HANGAR 9®

ARROW

Semi-Symmetrical Trainer

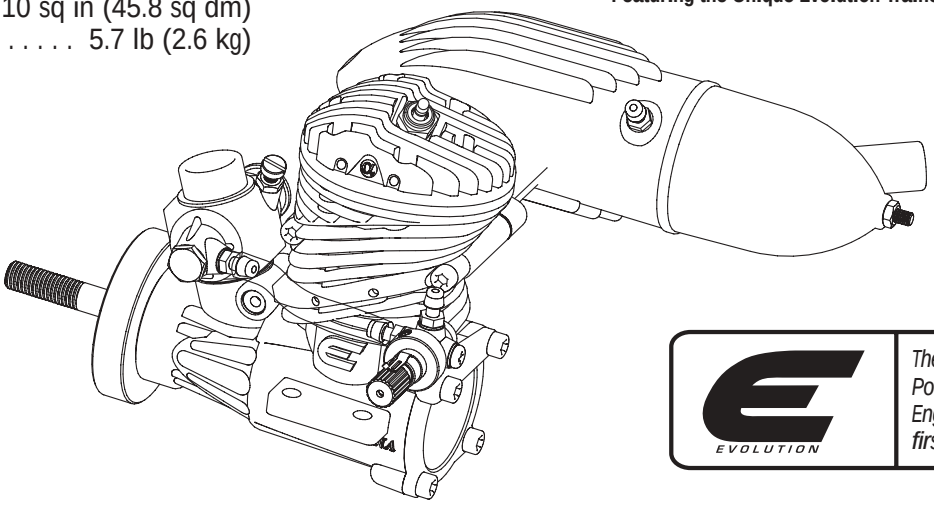
INSTRUCTION MANUAL

Specifications

Wingspan: . . . . . 63 in (1600mm)
Length: . . . . . 52.5 in (1334mm)
Wing Area: . 710 sq in (45.8 sq dm)
Weight: . . . . . 5.7 lb (2.6 kg)

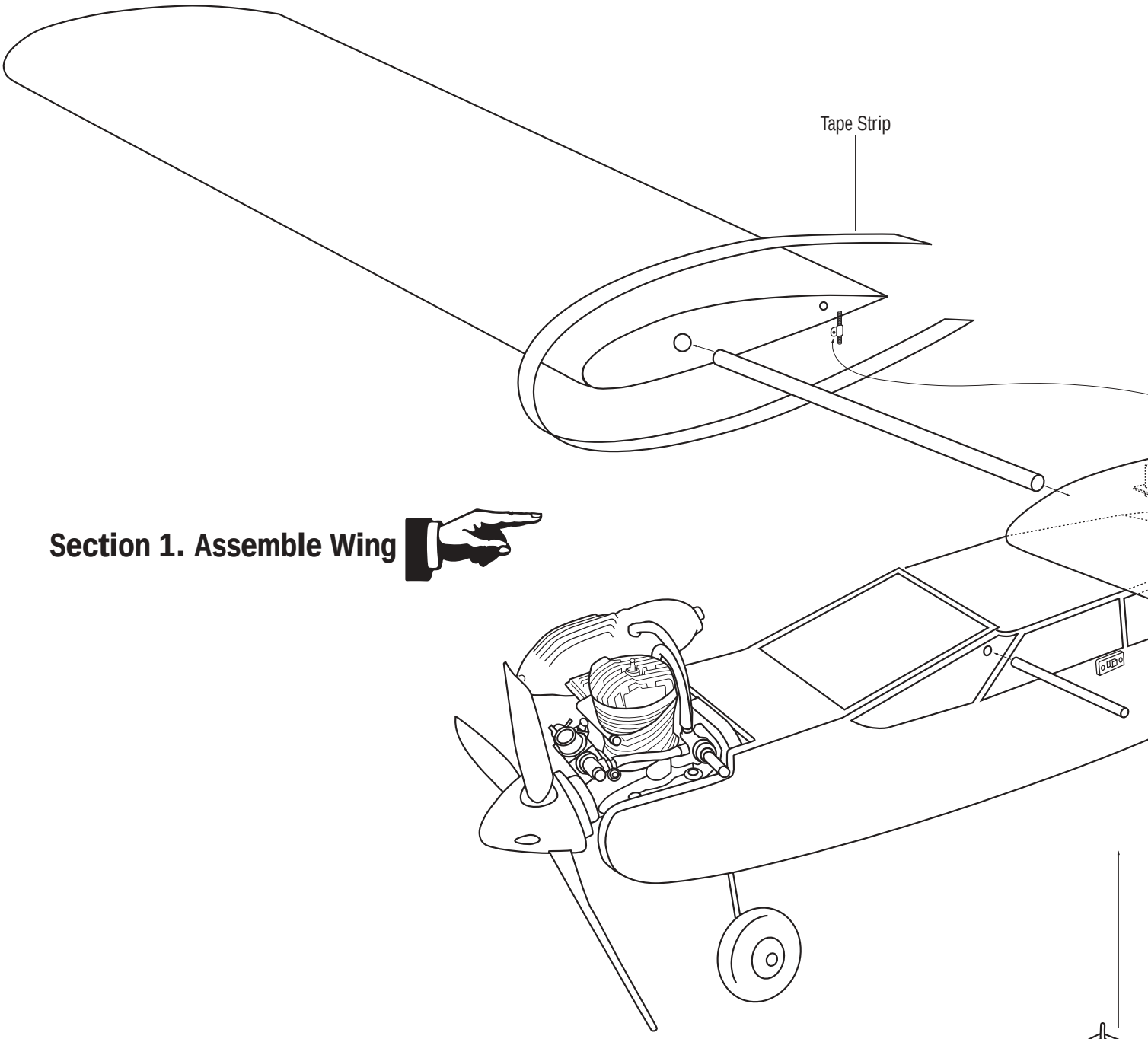
Ready-To-Fly

Featuring the Unique Evolution Trainer Power System



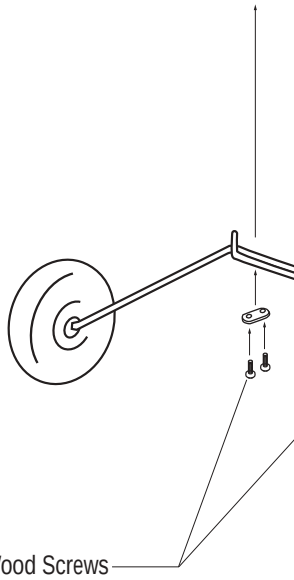
EVOLUTION

The Evolution Trainer Power System. Engineered for ease... first flight, every flight.

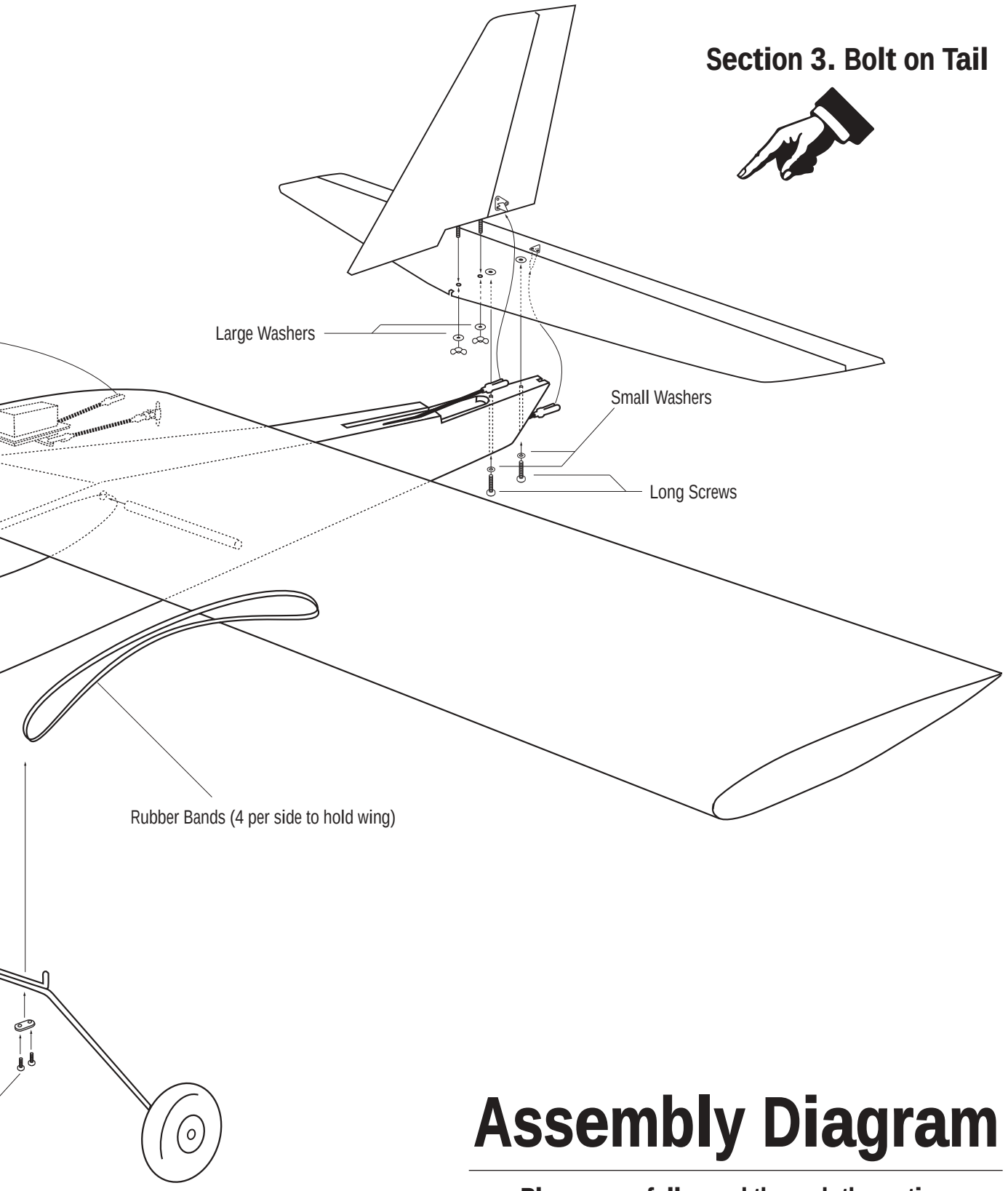


Section 1. Assemble Wing

Section 2. Mount Main Landing Gear



Section 3. Bolt on Tail

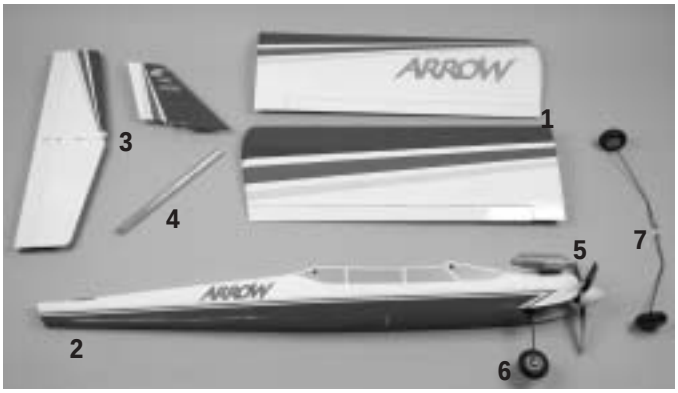


Assembly Diagram

Please carefully read through the entire instruction manual before beginning assembly of the Arrow Semi-Symmetrical Trainer Ready-To-Fly (RTF) kit.

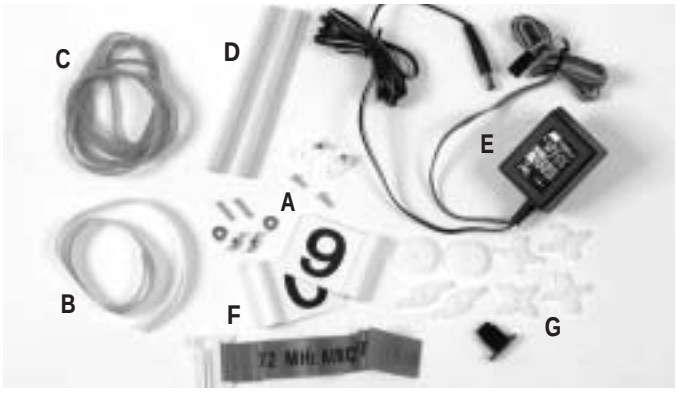
Table of Contents

Large Parts Layout



1. Wing Set **HAN2551**
2. Fuselage **HAN2552**
3. Tail Set **HAN2553**
4. Wing Joiner **HAN2554**
5. Engine (Evolution Trainer Power System)
6. Nose Gear
7. Main Landing Gear

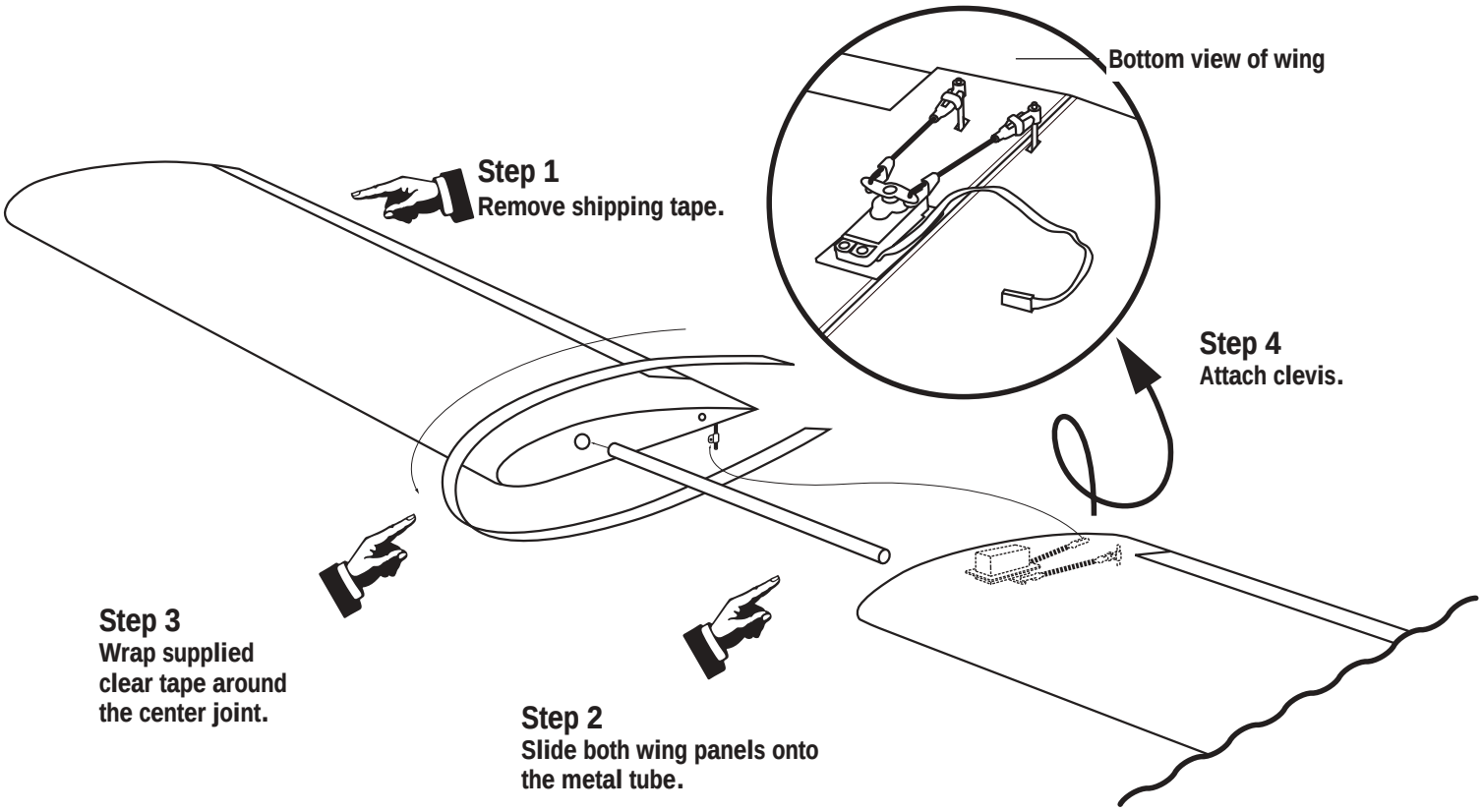
Small Parts Layout



A. Tail and Landing Gear Hardware
B. Center Wing Tape
C. #64 Rubber Bands
D. Wing Dowels
E. Transmitter and Receiver Charger
F. Radio Frequency Identifiers
G. Extra Servo Accessories (not used)

Items not shown:
Decal Set **HAN2555**

Section 1: Assembly of the Wing



Carefully remove the contents of the Arrow Trainer Ready-To-Fly kit. It is recommended that you charge the transmitter and receiver batteries 24 hours prior to flying your model.

Step 1
Remove each wing from its protective plastic bag. Remove the pieces of tape that hold the ailerons in place for shipping. The hinges in the Arrow Trainer have already been glued in place during manufacturing. Check the ailerons for security by gently pulling on them, trying to separate them from the wing.
Be careful not to damage the wing structure.

Step 2
Locate the aluminum wing tube and carefully slide it into the opening in one of the wing halves. The fit may be snug, so use a twisting motion while inserting the tube. There is a short metal pin located near the trailing edge that will key into the opposite wing panel and keep the wing from rotating around the wing tube. Carefully slide the other wing half onto the wing tube. Align the metal pin with its hole and press the wing panels together.

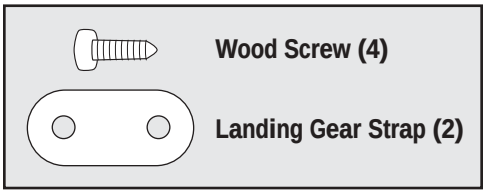
Step 3
Locate the clear wing joiner tape and apply it to the top and bottom of the wing along the joint. Start at the top of the trailing edge and wrap it around the front of the wing and to the bottom trailing edge.

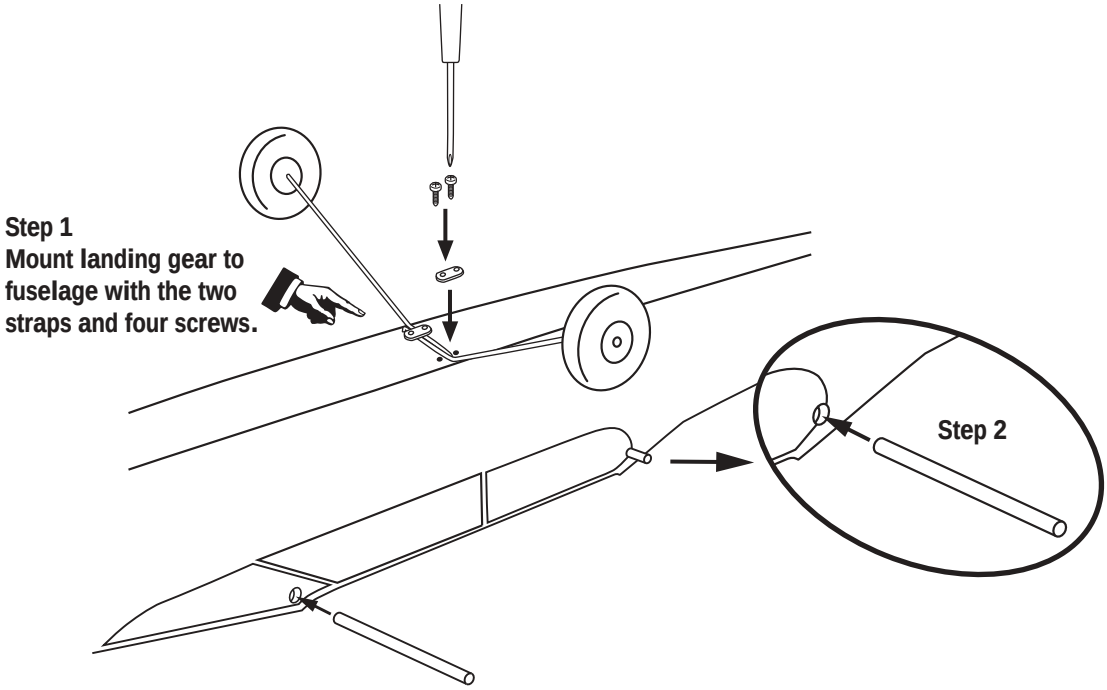
Step 4
The aileron servo lead has been wrapped around the linkage for shipment. Untie the servo lead to free up the aileron linkage. Note that the lead has been labeled with a piece of tape; do not remove this tape. One of the aileron linkages has already been connected to the aileron and secured with a small piece of tubing (clevis keeper). This is done to prevent the clevis from opening during flight.

Connect the other aileron linkage to the aileron and snap the clevis in place. Slide the clevis keeper over the clevis to secure the linkage to the aileron.

You have successfully assembled the wing of the Arrow Trainer.

Section 2: Installing the Main Landing Gear/Wing Hold-Down Dowels





Step 1
Locate the two landing gear wires, two nylon landing gear straps and the four 3mm x 10mm sheet metal screws. The wheels have already been installed for you. On the bottom of the fuselage, you will find a groove with a hole near each side of the fuselage to accept the landing gear wire. The landing gear wire slides into the hole and lies across the bottom of the fuselage. Install both landing gear wires.

Step 2
With the landing gear wires installed, secure them to the fuselage using the two nylon landing gear straps and four 3mm x 10mm sheet metal screws. The straps lay across the wires and the screws go into the predrilled holes on the bottom of the fuselage.

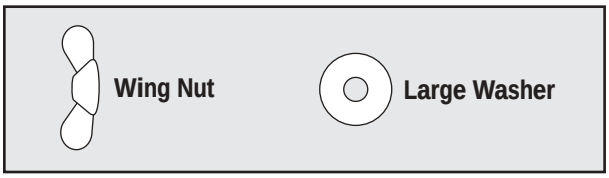
Step 3
Locate the two wing hold-down dowels and, using a twisting motion, carefully insert one into each of the two holes located in the fuselage. The dowels should be positioned so an equal amount protrudes from each side of the fuselage.

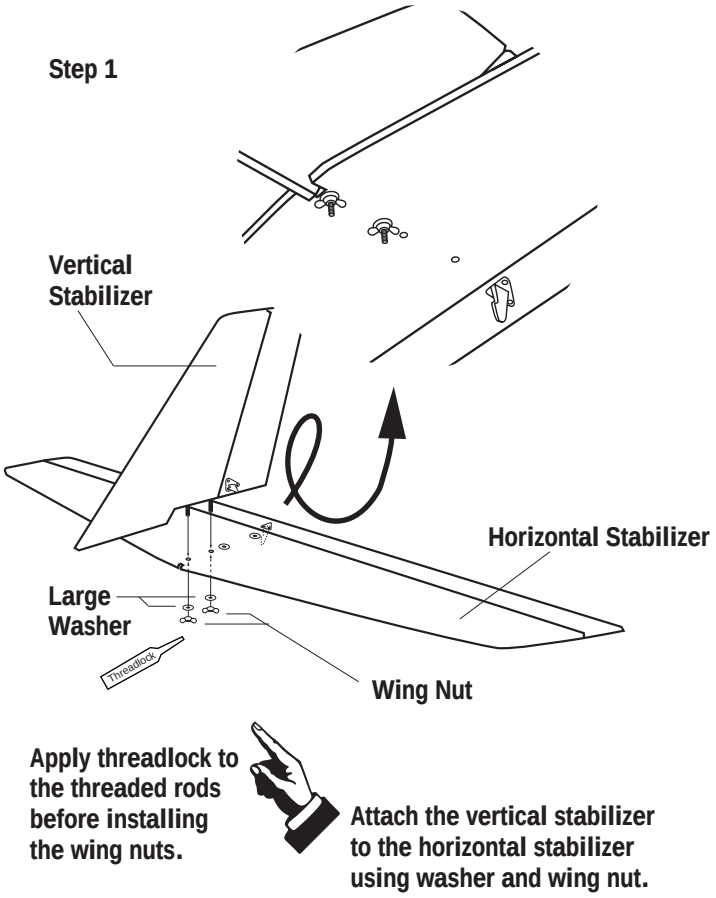
Section 3: Installing the Tail Assembly

Locate the horizontal stabilizer and vertical stabilizer assemblies. The rudder and elevator have been prehinged at the factory, and the control horns are also attached.

Remove the shipping tape holding the rudder and elevator in place. Check both the rudder and elevator for freedom of movement.

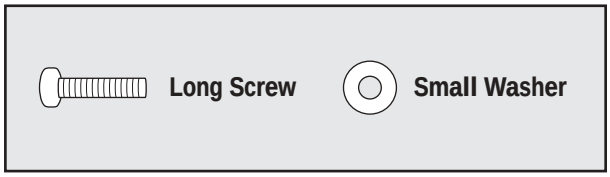
Step 1
The vertical stabilizer has threaded rods in the bottom that secure it to the horizontal stabilizer. Insert the threaded rods through the predrilled holes in the horizontal stabilizer. Secure them together using two large washers and wing nuts. Be sure to use a drop of threadlock on the threaded rods before tightening the wing nuts.

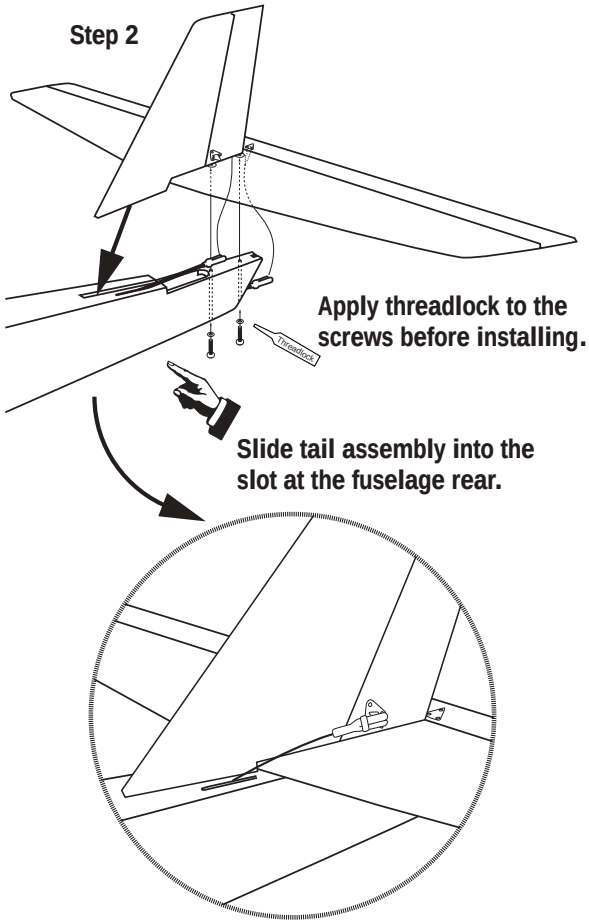




Step 2
Slide the tail assembly into the slot in the rear of the fuselage, making sure the rudder pushrod is on top of the horizontal stabilizer. Use the two long screws and two small washers to secure the tail assembly to the fuselage. There is a hole in the bottom of the fuselage to access the forward screw location. Place a drop of threadlock on the screws before installing them.

Hint: Use a magnetic screwdriver when installing the screws.



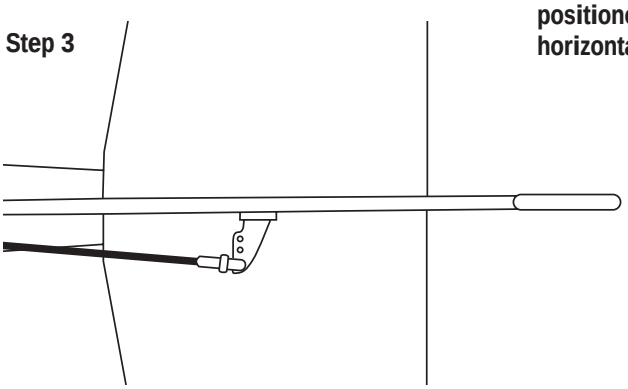


Section 3: Installing the Tail Assembly

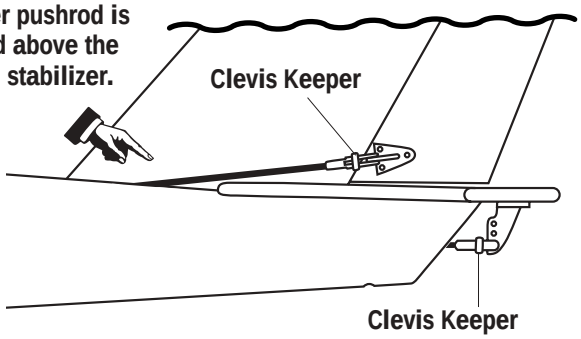
Continued

Step 3
Connect the rudder and elevator pushrod clevises to the preinstalled control horns. Install the clevises into the hole furthest away from the control surface (see illustration). Secure each clevis to the control horn by snapping the clevis pin into the hole. To prevent the clevises from accidentally opening in flight, make sure to slide the clevis keeper up onto the clevis.

Step 3



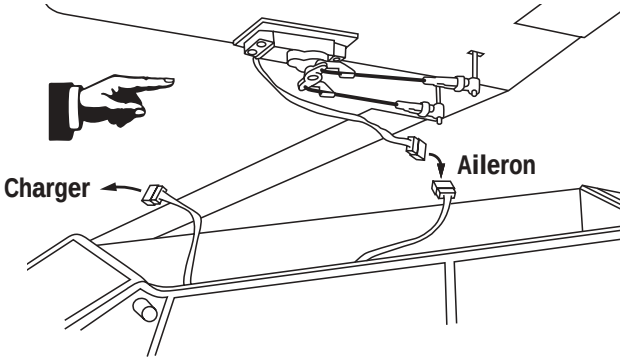
The rudder pushrod is positioned above the horizontal stabilizer.



Final Assembly

Plug the aileron servo connector into the connector marked “aileron” located in the fuselage. This will connect the aileron servo in the wing to the aileron channel of your receiver.

Temporarily attach the wing to the fuselage by stretching a rubber band from wing hold-down dowels starting at the leading edge of the wing back to the trailing edge of the wing. For now, use two rubber bands to mount the wing in position.



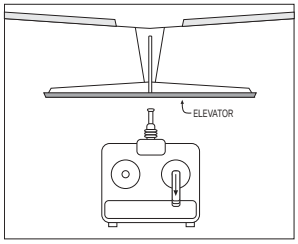
Center of Gravity (CG)

The Arrow Trainer has been balanced at the factory.
If changes are made in battery location or a different engine is installed, you will need to make sure the balance of the aircraft is correct before attempting to fly it. The balance point (center of gravity) of the Arrow is $3^{1}/_{8}$" from the leading edge of the wing. If you must add weight to the nose or tail, use the stick-on variety available at your local hobby shop.

Control Checks

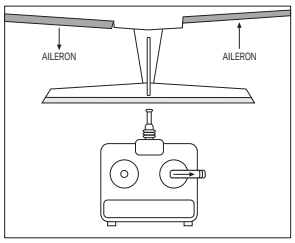
The correct servo directions are preadjusted, but it's a good idea to confirm the correct direction. After charging the transmitter and receiver batteries per the instruction included with the radio, turn on the transmitter and airplane and check that the controls are moving in the correct direction, as per the illustration below.

Elevator: Moving the right stick down should cause the elevator to move upward. Pushing the right stick up will cause the elevator to move down.



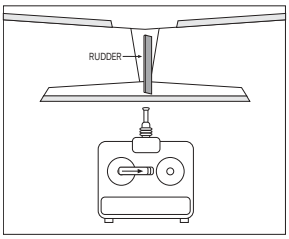
ELEVATOR

Aileron: Moving the right stick to the right should move the right aileron up and the left aileron down. Moving the stick in the opposite direction will give the opposite result.



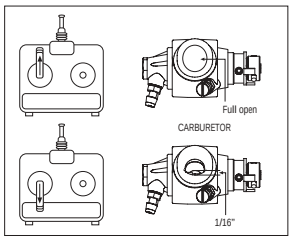
AILERON

Rudder: Moving the left stick to the right should move the rudder to the right. Moving the stick to the left moves the rudder to the left.



RUDDER

Throttle: Look into the carburetor. With the throttle (left stick) in the up position, the carburetor should be fully open. With the throttle in the lower position and trim lever at the mid-point, the carburetor should be 1/16" open.

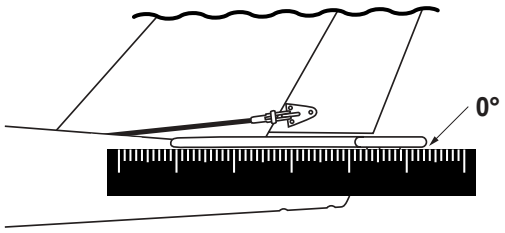


THROTTLE

It is very important that you make sure the control surfaces (rudder, elevator and ailerons) are at 0 degrees when the transmitter control sticks and trim levers are centered. Turn on your transmitter and receiver. Make sure the rudder, elevator and aileron sticks are centered and the trim levers are centered. Place a ruler against the control surfaces to see if there are any deflections from the center (0 degrees).

Adjustments to the control surfaces can be made by temporarily disconnecting the clevis from the horn and threading the clevis in or out on the control rod. Threading in causes the surface to move toward the rod. Threading out causes the surface to move away from the rod. Set the control surfaces, ailerons, elevator and rudder to 0 degrees.

Reconnect the clevises to the outer hole of the control horn of the rudder and elevator control horns. Make sure that the clevis keepers are in place.



Preflight Checks at the Flying Field

> **Important:** Be sure your batteries are fully charged, per the instructions included with your radio system.

Before each flight, check the screws and nuts that secure the metal plate holding the engine in place on the engine mount. Also check the clevises of each control surface for security and presence of a clevis keeper.

Check the screws that hold the tail assembly in place, as they can loosen during flight.

Check the muffler screws that attach the muffler to the engine after every flight.

Perform a ground range check before each day's flying as follows:

1. Do not extend the transmitter antenna. Turn the transmitter on.
2. Turn the model on.
3. Slowly walk away from the model while moving the control surfaces. The aircraft should function properly at a distance of 75–100 feet.
4. Make sure all trim levers on the transmitter are in the proper position.
5. Make sure all servos and switch harness plugs are secure.

Evolution Trainer Power System

The Evolution Trainer Power System has been specifically designed with the first time pilot in mind. The engine and special three blade propeller have been designed to give your Arrow Trainer the optimum performance for training new RC pilots. The engine is designed for easy starting and reliable idle to give you confidence in your equipment, allowing you to concentrate on developing your piloting skills.

Benefits of the Evolution Trainer Power System

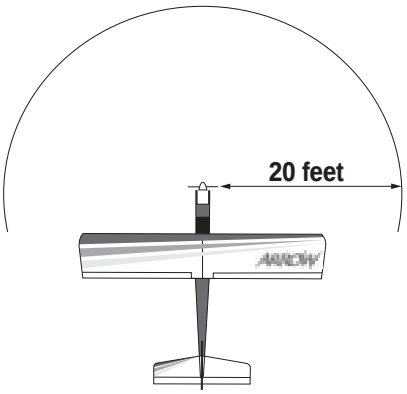
- Lower noise level than standard 10 x 6 prop, baffle in muffler lowers noise even more
- Smaller speed envelope—the 3-bladed prop design has a lower top speed, so overspeeding the model is less likely; this gives the beginner more reaction time while still providing lots of power to climb out of bad situations
- Pre-set needle settings—ready-to-run out of the box
- Needle valve limiters make it impossible for beginners to adjust the needles valves wrong to the point that the engine will not run
- User friendly—easy to start from first try with super reliable idle and no break-in needed

Warning: Before operating your engine, read and follow all safety points. A rotating propeller can cause serious personal injury.

Follow these instructions carefully! If this is the first time you have run a model airplane engine, we recommend that you seek the help of an experienced modeler. Your local hobby shop can put you in contact with the flying club in your area.

- Only use a “Start Stick” or electric starter to start the engine.
- Only make adjustments to the carburetor from behind the engine.

- Keep spectators at least 20 feet away and out of the path of a rotating propeller



- Wear safety glasses and hand protection when operating model engines. Do not permit any objects to touch a turning propeller. Remain clear of the propeller plane of rotation.
- To stop the engine, cut off the fuel and air supply by moving the throttle stick and trim lever down to close the carburetor. Do **not** stop the propeller with your hand or other object.

- Inspect the propeller after each flight; discard any propeller that has nicks, scratches or any other visible defect. Do **not** repair, alter or in any way modify a propeller. Replacement propellers are available through your local hobby retailer.

Starting the Evolution Engine

Field Equipment Needed
The following are included in the Hangar 9® Start-Up Field Accessory Pack (HANSTART)

- Sturdy cardboard construction tote box
- Manual fuel pump
- Hangar 9 glow plugs (2)
- 4-way wrench
- Rechargeable glow driver with charger
- Start stick

Other Items Needed
(not included in Start-Up Field Accessory Pack)

- Fuel, 10 to 15% nitro content
  (Cool Power or Powermaster recommended)
- Electric starter (optional)

Step 1
Fill the fuel tank with the proper fuel. We recommend 10% or 15% nitro content such as Cool Power or Powermaster fuel. Fill the tank by connecting the fuel pump to the line that is connected to the remote needle valve assembly. Disconnect the fuel line attached to the pressure fitting of the muffler; your tank is full when fuel begins to run out of the pressure line. Reconnect the fuel lines to the needle valve assembly and muffler.

Note: It is very important to reconnect the lines to the correct place. If they are reconnected incorrectly, the engine will not run properly.

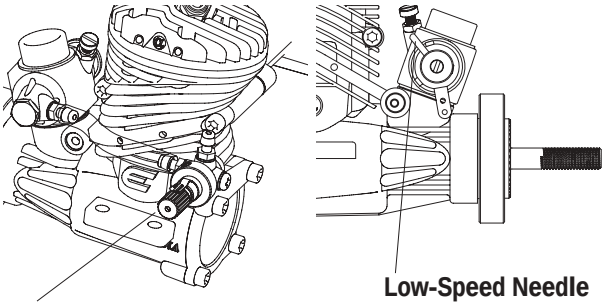
Step 2
To prime your engine, first turn on your transmitter and then your receiver. Move the throttle to full open and place your finger over the carburetor opening. Turn the propeller over by hand until you can see fuel entering the fuel line. Move the throttle stick full down to idle.

Caution: Always have a helper hold your plane when starting the engine.

Step 3
Move the throttle to the low position and the throttle trim lever to the middle position. Place the glow driver on the glow plug and, using a start stick, turn the propeller counterclockwise through the compression stroke. You should feel a “bump” against the start stick. When you feel the “bump,” flip the propeller counter clockwise to start the engine. Repeat the process if the engine does not start.

Engine Adjustments

Model engines run on a mixture of fuel and air. The high-speed and low-speed needle valves control the ratio of fuel to air that the engine receives. If you find that small adjustments are needed, have an experienced modeler help you to fine-tune your engine. Do not attempt to move the needles past the preset stops.



High-Speed Needle Adjustment

Low-Speed Needle Adjustment

Warning: Make all adjustments to the Evolution engine's low-speed needle valve with the engine stopped.

Our technicians have preset the needle valves of the Evolution engine. Your engine should run properly at these preset needle settings. On occasion, depending on your location, you may find it necessary to adjust the high-speed and low-speed needle valves to optimize the performance of your engine. The needle valves have limiters to allow small adjustments to the engine. The low-speed needle valve limiter allows 1/4 turn of the needle valve, turning clockwise (in) will lean the mixture while turning counterclockwise (out) will richen the mixture to the low-speed or idle setting of the engine. The high-speed needle valve limiter allows one full turn of the needle valve. As with the low-speed adjustment, turning the high-speed needle valve clockwise (in) will lean the mixture, while turning counterclockwise (out) will richen the mixture of the high-speed setting of the engine.

Fine-Tuning the High-Speed Needle

Start your engine and advance the throttle to full, then pinch the red fuel line going to the engine. If the engine dies immediately without an increase in rpm, the setting is too lean. Adjust the high-speed needle valve counterclockwise (out) 1/2 turn and repeat the test. When the high-speed needle is adjusted correctly, the engine should increase rpm slightly and then quit. If the engine rpm increases more than 200–300 rpm and continues to run, the needle valve setting is too rich. Adjust the needle valve clockwise (in) 1/8th of a turn and repeat the test until the engine responds correctly to the pinch test.

Fine-Tuning the Low-Speed Needle

After fine-tuning the high-speed needle, you can begin to test the low-speed needle. Start your engine and go to full throttle for approximately 5–10 seconds then return to idle. Pinch the red fuel line going to the engine. If the engine dies immediately without an increase in rpm, the setting is too lean. Adjust the needle valve counterclockwise (out) 1/8th of a turn and repeat the test. When the low-speed needle is adjusted correctly, the engine should increase rpm slightly and then quit. If the engine rpm increases more than 200–300 rpm and continues to run, the needle-valve setting is too rich. Adjust the needle valve clockwise (in) 1/16th of a turn and repeat the test until the engine responds correctly to the pinch test.

Flying the Arrow Trainer

For first time pilots, the thought of flying the Arrow Trainer through loops, rolls and perfect three-point landings can be thrilling. Learning to fly, however, takes time, patience, most importantly, a good instructor. If you're a first time pilot, don't try to fly your model without an experienced instructor. Your local hobby shop can put you in touch with an instructor in your area who can test fly your Arrow Trainer, and then give you your first chance on the "sticks" with very little risk of damage to the airplane. We cannot over emphasize the importance of having a qualified instructor to help you through your first flights.

The JR™ Quattro radio system has a built-in trainer system or "buddy box" option. The transmitter can be used with any JR transmitter and a trainer cord (JRPA130). Use of the "buddy box" for the first few flights is highly recommended.

More experienced pilots will find the Arrow Trainer to be a confidence-inspiring airplane. Its super stable and slow-flight characteristics make pinpoint landings easy. At full throttle, the Arrow Trainer is more than capable of most Sport aerobatics maneuvers, making it truly the trainer that goes where you point it.

Repair Information

Should you have the misfortune of a crash or broken part, see your local hobby dealer for replacement parts.

AMA Safety Code

1994 Official AMA National Model Aircraft Safety Code
Effective January 1, 2003
Model Flying MUST be in accordance with this Code in order for AMA Liability Protection to apply.

GENERAL

1) I will not fly my model aircraft in sanctioned events, air shows or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.

2) 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 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.

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully or deliberately fly my model in a careless, reckless and/or dangerous manner.

4) The maximum takeoff weight of a model is 55 pounds, except models flown under Experimental Aircraft rules.

5) I will not fly my model unless it is identified with my name and address or AMA number on or in the model. (This does not apply to models while being flown indoors.)

6) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the National Model Rocketry Safety Code or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as a primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. (A model aircraft is defined as an aircraft with or without an engine, not able to carry a human being.)

8) I will not consume alcoholic beverages prior to, nor during, participation in any model operations.

9) Children under 6 years old are only allowed on the flight line as a pilot or while under flight instruction.

RADIO CONTROL

1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites, a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in front of the flight line. Intentional flying behind the flight line is prohibited.

4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.)

5) Flying sites separated by three miles or more are considered safe from site-to site interference, even when both sites use the same frequencies. Any circumstances under three miles separation require a frequency management arrangement which may be either an allocation of specific frequencies for each site or testing to determine that freedom from interference exists. Allocation plans or interference test reports shall be signed by the parties involved and provided to AMA Headquarters. Documents of agreement and reports may exist between (1) two or more AMA Chartered Clubs, (2) AMA clubs and individual AMA members not associated with AMA Clubs or (3) two or more individual AMA members.

6) For Combat, the distance between the combat engagement line and the spectator line will be 500 feet per cubic inch of engine displacement. (Example: .40 engine = 200 feet); electric motors will be based on equivalent combustion engine size. Additional safety requirements will be per the RC Combat section of the current Competition Regulations.

7) At air shows or model flying demonstrations, a single straight line must be established, with one side for flying, the other side for spectators.

8) With the exception of events flown under AMA Competition rules, after launch (except for pilots or helpers being used), no powered model may be flown closer than 25 feet to any person.

9) Under no circumstances may a pilot or other person touch a powered model in flight.

Glossary of Terms

- **Ailerons:** Each side of this airplane has a hinged control surface (aileron), located on the trailing edge of the wing. Move the aileron stick on the transmitter left, the left aileron moves up and the right aileron moves down. Moving the left aileron up causes more drag and less lift, causing the left wing to drop down. When the right aileron moves down, more lift is created, causing the right wing to rise. This interaction causes the airplane to turn or roll to the left. Perform the opposite actions, and the airplane will roll to the right.
- **Carburetor:** By adjusting the needle valve in the carburetor, you control the engine's lean/rich fuel mixture and set the engine for correct operation.
- **Charger:** This is the device used to charge/recharge batteries. If Ni-Cd batteries are provided with the radio, a charger is usually provided as well.
- **Clevis:** The clevis connects the wire end of the pushrod to the control horn of the control surface. A small clip, the clevis has fine threads so that you can adjust the length of the pushrod.
- **Clunk:** Located inside the fuel tank, a clunk is weighted and ensures that the intake line has a steady supply of fuel regardless of the altitude of the airplane.
- **Control Horn:** This arm connects the control surface to the clevis and pushrod.
- **Control Surfaces:** The moveable part of the wing and tail that cause the aircraft to roll (aileron), pitch (elevator) or yaw (rudder).
- **Dead Stick:** When the airplane is in flight, gliding without the engine running, it is called "dead stick."
- **Dihedral:** The degree of angle (V-shaped bend) at which the wings intersect the fuselage is called dihedral. More dihedral gives an airplane more aerodynamic stability. Some sailplanes and trainer planes with large dihedral dispense with ailerons and use only the rudder to control the roll and yaw.
- **Electric Starter:** This is the small motor commonly used to start the airplane's engine.
- **Elevator:** The hinged control surface on the back of the stabilizer that moves to control the airplane's pitch axis. Pulling the transmitter's control stick toward the bottom of the transmitter moves the elevator upward, and the airplane begins to climb. Push the control stick forward, and the airplane begins to dive.
- **Expanded Scale Voltmeter (ESV):** This device is used to check the voltage of the battery pack.
- **Flight Box:** The box in which you store and transport your flying equipment is called a flight box.
- **Flight Pack or Airborne Pack:** These interchangeable terms describe the radio equipment that is installed on the airplane.
- **Fuel Overflow Line (Vent):** This line connects to the muffler and pressures the fuel tank when the engine is running. It also functions as an overflow line when the fuel tank is full.
- **Fuel Pickup Line:** This line connects the fuel tank to the carburetor.
- **Fuselage:** The main body of an airplane.
- **Glow Plug Clip/Battery:** A 1.2-volt battery with a clip that is connected to your engine's glow plug and is used to start the engine. You remove it once the engine is running smoothly.
- **High Wing:** The term describes an airplane that has its wing mounted on the top of the fuselage.
- **Hinge:** Flexible pieces used to connect the control surface to the flying surface. All hinges must be glued properly and securely to prevent the airplane from crashing. (This has already been done for you on the Arrow Advanced trainer.)
- **Horizontal Stabilizer:** The horizontal flying surface of the tail gives the airplane stability while in flight.
- **Leading Edge:** The front of a flying surface.
- **Main Landing Gear:** The wheel and gear assembly the airplane uses to land. It is attached to the bottom of the fuselage.
- **Muffler:** This device muffles engine noise and increases the back pressure from the engine's exhaust stack, which can improve the engine's performance at low speeds. RC clubs usually require mufflers.
- **Needle Valve:** This mechanism within the carburetor adjusts the fuel mixture. Refer to your instructions for directions on how to adjust the needle valve.
- **Ni-Cd:** This abbreviation stands for Nickel Cadmium, the chemical compound used in rechargeable batteries.
- **Nitro:** Short for nitromethane, a fuel additive that improves an engine's performance. 10% to 15% nitro content is recommended for the Evolution engine.
- **Nose Gear:** The part of the landing gear that is attached to the nose of the fuselage. The nose gear is usually connected to the rudder servo to help you steer the airplane on the ground.
- **Pitch Axis:** The horizontal plane on which the airplane's nose is raised or lowered. By moving the elevator, you can raise the airplane's nose above the pitch axis (climb) or lower it below the pitch axis (dive).
- **Pushrod:** The rigid mechanism that transfers movement from the servo to the control surface.
- **Receiver:** The receiver unit in an airplane receives signals from the ground transmitter and passes the instructions along to the airplane's servos.

- **Roll Axis:** The horizontal plane on which the airplane's wings are raised or lowered. By adjusting the ailerons, you can drop a wing tip below the roll axis and cause the airplane to bank or roll.
- **Rudder:** The hinged control surface on the vertical stabilizer that controls the airplane's yaw. Moving the rudder to the left causes the airplane to yaw left; moving the rudder to the right causes it to yaw right.
- **Servo:** The servo transforms your ground commands into physical adjustments of the airplane while it's in the air.
- **Servo Output Arm:** A removable arm or wheel that connects the servo to the pushrod (also called servo horn).
- **Spinner:** Term describing the nose cone that covers the propeller hub.
- **Switch Harness:** This switch is commonly located on the fuselage and governs the On/Off mechanism for the flight pack.
- **Tachometer:** A device that measures the engine's rpm (rotations per minute) by counting light impulses that pass through the spinning propeller.
- **Threadlock:** A liquid that solidifies; used to prevent screws from loosening due to vibration.
- **Torque Rods:** Inserted into the ailerons, these rigid wire rods run along the wing's trailing edge, then bend downward and connects to the pushrod.
- **Trainer Airplane:** Designed to fly with high stability at low speeds, a trainer model airplane allows new pilots some extra reaction time as they learn to control an airplane.
- **Transmitter:** The device used on the ground to transmit instructions to the airplane.
- **Vertical Stabilizer:** The vertical flying surface of the tail gives an airplane stability while in flight.
- **Wheel Collar:** The round retaining piece that anchors wheels in place on the wheel axle.
- **Wing:** The lifting surface of an airplane.
- **Yaw Axis:** The vertical plane through which the airplane's nose rotates as it yaws to the left or to the right. The rudder controls the yaw axis.
- **Z-Bend:** The wire ends of pushrods have Z-shaped bends that attach to the servo.

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HORIZON HOBBY

4105 Fieldstone Road
Champaign, Illinois 61822
(217) 355-9511
www.horizonhobby.com