Trainer function by pressing and HOLDING the Trainer button on the Master transmitter continuously and verify that the Student's transmitter controls the model's control surfaces correctly.
- 4) When the Trainer button is released, the Instructor will have full control over the model. When the Trainer button is held continuously, the Student has control over the model. As soon as the Trainer button is released, the Instructor will have full control over the model once again.



CONTROL FUNCTIONS


This section details the different Control Functions that the 90405 transmitter features. These Control Functions are different from the programmable Menu Functions.

The following Control Functions are featured:

CONTROL FUNCTION	CONTROL FUNCTION DESCRIPTION
Direct Model Select	USED TO SELECT SAVED MODEL PROGRAMMING DATA
Digital Trim Memory	SAVES MODEL-SPECIFIC TRIM VALUES FOR EACH OF THE PRIMARY FLIGHT CONTROLS
Dual Rate	USED TO REDUCE THE CONTROL THROW OF THE AILERON, ELEVATOR, AND RUDDER CHANNELS
Throttle Cut	USED TO SHUT DOWN YOUR ENGINE BY REDUCING THROTTLE CHANNEL CONTROL THROW

DIRECT MODEL SELECT

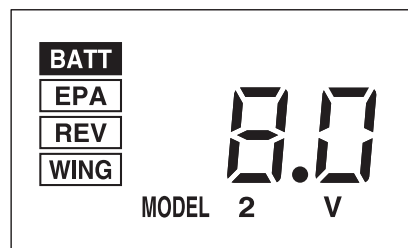
The 90405 transmitter can store Programming Data for up to 3 different models - Model 1, Model 2, and Model 3. The Direct Model Select function allows you to select which of the three models you would like to use.

 Prior to setting up a new model, make sure that you select a Model Number that doesn't include one of your current model's Programming Data. This will prevent you from accidentally overwriting the Programming Data of a current model.

Using the Direct Model Select Function

- 1) Turn the transmitter OFF.
- 2) Press and HOLD the programming key of the model you wish to setup or fly, then turn the transmitter ON. The Model Name (either MODEL 1, MODEL 2, or MODEL 3) will be displayed at the bottom of the Programming Window.

INC+/M1 selects Model 1, DEC-/M2 selects Model 2, and CH/M3 selects Model 3.




 Before flying, verify that the Model Name displayed in the Programming Window is the actual model that you'll be flying.

IMPORTANT To reset the Programming Data for a model, each menu option must be reset individually by navigating to the specific menu option, for example, EPA TH H, and pressing the INC+/M1 and DEC-/M2 keys at the same time. We suggest doing this first if you're programming a new model over an existing model.

DIGITAL TRIM MEMORY

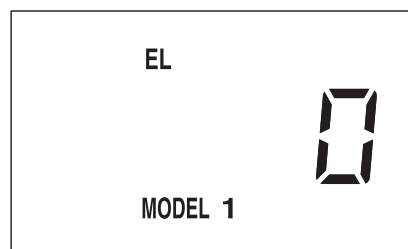
The 90405 transmitter features Digital Trim Memory. Any amount of control surface trim that you set during flight using the trim switches is automatically stored in memory for that specific channel and for that specific model. The Digital Trim values for each model will automatically be loaded when the transmitter is turned ON.

Each time a trim switch is pressed, the trim moves in 5% increments and a single audible tone sounds. When the trim reaches Zero, a double audible tone sounds. This allows you to know when the trim is centered without needing to look down at the transmitter during flight.

 We suggest always keeping the throttle Trim value at 0 or at a value that allows a minimum reliable idle. The transmitter features a Throttle Cut function which is used to shut down your engine. This is easier, faster, and safer than using the throttle trim switch to shut down your engine, and prevents you from having to continuously readjust your engine's idle speed.

Using the Trim Switches

- 1) When you press a trim switch, the Trim value and channel will be displayed in the Programming Window. Push the trim switches forward (or right) to increase Trim in one direction and pull the trim switches back (or left) to increase Trim in the opposite direction. The current amount of Trim for that particular channel is displayed in the Programming Window.

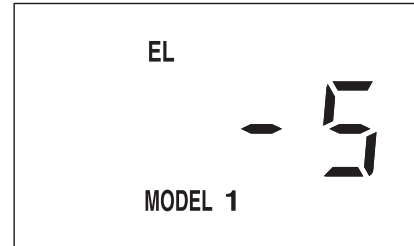


CONTROL FUNCTIONS

Using the Trim Switches, Continued...

- 2) Press the trim switches up or down, or right or left, to change the center trim of the servos. The current amount of Trim for that particular channel is displayed in the Programming Window.

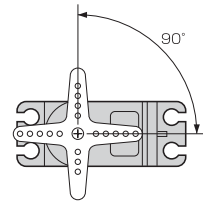
TRM setting range is -100 to 100. The default setting is 0.



Setting Up Your Model's Control Linkages


Ideally, you don't want to use any more trim than necessary to center the servos or trim your aircraft for level flight. When you set up your aircraft's control linkages, observe the following:

- 1) All four Trim values should first be set to 0, then the control horns should be installed onto the servos as close to being centered as possible. In some cases, you can get the servo horns closer to being centered by rotating the servo horns 180° and reinstalling them.
- 2) Use the trim switches to make final adjustments to center the servo horns, then mechanically center each of the control surfaces by adjusting the clevises and/or adjustable pushrod connectors.
- 3) You can now fly your model and use the trim switches to trim your aircraft for level flight.



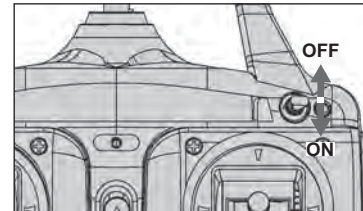
DUAL RATE

The Dual Rate function allows you to change the control authority of the control surfaces by changing the amount of servo travel. For example, if you are flying an aerobatic aircraft that requires a lot of control throw for aerobatics, but that same amount of control throw makes the aircraft difficult to control during normal flight, you can use the Dual Rate function to lower the control throw for normal flight with just the flip of the Dual Rate switch.

 The Dual Rate function reduces the control throw of the aileron, elevator, and rudder channels. When Dual Rate is turned ON, servo travel will be reduced to 75% of maximum control throw as defined by the End Point Adjustment percentage values. The elevator, aileron, and rudder channels are affected equally and at the same time.

Using the Dual Rate Function


- 1) When Dual Rate Switch is turned OFF, the aileron, elevator, and rudder servos will provide maximum desired control surface throw as defined by the End Point Adjustment percentage values. For more information, see page 17.
- 2) When Dual Rate is turned ON, servo travel will be reduced to 75% of maximum control throw. For example, if your elevator moves Up and Down 1" with Dual Rate turned OFF, your elevator will move Up and Down 3/4" with Dual Rate turned ON.



 Prior to takeoff, check the position of the Dual Rate switch to ensure that it is in the position you want.

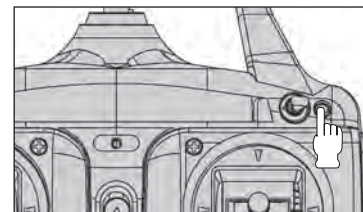
THROTTLE CUT

The Throttle Cut function allows you to reduce throttle servo travel approximately 15% by simply pressing the Throttle Cut button. The Throttle Cut function is used to shut down your engine after flight. This is easier, faster, and safer than using the throttle trim switch to shut down your engine.

 Before using the Throttle Cut function, make sure that the idle stop screw (if featured) on your engine is adjusted to allow your engine's carburetor barrel to close completely.

Using the Throttle Cut Function

- 1) Adjust the throttle trim switch to provide the lowest reliable idle for your engine.
- 2) With your engine at idle, press and HOLD the Throttle Cut button to shut down your engine.
- 3) After your engine shuts down, release the Throttle Cut button.



TROUBLESHOOTING GUIDE

This troubleshooting guide has been provided to help you diagnose and solve most problems that you may encounter with your 90405 2.4GHz FHSS-1 radio control system. Most problems encountered can be solved by following the problem-cause-solution sections.

If you cannot solve the problem using this troubleshooting guide, please contact Airtronics Customer Service using the information on the back cover of this Operating Manual.

PROBLEM	CAUSE	SOLUTION
Transmitter does not turn ON	Batteries not installed correctly	Reinstall batteries. Observe correct polarity
	Damage caused by using incorrect charger or reverse polarity	Contact Airtronics Customer Service
	Low transmitter battery voltage	Replace or recharge transmitter batteries
Transmitter will not bind to receiver	Too much time elapsed after pressing receiver Bind Button	Quickly press the transmitter Bind Button after releasing the receiver Bind Button
	Attempting to bind incompatible receiver	Transmitter compatible only with Airtronics 2.4GHz FHSS-1 aircraft receivers
	Using ESC with BEC	Disconnect ESC and use standard receiver battery for Binding procedure, then reconnect ESC after binding
Audible alarm beeps continuously	Low transmitter battery voltage	Replace or recharge transmitter batteries
Servo movement is slow	Control linkages binding	Adjust control linkages to operate smoothly
	Low receiver battery voltage	Recharge receiver battery
Inadequate transmitting range	Low transmitter or receiver battery voltage	Replace or recharge batteries
	Receiver antennas not mounted correctly in your model or are damaged	Mount receiver antennas as recommended or replace antennas
	Transmitter antenna not angled to optimum position	Adjust transmitter antenna so that it's angled to the optimum position during use
	Transmitter in Low-Power Range Check mode	Change transmitter to Normal mode
Servo(s) move the wrong direction	Incorrect Servo Reversing setting	Change Servo Reversing setting assigned to the channel affected in REV menu
Servo horn(s) not centered	Servo horn not installed correctly	Turn servo horn 180° and reinstall
	Trim switch not adjusted	Use trim switch to center servo arm
Control linkage(s) bind	Too much servo travel	Reduce servo travel using EPA menu
Channels not operating correctly	Incorrect Mixing option chosen	Choose desired Mixing option in WING menu
Battery Indicator flashes	Low transmitter battery voltage	Replace or recharge batteries
	Trainer Cable plugged into transmitter	This is normal
Transmitter Bind LED flashes	Transmitter in Low-Power mode	Complete Range Check in Low-Power mode, then turn transmitter OFF, then back ON to enter Normal mode
Transmitter Bind LED goes out	Trainer Cable plugged in and transmitter in Slave mode	This is normal
LCD appears dark or hard to read	Transmitter left in direct sunlight for too long	Place transmitter in shade until LCD clears up. Do not place transmitter in direct sunlight for long periods of time
TRAINER menu option not displayed	No Trainer Cable plugged into transmitter	Plug Trainer Cable into transmitter
Controls too sensitive	Too much control throw	Turn Dual Rate switch ON to lower control throw

GLOSSARY OF TERMS

Aileron/Elevator Control Stick: Controls the Aileron and Elevator axes. Moving the Aileron control stick Right and Left causes your aircraft to Roll Right and Left. Moving the Elevator control stick Backward and Forward causes your aircraft to Pitch Up and Down.

Antenna: Transmits the signal from the transmitter to the receiver in the model. The Antenna should be pivoted into the vertical position during use. When not in use, the Antenna should be collapsed into the horizontal position to prevent damage during handling and transport.

Antenna Reception Wires: The portion of each of the receiver antenna wires that actually receives the transmitter signal.

Battery Compartment: Houses the 6 'AA' Alkaline batteries that power the transmitter. The transmitter uses 6 cells for lighter weight and better feel, while still providing long usage time and high power output.

Battery Indicator: Indicates that there is power to the transmitter. When the trainer cable (available separately) is plugged in, or when the battery voltage drops to 6.7 volts, the Battery Indicator flashes.

Binding: The act of pairing the transmitter and receiver to prevent interference from radio controllers operated by other users. The transmitter and receiver must be paired so that the two can 'talk' to each other.

Bind Button: Used to Bind the transmitter and receiver. The transmitter Bind Button is used to enter Low-Power Range Check mode to ensure adequate operating range prior to flight.

Bind LED: Displays the current status of the transmitter and receiver pair.

Charging Jack: Used for onboard charging of the optional Ni-Cd or Ni-MH batteries. An optional Airtronics 95035 110v AC Transmitter and Receiver charger is available separately.

Coaxial Cables: The portion of each receiver antenna wire that extends the Antenna Reception Wires. The Coaxial Cables can be bent into gentle curves, however, do not bend the Coaxial Cables acutely, or repeatedly bend them, or the antenna wire's cores can be damaged.

Delta Mixing: Delta mixing, more commonly referred to as Elevon mixing, combines the use of aileron and elevator from two separate control surfaces to provide both roll and pitch control.

Digital Trim Memory: Allows the transmitter to store trim values in its memory. The amount of control surface trim that you set during flight using the trim switches is automatically stored in memory for that specific channel and for that specific model. The trim values for each model will automatically be loaded when the transmitter is turned ON.

DIN Connector: The DIN Connector is where the trainer cable (available separately) is plugged into. An adapter to use the transmitter with a flight simulator can also be plugged into the DIN Connector.

Direct Model Select: Direct Model Select allows you to select one of three models from memory.

Dual Rate: The Dual Rate function allows you to change the control authority of the control surfaces by changing the amount of servo travel. The Dual Rate function reduces the control throw to 75% of the current End Point Adjustment programmed and effects the Elevator, Aileron, and Rudder channels equally at the same time.

End Point Adjustment: The End Point Adjustment function allows you to adjust servo travel in each direction. This makes it possible to balance control surface throw in both directions. For example, if you want your elevator to move Up and Down two inches in each direction, but the elevator moves Down more than two inches, decrease the End Point Adjustment in the Down direction, so that the elevator moves Up and Down the same amount.

Fail Safe: The Fail Safe function automatically sets the servos to a predetermined position in the event that the signal between the transmitter and the receiver is interrupted, whether due to signal degradation or to a low transmitter battery.

FH1 Modulation: Frequency Hopping 1st generation FHSS technology.

FHSS: Frequency Hopping Spread Spectrum. FHSS is a modulation type which transmits data across the entire frequency spectrum by transmitting data on different channels at an extremely fast interval.

Landing Gear Switch: Used to control the operation of the Landing Gear channel. This channel is a non-proportional channel, and is ideal for controlling the retractable landing gear or the flaps on your aircraft.

Low-Power Mode: The Low-Power Mode function lowers the transmitter's RF output level to check radio signal reception (Range Check). Use this function to check radio signal reception on the ground, prior to flight.

Multi-Function LCD: The heart of the programming and display features of the transmitter. All programming and transmitter display functions are shown on the LCD.

GLOSSARY OF TERMS

Neck Strap Anchor: Used to attach your neck strap (available separately) to the transmitter.

Operating Voltage: The safe voltage that the transmitter or receiver can operate within. Exceeding the minimum operating voltage can result in loss of power to the device(s). Exceeding the maximum operating voltage can result in damage to the device(s).

Output Power: The power (in Milliwatts) that your transmitter transmits a signal. Output power is defined by government guidelines and differs by region.

Power Switch: Turns the transmitter ON and OFF.

Programming Keys: The Programming Keys are used to facilitate transmitter programming and select models stored in memory. The four Programming Keys consist of the INC+/M1 (Increase/Model 1) key, the DEC-/M2 (Decrease/Model 2) key, the CH/M3 (Channel Select/Model 3) key, and the MENU key.

Servo Reversing: Electronically switches the direction of servo travel. For example, if you move the elevator control stick forward, and the elevator moves up, you can use the Servo Reversing switch to make the elevator move down.

Temperature Range: The range in temperature of the outside air that the transmitter can safely and reliably operate in.

Throttle/Rudder Control Stick: Controls the Throttle and Rudder axes. Moving the Rudder control stick Right and Left causes your aircraft to Yaw Right and Left. Moving the Throttle control stick Forward and Backward Increases and Decreases your engine's speed.

Throttle Cut Button: Used to control the Throttle Cut function. The Throttle Cut function allows you to reduce throttle servo travel by approximately 15% with just a press of the button. The Throttle Cut function is used to shut down your engine after flight.

Trainer System: Provides a way of training pilots to fly. During use, one transmitter acts as the Master (Instructor) and the other transmitter acts as the Slave (Student). The Instructor controls the Student's model as long as the Trainer Button is released. Once the Instructor maneuvers the model to a safe altitude, the Instructor holds the Trainer Button and the Student has control of the model. The Student will have control of the model as long as the Instructor holds the Trainer Button. Once the Trainer Button is released, the Instructor will have control of the model once again. If at any time the Instructor feels that the Student is in a situation that endangers the model, the Instructor releases the Trainer Button and control of the model returns instantly to the Instructor.

Trim Switch: Used to control the center trim of the channel that the Trim Switch is adjacent to.

V-Tail Mixing: V-Tail mixing combines the use of elevator and rudder to provide pitch and yaw control. V-Tail mixing is commonly found on gliders and sailplanes that don't feature a separate vertical fin and horizontal stabilizer.

Z-Connector: The type of servo and battery connector used by Airtronics. The Z-Connector is a universal connector which is electronically compatible with the airborne components of other radio control system manufacturers.

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