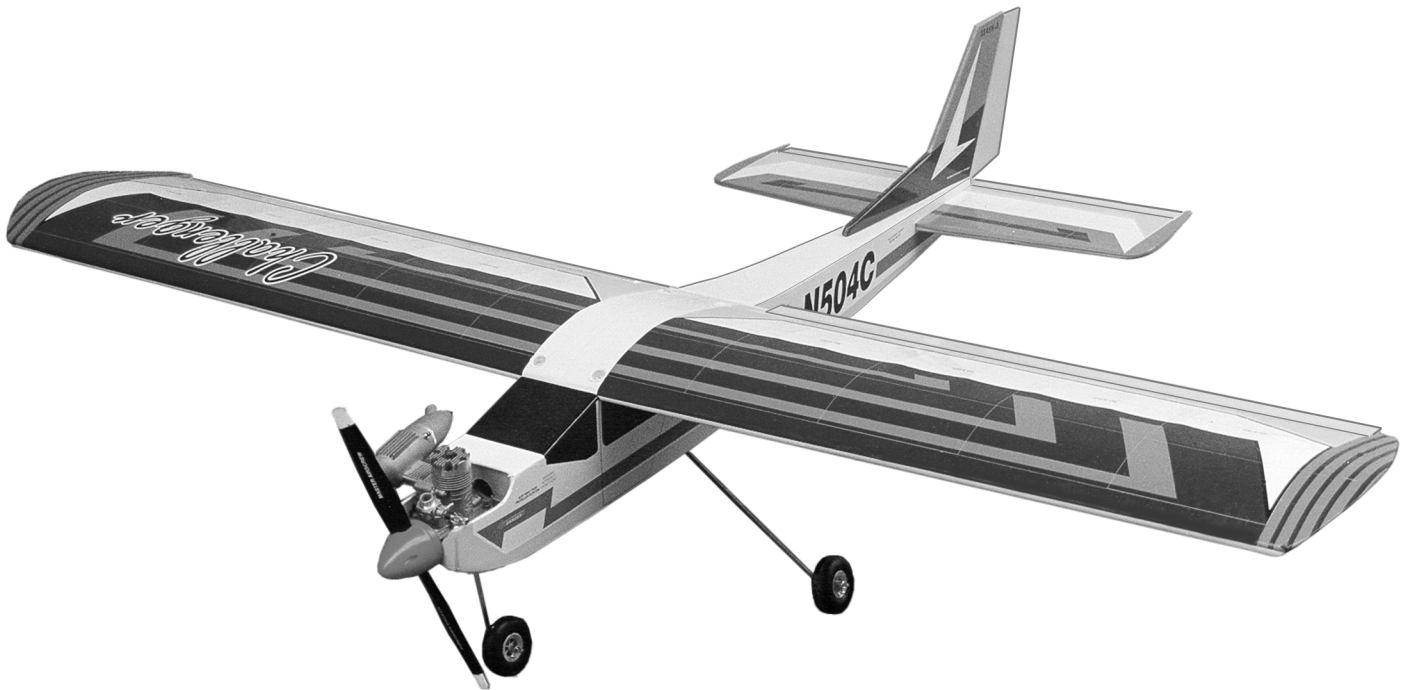




CHALLENGER 40 ARF TRAINER



Assembly and Operations Manual

First Edition 1999 11 30

**Please Thoroughly Review This Manual
and all other documentation and instructions
Before Assembling or Operating
the
VMAR Challenger 40ARF Trainer**

Visit us on the Web at www.richmondrc.com/vmar

VMAR CHALLENGER 40ARF TRAINER



Liability Disclaimer

It is important that the following liability disclaimer be **READ BEFORE ASSEMBLING OR USING THIS PRODUCT**

Model airplanes, model engines, model engine fuel, propellers and products such as the VMAR Challenger 40ARF Trainer can be hazardous if improperly used. Be cautious and follow all safety recommendations when using your VMAR Challenger 40ARF Trainer. Keep hands, tools, clothing and all foreign objects well clear of engines when they are operating. Take particular care to safeguard and protect your eyes and fingers and the eyes and fingers of other persons who may be nearby. Use only a good quality propeller that has no cracks or flaws. Stay clear of the propeller and stay clear of the plane of rotation defined by the propeller.

The Manufacturer, Distributor, Retailer and/or other suppliers of this product expressly disclaim any warranties or representations, either expressed or implied, including but not limited to implied warranties of fitness for the purposes of achieving and sustaining remotely controlled flight.

In no event will the Manufacturer, Distributor, Retailer and/or other suppliers of this product have any obligation arising from contract or tort, or for loss of revenue or profit, or for indirect, special, incidental, consequential or other damages arising from the use of this product.

In purchasing and/or using this product, the user accepts all responsibility for its use and accepts all liability associated with such use.

Proceeding with assembly and use of this product indicates Agreement With and Acceptance of the Liability Disclaimer.

CAUTION.

A Remote Control Model Aircraft is not a toy. It is a flying model that functions much like a full size airplane. If you do not assemble and operate this product properly you can cause injury to yourself and others and damage property. DO NOT FLY this model if you are not qualified.

You are ultimately responsible for the mechanical, aeronautical and electrical integrity of this model and it's structure, control surfaces, hinges, linkages, covering, engine, radio, wiring, battery and all other components. Check all components before and after each flight. Don't fly until it's right!

INTRODUCTION.

Thank you for purchasing a VMAR Product. VMAR Manufacturing is committed to delivering superior value to the RC modeller. Your new VMAR Challenger 40ARF Trainer is a market leader in features, value, ease of use and flexibility. Please review these instructions before beginning the simple assembly procedure.

We've used metric measurements throughout these instructions. We know that some of you like metric while others think that furlongs per fortnight makes a nifty velocity indicator. If you are in the furlongs camp, bear with us... it's not a big deal... 3 millimetres is stated as 3 mm and 3 mm is about 1/8 of an inch. Fire up your confuser and you'll find that 25.4 mm makes an inch. In most cases we have listed both metric and imperial with the imperial measurement in inches in brackets ().

Whenever we've used the directional terms left or right, they are with respect to the Challenger when viewed as you would from sitting in the cockpit... that is when viewed from the back looking forward.

The Challenger 40 ARF Trainer from VMAR Manufacturing carries on the VMAR tradition of offering beginners an easy to fly, easy to assemble and top value 40 size ARF Trainer. Simply put, the Challenger is the best quality, best value, easiest to fly ARF trainer available anywhere! Nothing can even come close to the Challenger for value!

Fantastic quality, outstanding graphic scheme and details, unbeatable value, knock 'em dead looks, more features and a price you just cannot beat!

Your instructor will likely be looking for quality clevises on your control surfaces. Most ARF's use factory grade clevises that leave you somewhat wanting in the confidence department. Guess what? The Challenger uses VMAR metal pin clevises on all control surfaces! You won't be throwing our clevises in file 13... you'll be flyin 'em with confidence in your Challenger!

We've coupled those VMAR metal pin clevises to super strong steel push rods that run in plastic tube guides all the way from the tail to the radio compartment! Connections between the threaded control rods and the servo arms are done with custom VMAR metal pin clevises that have been designed to accommodate the high angular rotation of the servo arms. Nothing but nothing is going to break, bend, fail or otherwise cause you grief between your servo's and the tail feathers of your Challenger! We've also included a servo tray. Not only do we provide a servo tray but it is the best most universally adjustable tray available anywhere. Once you see how our servo tray works, you'll be trying to buy 'em as a part!

Another feature that experienced RC flyers look for is "pinned" hinges that don't rely solely on the hinge glue to keep the control surfaces attached. Look no further. Turn over a Challenger wing and look at the outboard and in-board hinges... yup, they're pinned! Double pinned in fact! With steel pins to ensure the hinges are in to stay! Better yet we've done all the end hinges on the rudder and elevator as well! Check out other ARF trainers and you'll see how rare this level of completeness is.

Don't have a drill and tap system for installing your engine? Relax, we've already done it for you by providing a cast aluminum engine mount that has been pretapped and comes with black allen head machine screws and engine clamp straps. Check out how much a metal engine mount costs in the store and you'll wonder how we can do it! Put your engine on the mount, line it up, cinch down the clamps and you are done with the engine mounting stuff!

DAMAGED, MISSING or DEFECTIVE ITEMS.

Please check the "READ THIS FIRST" pamphlet included with your kit for information about Troubleshooting, Contact Procedures, Return Procedures and Conditions.

If upon arrival of your model you noted damaged, missing or defective components DO NOT proceed with assembly.

Damaged, missing or defective components must be reported to your vendor within 30 days of purchase and BEFORE any assembly begins. Please DO NOT START if something is damaged, missing or defective. Your vendor will not be able to provide you with exchanges or replacements of parts that have been assembled.

DO NOT START UNLESS IT'S RIGHT!

MANUAL - ERRORS AND OMISSIONS

This page was last updated 1999 11 30.

Please check the "READ THIS FIRST" pamphlet included with your kit. Review any Errors or Omissions listed there that may describe errors or omissions in this manual that we discovered after the manual was printed but prior to your kit being shipped.

Check our web site at www.richmondrc.com/vmar for the latest information related to this product. Such information may include further tips or corrections to the documentation that we have added since your kit was shipped.

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Errors and Omissions.

Corrections to errors or omissions related to the documentation and discovered after the initial printing may be noted in a separate pamphlet entitled "READ THIS FIRST"

BEFORE PROCEEDING: Please check the READ THIS FIRST pamphlet carefully for any Errors or Omissions and take careful note of any references to corrections or additional instructions.

VMAR CHALLENGER 40ARF TRAINER



PHASE 1 - CHECK OUT THE CONTENTS.

PLEASE SAVE YOUR BOXES UNTIL CHECK OUT COMPLETE

You've taken the lid off the box, read over the "READ ME FIRST" pamphlet and you are ready to start with the assembly procedure... you're about 6-8 hours away from being ready to go flying! Now is the time to look over what's in the box. Please go through the contents and make sure nothing has been damaged in shipping. **Damaged, missing or defective components must be reported to your vendor BEFORE any assembly begins. Please DO NOT START if something is damaged, missing or defective. See Page 3 for further information. As you can imagine, once you join the wing halves or install your radio or engine your options for returns are very limited. Your vendor will not be able to provide you with exchanges or replacements of parts that have been assembled. DO NOT START UNLESS IT'S RIGHT!**

STEP 1.1 - CHECK OFF MAJOR COMPONENTS INCLUDED.

Please read the "Read Me First" sheet before proceeding any further.

Ensure that you have the following major components. Do not open the bags at this point... just look through the box to ensure that you have the following major components.

- 1 Right wing [WR]
- 1 Left wing [WL]



- 1 Fuselage [FS] with the following components that have been pre-installed in the fuselage:

- Engine mount [EM],
- Elevator, rudder and nose gear control rods,
- 2 piece throttle control rod [CRT] with collars [COL]
- Universal adjustable servo tray [ST], [STDS], [STSS], [STMS], [AW]
- 2 EZ connectors [EZ] attached to the ends of the nose gear push rod.



- 1 Vertical stabilizer with pre-installed rudder [TV]



- 1 Horizontal stabilizer with pre-installed elevator [TH]



- 1 Master Bag containing parts & parts bags

STEP 1.2 - CHECK OFF CONTENTS OF THE MASTER BAG.

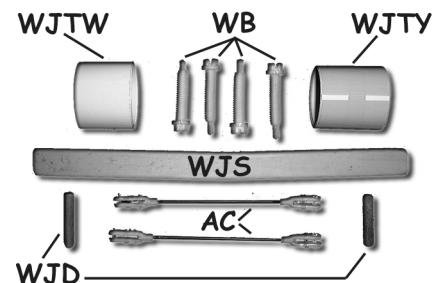
Open the Master Bag and carefully remove the contents. Confirm that you have the following items. Do not open the parts bags at this point, just check them off for now.

- 1 Fuel tank [FT]
- 1 Spinner (nose cone) [SS] with screws
- 1 Wing Parts Bag 1 Misc Parts Bag
- 1 Main Gear Parts Bag 1 Nose Gear Parts Bag
- 1 Control Horn Parts Bag

STEP 1.3 - CHECK OFF CONTENTS OF THE WING PARTS BAG.

Open the Wing Parts Bag and carefully remove the contents. Confirm that you have the following items and then return them to the Wing Parts Bag.

- 2 Wing joint dowels [WJD] 25 mm (1 in.) long, wood
- 4 Wing mounting bolts [WB] made of white plastic
- 1 Small roll of wing joint tape [WJTW], white
- 1 Small roll of wing joint tape [WJTY], yellow
- 2 Aileron control rods with clevises at both ends [AC]
- 1 Wing spar joiner [WJS] made of wood. *Note: If the Wing Spar Joiner [WJS] is not in the Wing Parts Bag it will be have been shipped with one of the Wing halves.*



STEP 1.4 - CHECK OFF CONTENTS OF THE MISC PARTS BAG.

Open the Misc Parts Bag and carefully remove the contents. Confirm that you have the following items and then return them to the Misc Parts Bag.

- 2 Wooden guide blocks [WGB]



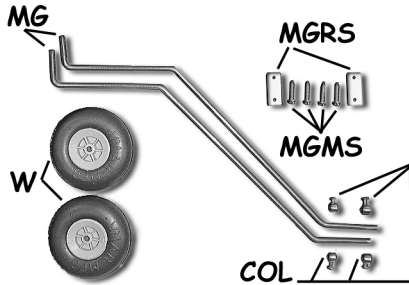
VMAR CHALLENGER 40ARF TRAINER



STEP 1.5 - CHECK OFF CONTENTS OF THE MAIN GEAR PARTS BAG.

Open the Main Gear Parts Bag and carefully remove the contents. Confirm that you have the following items and then return them to the Main Gear Parts Bag.

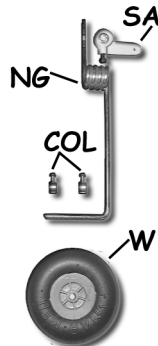
- 2 Ultralight treaded wheels 62 mm (2-7/16 in.) diameter [W]
- 4 Wheel collars [COL] with set screws
- 4 Sheet metal screws [MGMS] approx 15mm (5/8 in.) long
- 2 Landing gear straps [MGRS], approx 9 mm x 21 mm (3/8 x 7/8 in.) made of white plastic with a hole at each end.
- 2 Pre-bent main landing gear wires [MG] approx 275 mm (11 in.) long



STEP 1.6 - CHECK OFF CONTENTS OF THE NOSE GEAR PARTS BAG.

Open the Nose Gear Parts Bag and carefully remove the contents. Confirm that you have the following items and then return them to the Nose Gear Parts Bag.

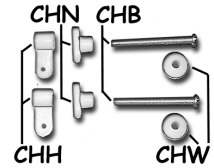
- 2 Wheel collars [COL] with set screws
- 1 Nose gear steering arm [SA] with set screw
- 1 Pre-bent metal nose gear wire [NG]
- 1 Ultralight treaded wheel 62 mm (2-7/16 in.) diameter [W]



STEP 1.7 - CHECK OFF CONTENTS OF THE CONTROL HORN PARTS BAG.

Open the Control Horn Parts Bag and carefully remove the contents. Confirm that you have the following items and then return them to the Control Horn Parts Bag.

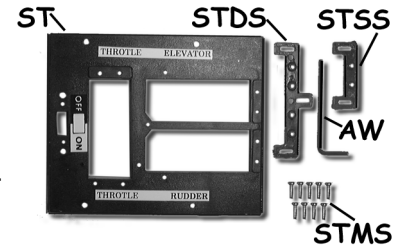
- 2 Metal bolts [CHB] 2.5 mm x 25-30 mm (1 to 1-3/16 in.)
- 2 Plastic control horns [CHH]
- 2 Plastic bevelled washers [CHW]
- 2 Plastic T-nuts. [CHN]



STEP 1.8 - CHECK OFF CONTENTS OF THE SERVO TRAY PARTS BAG.

The Servo Tray Parts Bag is **INSIDE THE FUSELAGE**. Undo the two securing screws and remove the servo tray from the fuselage. Confirm that you have the following items and then return them to the Servo Tray Parts Bag.

- Universal adjustable servo tray [ST]
- 2 black plastic adjustable slider plates, 1 long [STDS], 1 short [STSS], for mounting the servos
- 9 small screws [STMS]. 5 for mounting the adjustment plates & 4 to mount the universal servo tray to the fuselage.
- 1 Allen wrench [AW] for the screw in the pre-installed EZ connectors



STEP 1.9 - CHECK OFF LOOSE MATERIALS PACKED IN THE BOX.

- Yellow patch sheet
- White patch sheet
- Assembly and Operations Manual
- "READ ME FIRST" pamphlet
- Listing of Accessories, Options & Spare Parts

Missing Something? Please See Page 3.

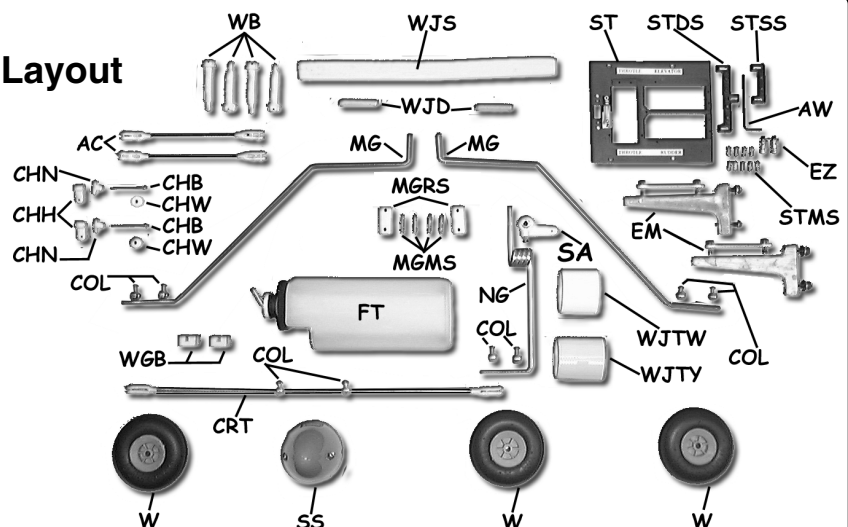
VMAR Challenger 40 ARF Parts Layout

NOTE:

- The elevator, rudder & steering push rods have been pre-installed into the fuselage and are not shown here.
- Items ST, STDS, STSS, AW, and STMS are included in the Servo Tray Bag and were temporarily installed in the fuselage at the factory along with item CRT and two of item COL.
- items EZ have been pre-installed on each end of the pre-installed steering control rod at the factory.
- Items EM have been pre-installed in the fuselage at the factory.

LEGEND:

- Items shown in the illustrations are flagged with legend references in **BOLD UPPER CASE** and appear within **[SQUARE BRACKETS]** throughout the manual. These are not part numbers. Please refer to the attached Listing of Replacement Parts, Tools & Accessories for Part Numbers applicable in your market area.



STEP 1.10 CHECK OFF TOOLS AND SHOP MATERIALS NEEDED.

These tools & shop materials are not included and are required to complete & operate your Challenger and most other remote control aircraft. For some specific recommendations & part numbers please see the attached listing of tools & materials available in your market area.

- Clean and flat table or work surface approximately 600 x 1800 mm (24 x 72 in.)
- 2.5 mm ball socket screwdriver or Allen wrench
- 3.0 mm ball socket screwdriver or Allen wrench
- 4.0 mm ball socket screwdriver or Allen wrench
- Phillips (cross head) screwdriver small size
- Phillips (cross head) screwdriver medium size
- Flat blade screwdriver medium size
- Heat gun for covering (optional for covering touch up)
- 30 Minute Epoxy and 240 grit sandpaper.
- Epoxy mixing dishes, brushes and sticks
- Scissors
- Masking tape
- Ruler or tape measure
- Side ("wire") cutters
- Flat file (optional)
- Pencil
- Ball point pen
- Pliers
- Hobby knife with #11 blade
- Thin cyanoacrylate CA instant glue.
- Silicone based sealant
- Crescent wrench (optional)
- Paper towels
- Rubbing alcohol

STEP 1.11 CHECK OFF OTHER ITEMS NEEDED TO COMPLETE CHALLENGER.

These items are not included and are required to complete and operate your Challenger and most other remote control aircraft. For specific recommendations and part numbers please see the attached listing of items available in your market area.

- Medium fuel tubing appropriate for your choice of engine and fuel. 500-750 mm (24-36 in.)
- Liquid thread locker.
- RC FM radio with at least four channels of control and on a frequency appropriate for your market area.
- Four servo's compatible with the RC FM radio. Servos are generally sold with new radio systems.
- External switch actuator appropriate for your radio system (optional).
- Engine and muffler suitable for use in a remote control model aircraft. A two stroke glow fuel .40-.53 cubic inch engine is recommended.
- Propeller suitable for the engine. See the engine instruction manual for recommended diameter and pitch.
- Engine glow plug
- Engine glow plug ignitor
- Engine 4 way wrench
- Fuel for the engine.
- "After Run" oil for engine.
- RC foam sheeting for wrapping radio receiver and battery pack.

STEP 1.12 CHECK OFF OPTIONAL EQUIPMENT AND ACCESSORIES.

These items are not included and are not required but make the operation of your Challenger and most other remote control aircraft easier & more enjoyable. For some specific recommendations and part numbers please see the separate listing of Accessories, Options & Spare Parts available in your market area.

- Power Tote Deluxe field box #VMA-PT109D
- Fuel pump and connecting tubing
- Fueling valve
- Chicken stick or electric starter
- Battery to power electric starter
- Battery charger
- Power panel to manage starter and pump if electric.
- VMAR Model Engine Test Stand #VMA-ETS120.
- Extra propellers Extra glow plugs
- Misc tools 1/4 - 20NC tap
- Stick on weights





NOTES

NOTES

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☐ PHASE 2 - WING ASSEMBLY.

☐ STEP 2.1 - TERMS TO REMEMBER

- First the easy part, the outboard ends of the wings are called the "wing tips".
- Each wing half has a flat wooden face that is at the opposite end from the wing tips. This flat wooden face is called the "wing root". We will be joining the wing halves shortly and the wing roots will end up contacting each other.
- The back edge of the wing can move up and down. The moveable section is called an "aileron". The ailerons are mounted to the "trailing edge of the wing" using hinges.
- The front edge of the wing is rounded and is called the "leading edge".
- The "bottom" of the wing is flat, the top of the wing is curved to provide lift.
- The "wing spar joiner" is a slightly V shaped piece of wood that will serve to join the wing halves together and provide strength to the wing when in the air.

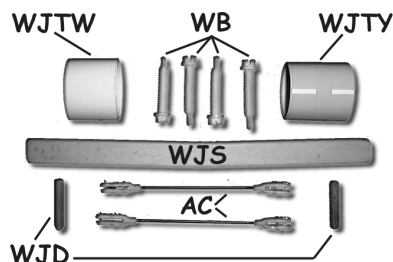
☐ STEP 2.2 - DRY ASSEMBLY OF THE WING HALVES.

You will first be assembling the wing with no glue. We call this a "dry assembly" and it is important to use no glue until you have done the dry assembly to check everything out.



☐ 2.2.1 To dry assemble the wing you will need the right wing half [WR] and the left wing half [WL] as shown above and the following items from the Wing Parts Bag.

- ☐ 1 Wing spar joiner [WJS] made of wood
- ☐ 2 Wing joint dowels [WJD] 25 mm (1 in.) long, wood
- ☐ 4 Wing mounting bolts [WB] made of white plastic



☐ 2.2.2 You will also need the following items that are not included with your Challenger.

- ☐ Pencil
- ☐ Masking tape.

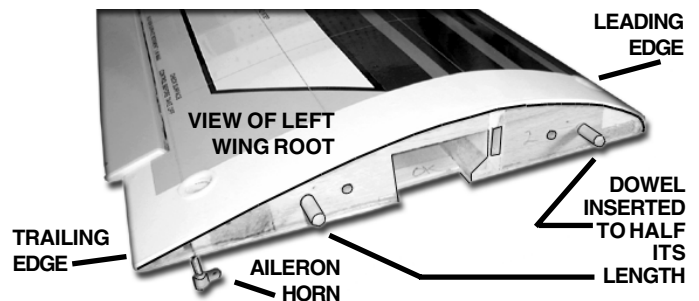
☐ 2.2.3 Remove the wing halves [WL] and [WR] from the plastic bag they were shipped in. Examine the wing halves carefully before proceeding.

☐ 2.2.4 Remove the protective tape and cardboard that has been applied to the wire like aileron horns. These are found near the wing roots. Peel the protective tape away carefully.

☐ 2.2.5 Place the wings top side up on a table so that the leading edge ("front") of the wing is away from you and the ailerons are towards you. Position the left wing to the left and the right wing to the right so that the wing roots are facing each other.

☐ 2.2.6 Position the wing so that the ailerons and white plastic aileron horns are hanging over the edge of the table allowing the wing halves to lie flat on the table surface with the yellow side of the wing facing down.

☐ 2.2.7 Locate the two short wing joint dowels [WJD]. Mark a centre line around each dowel with the pencil. Insert a dowel into the hole in the left wing root that is located closest to the leading edge of the left wing. Push the dowel into the hole up to the half way mark denoted by the pencil line.



☐ 2.2.8 Insert the second wing joint dowel into the hole in the left wing root that is located closest to the trailing edge of the left wing. Push the dowel into the hole up to the half way mark denoted by the pencil line.

☐ 2.2.9 Examine the wooden wing spar joiner [WJS]. Note that it is not straight. It has a slight V shape. Mark a centre line at the apex of the V with a pencil. When the wing spar joiner looks like a broad V it is right way up. If the wing spar joiner looks like a broad upside down V it is the wrong way up and should be turned over. Pencil in arrows pointing up on both sides of the wing spar joiner

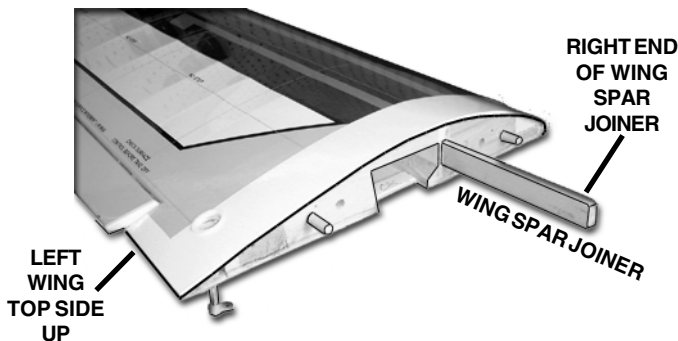
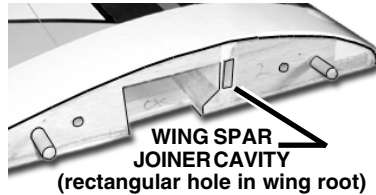
INSERT INTO WING HALVES SO THAT WING TIPS ARE HIGHER THAN CENTRE WHEN WING UPRIGHT

LEFT ↑UP WJS ↑UP RIGHT

MARK CENTRE LINE & "UP" ARROWS WITH PENCIL

❑ **2.2.10** Check the entrance to the wing spar joiner cavity in the wing roots. There may be "flashing" or a thin skin of wood covering the entrance to the cavity which should be removed carefully with a sharp hobby knife.

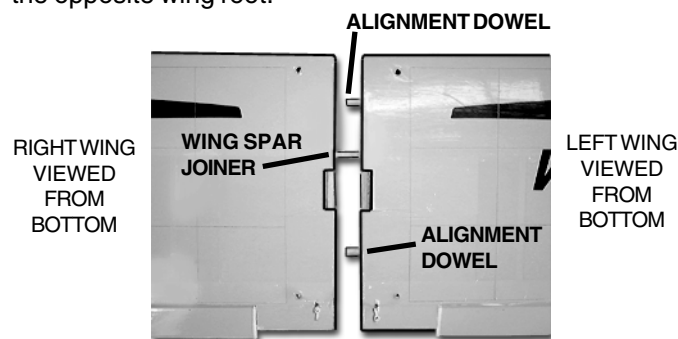
❑ **2.2.11** Holding the wing spar joiner in your right hand and right way up like a broad V slide the wing spar joiner firmly and carefully into the wing spar joiner cavity ("hole") in the root of the left wing. Push firmly and carefully until the wing spar joiner is inserted into the left wing up to the pencil mark at the apex of the V.



❑ **2.2.12** Holding the left wing firmly in place on the table with the top side up, take the right wing and carefully position the right wing spar joiner cavity onto the end of the wing spar joiner protruding from the left wing.

❑ **2.2.13** Turn the wing halves over so that you are looking at the bottom of the wing halves with the leading edge facing away from you and the ailerons closest to you.

❑ **2.2.14** Slide the right wing firmly and carefully onto the wing spar joiner until the wings are about 25 mm (1 in.) apart. Stop at this point and examine the wing assembly. You should see that the wing when bottom side up, takes on a slight inverted V shape with tips sweeping downwards. You should also note that the two short wing alignment dowels are lining up with two receiving holes in the opposite wing root.

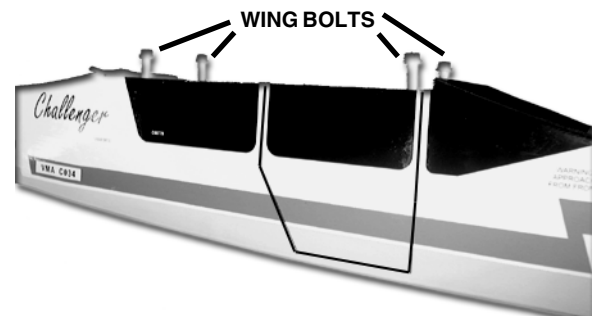


❑ **2.2.15** Carefully and firmly slide the right wing towards the left. Wiggle the wings slightly to encourage the two wing alignment dowels to mate with their respective receiving holes in the opposite wing root.

❑ **2.2.16** Carefully and firmly continue to slide the right wing towards the left until the wing roots touch. Push the wing halves firmly together and apply masking tape across the joint to keep the wing roots aligned and firmly in contact with each other. Apply masking tape top and bottom and along the joint.

❑ **2.2.17** Continue working with the wing turned over so that you are looking at the bottom of the wing with the leading edge facing away from you and the ailerons closest to you.

❑ **2.2.18** Take the fuselage [FS] out of its protective bag and locate four of the plastic wing bolts [WB] from the wing parts bag. Lubricate the wing bolts with a light grease or a very light coating of candle wax and screw the bolts into the wing mounting blocks in the fuselage. Go slowly, winding the bolts in a bit, back them out, add a bit more lube and then screw them in further in stages. You will note that it becomes easier as you go. Using a 4 way wrench on the socket heads of the bolts makes it easier but a flat bladed screw driver will do the job.



If the wing bolts appear to be unduly tight in the blocks when you try to screw them in, do not force the issue. Back the bolts out and "chase" the threads in the mounting blocks with a 1/4-20 NC tap. You can purchase these at most hardware stores or visit your local hobby retailer. Thread the tap lightly and gently into the threaded holes and twist it carefully until it engages with the threads and then turn the tap through the block and back it out again.

❑ **2.2.19** Remove all the wing bolts from the fuselage.

❑ **2.2.20** Examine the four wing bolt holes in the wing. Use a sharp hobby knife to carefully cut away the covering that has been applied over the holes on the bottom of the wing.

❑ STEP 2.2 - DRY ASSEMBLY OF THE WING HALVES *cont'd.*

❑ 2.2.21 Place the wing right way up in the wing saddle area of the fuselage. Place the four wing bolts into the wing bolt holes in the top of the wing and make sure you can screw them down into the wing bolt mounting blocks in the fuselage.



❑ 2.2.22 Unscrew the wing bolts from the fuselage blocks and remove the wing from the fuselage.

❑ STEP 2.3 - GLUING THE WING HALVES

❑ 2.3.1 Before gluing the wing halves together, dry assemble everything as outlined in the preceding step. It is critical that you dry assemble the wing halves before you begin to use epoxy. Remember, you've got one chance to get it right! Be careful and get things straight the first time! If you have not dry assembled the wing as outlined in the previous steps, stop now and go back and do the dry assembly before proceeding beyond this step.

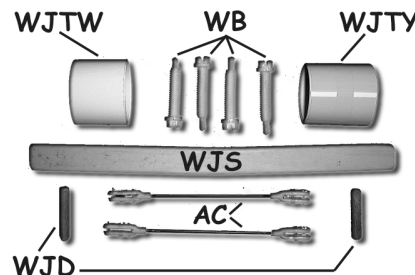
❑ 2.3.2 After you have done the dry assembly and test bolted the wing to the fuselage to confirm that everything fits together, it is time to disassemble the dry assembled wing. Carefully remove the masking tape and pull the wing halves apart. Use short rocking and gentle twisting motions when pulling the wings slightly apart.

❑ 2.3.3 Use a pencil to carefully mark both wing roots with an arrow pointing up and check that you have previously marked both faces of the wing spar joiner with an arrow pointing up so that the wing can be easily reassembled correctly.

❑ 2.3.4 Completely separate the wing halves and remove the two short wing alignment dowels and the wing spar joiner. Set the dowels and joiner aside for now.

❑ 2.3.5 To assemble and glue the wing you will need the two wing halves [WR] and [WL] and the following items from the Wing Parts Bag.

- ❑ 1 Wing spar joiner [WJS] made of wood
- ❑ 2 Wing joint dowels [WJD] 25 mm (1 in.) long, wood
- ❑ 1 Small roll of wing joint tape [WJTW], white
- ❑ 1 Small roll of wing joint tape [WJTY], yellow



❑ 2.3.6 You will also need the following items that are not included with your Challenger.

- ❑ 30 Minute Epoxy parts A and B
- ❑ Sandpaper (Coarse 240 grit recommended)
- ❑ Epoxy brush and ❑ Stir sticks
- ❑ Disposable mixing dish for the epoxy
- ❑ Paper towels ❑ Rubbing alcohol
- ❑ Hobby knife ❑ Masking tape.

USE 30 MINUTE EPOXY!

Use 30 Minute Epoxy to glue the wing together. Use only epoxy with a cure time of 30 minutes. Faster cure time epoxy will not allow you time to correctly position the parts before it begins to cure. 30 Minute Epoxy also provides a stronger bond than faster cure epoxy and you want the strongest bond you can get.

❑ 2.3.7 Using coarse sandpaper, lightly sand all sides of the wing spar joiner, the wing alignment dowels and the faces of both wing roots.

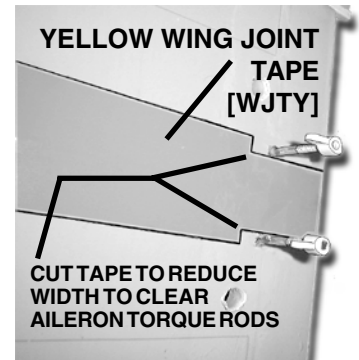
❑ 2.3.8 Using a disposable mixing dish and stir sticks, thoroughly mix up a batch of 30 Minute Epoxy according to the instructions that came with the epoxy.

❑ 2.3.9 Using a disposable epoxy brush, apply the 30 Minute Epoxy liberally to all sides of one end half of the wing spar joiner [WJS] and use the joiner to work the 30 Minute Epoxy into both of the wing spar joint cavities. Apply more epoxy to the one end of the wing spar joiner as you work epoxy into the second wing spar joint cavity. It is important to work 30 Minutes Epoxy into the wing spar joint cavities of the left and right wings. Don't scrimp on the epoxy! Use lots.

- ❑ **2.3.10** Insert the end of the wing spar joiner that is covered with glue into the wing spar joiner cavity of the left wing up to the pencil line on the wing spar joiner. Make sure the wing spar joiner is right way about.
- ❑ **2.3.11** Apply 30 Minute Epoxy to the two dowel receiving holes in the wing roots of both the left and right wings.
- ❑ **2.3.12** Apply 30 Minute Epoxy to one half end of the two wing dowels [WJD].
- ❑ **2.3.13** Insert the epoxy end of the two wing dowels into the dowel receiving holes in the left wing. Insert the dowels into the wing root of the left wing up to the pencil lines on the dowels.
- ❑ **2.3.14** Carefully, thoroughly and quickly use an epoxy brush to apply 30 Minute Epoxy to:
 - ❑ Both sides and both edges of the wing spar joiner protruding from the wing root of the left wing. Use lots of 30 Minute Epoxy.
 - ❑ The protruding ends of the wing joint dowels.
 - ❑ The wing roots of both (yes both!) the left and right wings.
- ❑ **2.3.15** Carefully slide the right wing onto the end of the wing spar joiner protruding from the root of the left wing. Make sure the wing spar joiner is oriented correctly so that when the wing is top side up the wing tips are rising as you move away from the centre of the wing. Check the arrows you pencilled in earlier.
- ❑ **2.3.16** Slide the wings together until they are about 75 mm (3 in.) apart. Check things out carefully. Make sure the dowels are in place in the left wing root and that the two wings are both facing up and the wing spar joiner is right way up.
- ❑ **2.3.17** Slide the wings tightly together so that the wing roots touch and epoxy squeezes out between the wing roots to confirm that the roots are touching and that the 30 Minute Epoxy is still wet enough to flow and give a good bond.
- ❑ **2.3.18** Using a paper towel, moistened with a bit of rubbing alcohol, wipe away any excess epoxy that squeezes out between the wing roots and align the top and bottom surfaces.
- ❑ **2.3.19** Hold the wing roots tightly together for at least 1 hour using masking tape straps across the joint on the top and bottom of the wing. Apply masking tape along the top and bottom joint to trap the epoxy in place and prevent it running out of the joint before the epoxy cures.

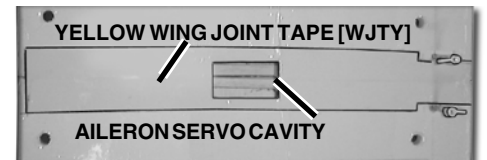
❑ **STEP 2.4 - APPLYING WING JOINT TAPE.**

- ❑ **2.4.1** Using the yellow roll of wing joint tape [WJTY] and scissors trim the width at one end of the tape so that it is about 22 mm (7/8 in.) wide and can pass clearly between the aileron torque rods on the bottom of the wing.



- ❑ **2.4.2** Peel away about 75 mm (3 in.) of the backing material from the trimmed end and apply the yellow tape to the underside of the wing such that the tape straddles the wing joint seam. Keep the tape centred across the seam.

Work forward from the trailing edge towards the leading edge, peeling away more of the backing material



as you go. At all times keep the tape centred over the wing seam and keep tension on the tape. Rub the tape with your hand or a soft cloth to tack it down. Trim the length to fit just short of the leading edge.

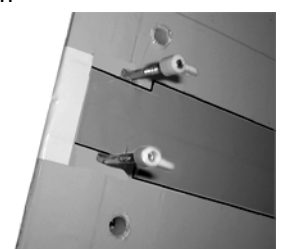
- ❑ **2.4.3** Re-open the aileron servo cavity by using your hobby knife to neatly cut away the trim tape.

- ❑ **2.4.4** Using the white roll of wing joint tape [WJTW], peel away about 75 mm (3 in.) of the backing material & apply the tape to the top side of the wing such that the tape straddles the wing joint seam. Keep the tape centred across the seam.



Start on the bottom of the wing about 25 mm (1 in.) back from the leading edge and work up and over the top surface of the wing towards the trailing edge, peeling away the backing material as you go. At all times keep the tape centred over the wing seam and keep tension on the tape. Rub the tape with your hand or a soft cloth to tack it down.

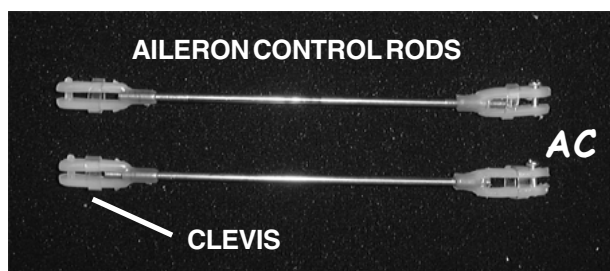
- ❑ **2.4.5** Work back to the trailing edge and then around the trailing edge to cover about 12 mm (1/2 in.) of the bottom of the wing.



❑ STEP 2.5 - INSTALLING THE AILERON SERVO INTO THE WING.

❑ 2.5.1 To install the aileron servo into the wing you will need the following items:

- ❑ Servo
- ❑ Servo mounting screws and grommets as supplied with the servo
- ❑ Servo control arm as supplied with the servo
- ❑ Two aileron control rod [AC] assemblies from the wing parts bag. The assemblies consist of a metal rod with a plastic clevis screwed onto each end.
- ❑ Masking tape. ❑ Phillips Screwdriver.



❑ 2.5.2 Turn the wing upside down. Trial fit the aileron servo into the servo-mounting cavity located in the centre of the bottom of the wing. The cavity straddles the wing joint. You may have to modify the cavity slightly to provide clearance for the servo and servo wires. Use a hobby knife to modify the cavity as required. Most servos have their wire exit guide protruding from one end. Position your servo so that the wire exit guide is closest to the leading edge. The servo cavity in the wing has extra room at the end of the cavity closest to the leading edge to accommodate the servo wiring.

❑ 2.5.3 Screw the servo into place with the screws and grommets supplied. It is important to install the grommets and screws correctly. See the manual that came with your radio for instructions about your particular servo grommets. Fasten the screws down according to the manufacturer's recommended tightness.

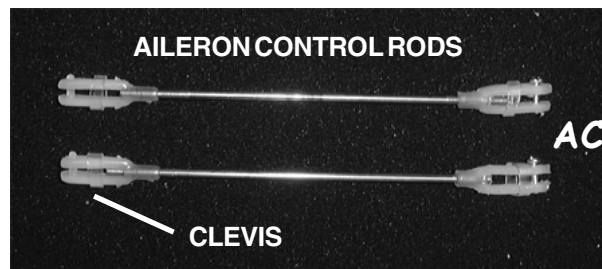


❑ STEP 2.6 INSTALLING THE AILERON CONTROL RODS TO THE AILERON SERVO.

❑ 2.6.1 Consult your radio instruction manual and centre the aileron servo by plugging it into the aileron channel in the receiver. Turn on the transmitter and then the receiver. Centre the aileron trim lever on the transmitter. Remove the servo arm mounting screw & the servo arm.

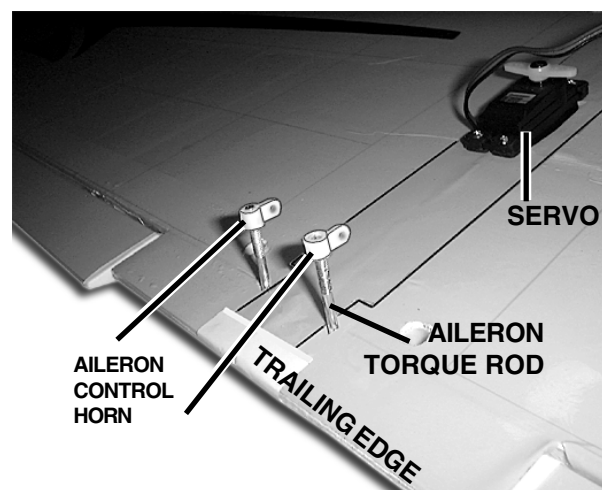
❑ 2.6.2 Mount the servo arm back on the servo. Position the arm to be parallel with the back edge of the wing. Screw the arm into place with the servo arm mounting screw supplied with the servo.

❑ 2.6.3 Locate the two aileron control rods [AC] in the hardware bag. Ensure the clevises are screwed well onto the threaded portions of the rod. Rotate and tug aggressively on the clevises and ensure that they are not loose on the rods.

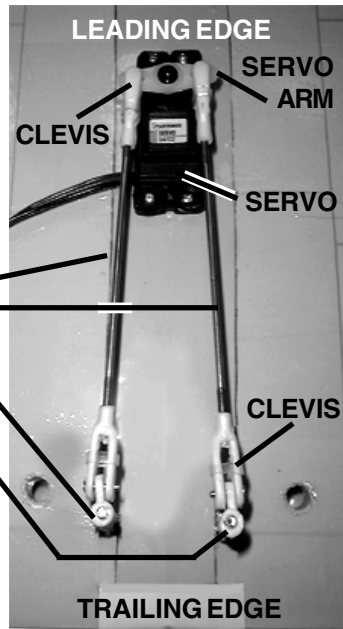


❑ 2.6.4 Tape the ailerons into their neutral position so that they are even with the trailing edge of the wing and not pointing either up or down.

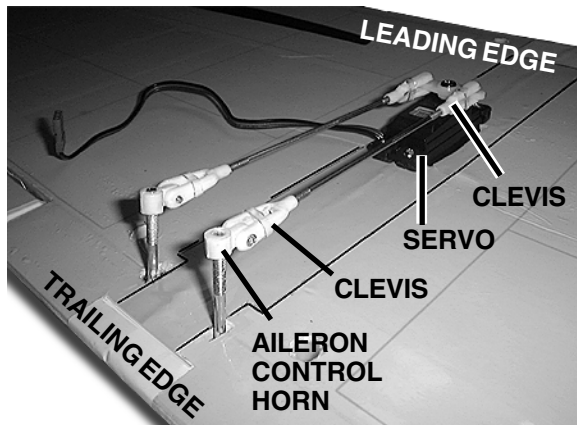
❑ 2.6.5 Ensure that the aileron control horns are screwed onto the threaded aileron torque rods that protrude from the wing and that both control horns are in approximately the same place on their respective torque rods.



❑ 2.6.6 Connect the clevises on the aileron control rods to the aileron servo arm.



❑ 2.6.7 Connect the clevises on the other end of the aileron control rods to the aileron control horns.



❑ 2.6.8 Remove the masking tape holding the ailerons.

❑ 2.6.9 Turn on your radio and activate the ailerons using the aileron stick and ensure a smooth full motion can be achieved.

❑ 2.6.10 With the wing top side up and viewed from the back, ensure that moving the transmitter aileron stick to the left raises the left aileron and lowers the right aileron. Movement of the stick to the left will roll the aircraft to the left (counter clockwise roll of the wing when viewed from the back).

❑ 2.6.11 With the wing top side up and viewed from the back ensure that moving the transmitter aileron stick to the right raises the right aileron and lowers the left aileron. Movement of the stick to the right will roll the aircraft to the right (clockwise roll of the wing when viewed from the back).

❑ 2.6.12 If when doing the tests noted in 2.6.10 and 2.6.11 the direction of aileron deployment is incorrect, consult your radio manual for how to reverse the direction of rotation of your servo. Control surface movement and alignment will be checked again during final setup but it is a good idea to set things up properly as you go along with the assembly of your kit.

NOTES

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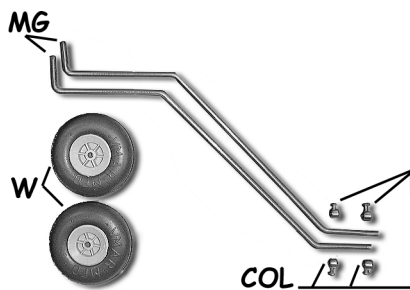
❑ PHASE 3 - INSTALLING THE LANDING GEAR.

The Challenger has a tricycle gear configuration ("trike gear") using a steerable nose wheel and main landing gear. Trike gear is recommended in trainers and makes it much easier to steer your model on the ground and to control it during take off.

❑ STEP 3.1 - CHALLENGER - MAIN LANDING GEAR ASSEMBLY.

❑ 3.1.1 To assemble the main landing gear you will need the following items from the Main Gear Parts Bag.

- ❑ 2 Ultralight treaded wheels 62 mm (2-7/16 in.) diameter [W]
- ❑ 4 Wheel collars [COL] with set screws
- ❑ 2 Pre-Bent Main Landing Gear Wires [MG] approx 275 mm (11 in.) long



You will also need the following items that are not included with your Challenger.

- ❑ Liquid thread locker
- ❑ Phillips screw driver

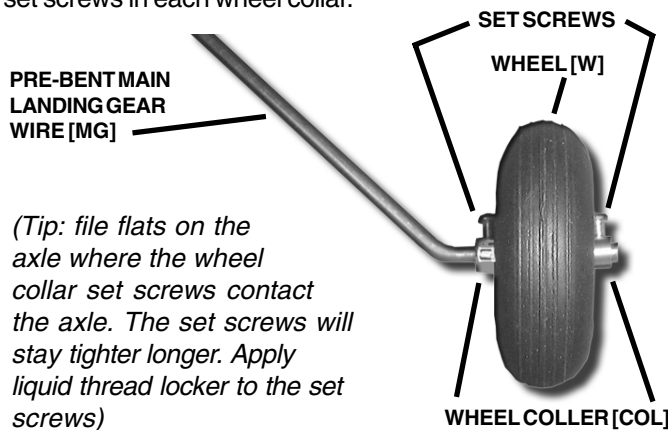
❑ 3.1.2 Locate both of the pre-bent main landing gear wires [MG]

❑ 3.1.3 Place one of the wheel collars [COL] on the pre-bent main landing gear wires.

❑ 3.1.4 Place one of the ultralight treaded wheels [W] on the pre-bent main landing gear wires.

❑ 3.1.5 Install a second wheel collar [COL] on to the pre-bent main landing gear wires. Leave enough of a gap to allow the wheel to rotate freely.

❑ 3.1.6 Apply liquid thread locker and securely tighten the set screws in each wheel collar.

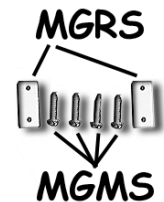


❑ STEP 3.2 - CHALLENGER - MAIN LANDING GEAR INSTALLATION.

The main landing gear must be assembled before it can be installed. See Step 3.1 if you have not yet assembled the main landing gear.

❑ 3.2.1 To install the main landing gear you will need the fuselage [FS], the main landing gear assemblies from Step 3.1 and the following items from the Main Gear Parts Bag.

- ❑ 4 Sheet metal screws [MGRS] approx 15 mm (5/8 in.) long
- ❑ 2 Landing gear straps [MGMS], approx 9 mm x 21 mm (3/8 x 7/8 in.) made of white plastic with a hole at each end.



You will also need the following items that are not included with your Challenger.

- ❑ Tape measure
- ❑ Phillips screw driver

❑ 3.2.2 Turn the fuselage [FS] over and examine the bottom of the fuselage carefully. Measure back about 285 mm (15 in.) from the front of the fuselage and locate four small holes in the covering on the bottom of the fuselage. There may also be a sticker on the bottom of the fuselage just forward of the four holes. If the sticker is present it will say "MAIN LANDING GEAR LOCATION".

❑ 3.2.3 Using your fingers, feel for a slot underneath the covering. The slot runs across the bottom of the fuselage from side to side and lies between the four small holes.

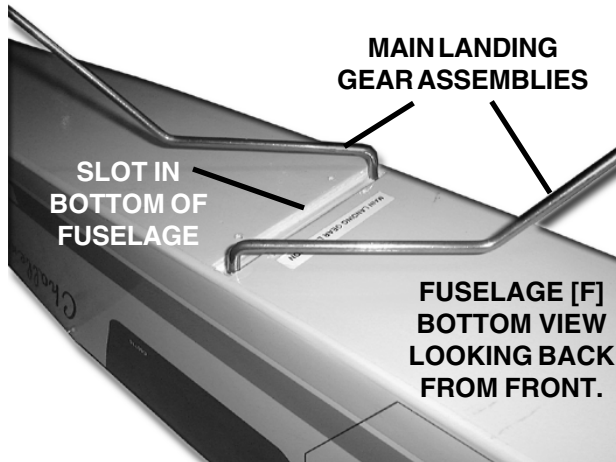


VIEW OF BOTTOM OF FUSELAGE

❑ 3.2.4 Use a sharp blade in your hobby knife and carefully remove the covering that obscures the slot in the fuselage. Do not cut into the wood... just remove the covering. If you inadvertently cut into the wood, seal the cut line with CA glue.

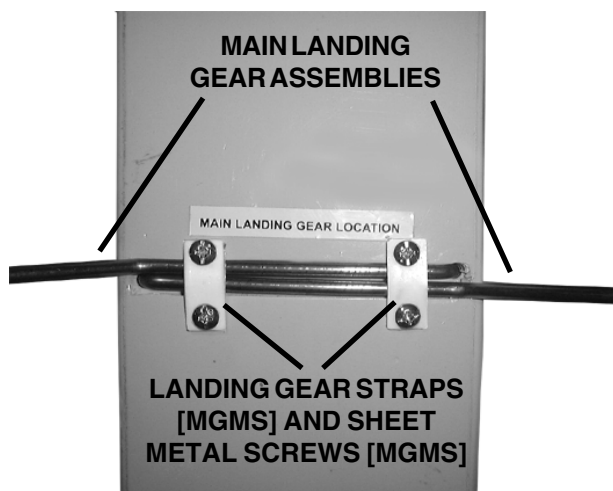
❑ 3.2.5 The slot has a hole at each end. Look carefully and you will notice one hole is close to the back edge of the slot and the other hole is close to the front edge of the slot. These two holes and the slot will be used to install the main landing gear assemblies that you built in Step 3.1

❑ **3.2.6** Locate the two main landing gear assemblies from Step 3.1 Carefully insert the wire end of each assembly into the holes at the end of the landing gear slots. We suggest rotating the assemblies back and forth and wiggling the wire down into the holes until the landing gear is just slightly away from contacting the fuselage. See the illustration below.



❑ **3.2.7** Consult the illustration below before proceeding. Then rotate the two main landing gear assemblies so that they line up with the slot in the fuselage. Press the wire down firmly into the slots. Tapping with the handle and then the blade of a screwdriver will help seat the gear wires into the slot.

Install the 2 landing gear straps [MGRS], approx 9 mm x 21 mm (3/8 x 7/8 in.) made of white plastic with a hole at each end using the 4 sheet metal screws [MGMS] approx 15 mm (5/8 in.) long and a Phillips screw driver. Turn all the screws in evenly a small increment at a time. Tap on the gear wires as you go until the screws are firmly holding the straps in place and the straps are holding the gear wires firmly into the slot in the fuselage.



NOTES

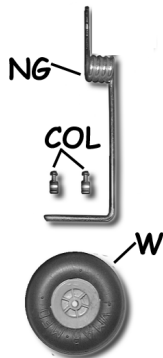
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❑ STEP 3.3 - CHALLENGER - NOSE GEAR ASSEMBLY.

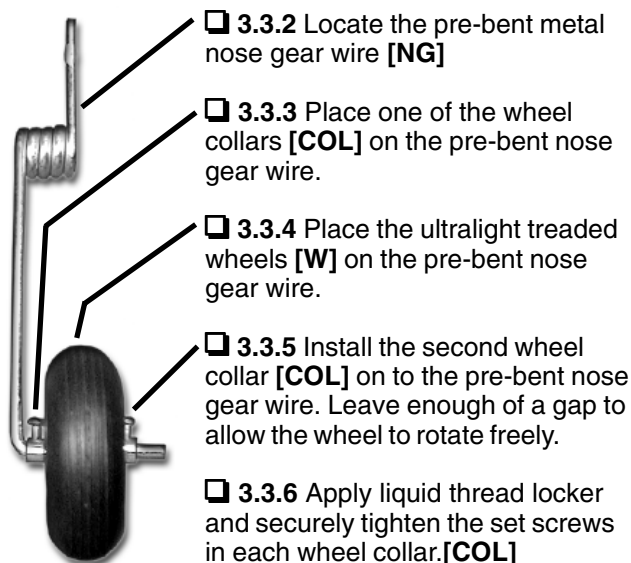
❑ **3.3.1** To assemble the nose gear you will need the following items from the Nose Gear Parts Bag.

- ❑ 2 Wheel collars [COL] with set screws
- ❑ 1 Pre-bent metal nose gear wire [NG]
- ❑ 1 Ultralight treaded wheel 62 mm (2-7/16 in.) diameter [W]

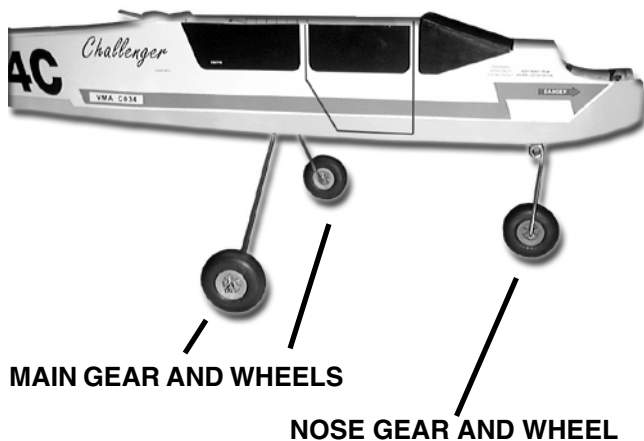


You will also need the following items that are not included with your Challenger.

- ❑ Liquid thread locker
- ❑ Phillips screw driver



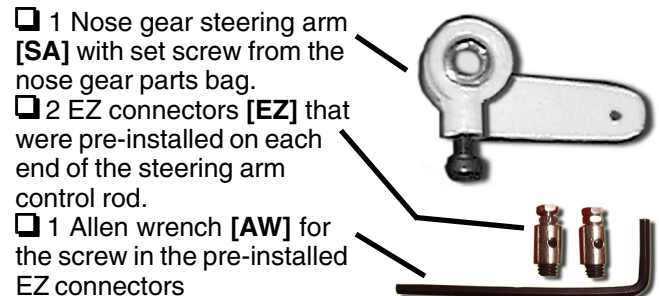
- ❑ **3.3.2** Locate the pre-bent metal nose gear wire [NG]
- ❑ **3.3.3** Place one of the wheel collars [COL] on the pre-bent nose gear wire.
- ❑ **3.3.4** Place the ultralight treaded wheels [W] on the pre-bent nose gear wire.
- ❑ **3.3.5** Install the second wheel collar [COL] on to the pre-bent nose gear wire. Leave enough of a gap to allow the wheel to rotate freely.
- ❑ **3.3.6** Apply liquid thread locker and securely tighten the set screws in each wheel collar.[COL]



❑ STEP 3.4 - CHALLENGER - NOSE GEAR INSTALLATION.

The nose gear must be assembled before it can be installed. See Step 3.3 if you have not yet assembled the nose gear.

❑ **3.4.1** To install the nose gear you will need the fuselage [FS], the nose gear assembly from Step 3.3 and



You will also need the following items that do not come with your Challenger.

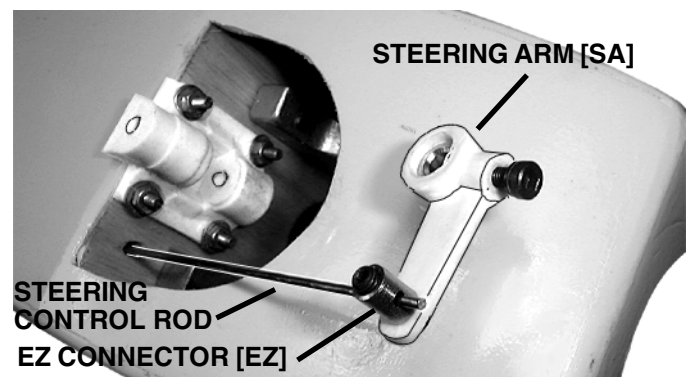
- ❑ Phillips screw driver
- ❑ Liquid thread locker

❑ **3.4.2** Locate the nose gear steering arm and back off the steering arm set screw.

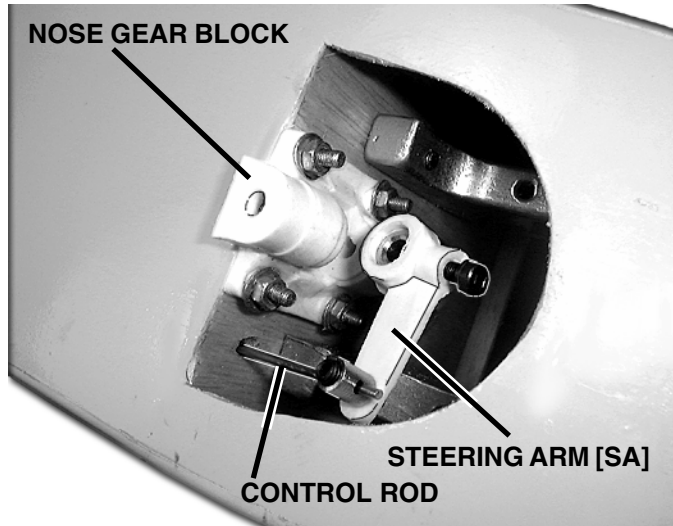
❑ **3.4.3** Turn the fuselage over and locate the steering control rod protruding from the firewall. Pull the control rod forward so that you have a bit of room to work.

❑ **3.4.4** Using the Allen wrench from the Servo Tray Parts Bag, remove the pre-installed EZ connector from the end of the steering arm control rod and after consulting the illustration below, install the EZ connector on to the nose gear steering arm. Tighten the retaining nut securely.

❑ **3.4.5** Connect the steering control rod to the EZ connector as shown below. Tighten the Allen screw securely using the Allen wrench and a touch of liquid thread locker.



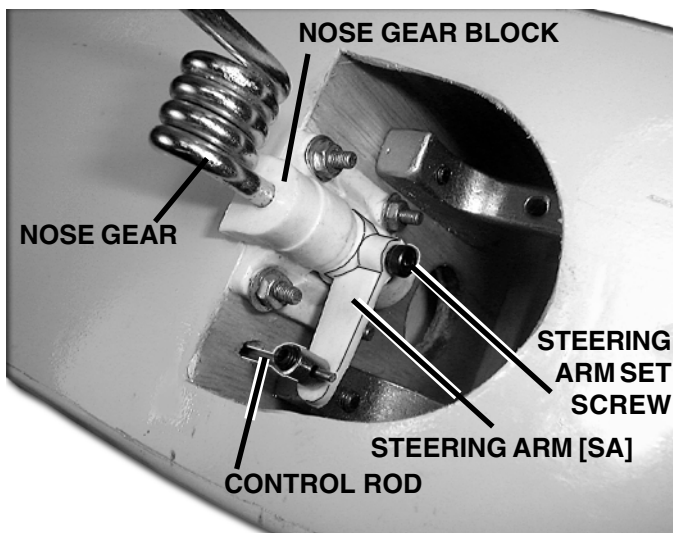
❑ 3.4.6 Carefully push the control rod back into the fuselage and position the steering arm so that it can be inserted into the recess in the nose gear block.



❑ 3.4.7 Slide the steering arm into the pre-installed nose gear block and from the bottom of the fuselage, insert the non-wheel end of the nose gear assembly down through the nose gear block and the steering arm.

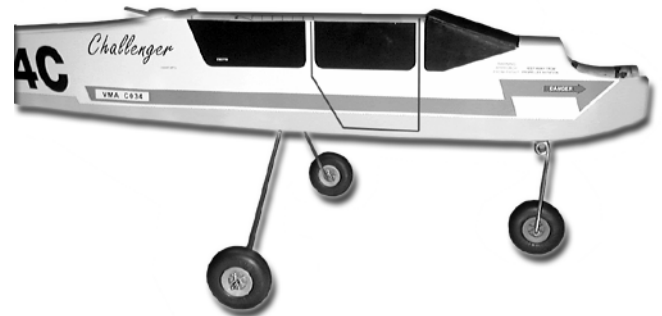
❑ 3.4.8 Rotate the nose gear assembly so that the wheel points straight ahead and the coil spring is closer to the tail of the fuselage.

❑ 3.4.9 Rotate the steering arm so that it lies about 5 degrees rotated forward and away from the firewall when the nose wheel is straight.



❑ 3.4.10 There is a flat notch filed in the front face of the nose gear wire that is intended to align with and provide a seat for the steering arm set screw. Push the nose gear wire down further into the nose gear block as you tighten the steering arm set screw onto the flat notch.

❑ 3.4.11 Tighten the steering arm set screw securely using a ball wrench or allen key. Apply a suitable liquid thread locker to the set screw.



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❑ PHASE 4 - THE FUEL TANK & RECEIVER BATTERY PACK.

The fuel tank is shipped in the Master Parts Bag. The pre-bent metal fuel outlet tubing, fuel stopper, cinch bolt and plastic retaining disks have been pre-assembled and inserted into the neck of the tank. The fuel clunk has also been placed into the tank.

❑ STEP 4.1 - ASSEMBLING THE FUEL TANK.

❑ 4.1.1 To assemble the fuel tank you will need the following items included with the kit:

- ❑ The fuel tank [FT]
- ❑ The pre-assembled stopper and pre-bent metal fuel tubing assembly shipped inserted in the tank.
- ❑ Clunk (shipped inside the tank)

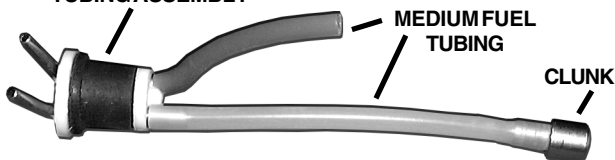
You will also need the following items not included with the kit:

- ❑ 100 mm (4 in.) of medium fuel tubing suitable for your fuel type
- ❑ 50 mm (2 in.) of medium fuel tubing suitable for your fuel type. If possible select a different colour for this piece
- ❑ Phillips screw driver

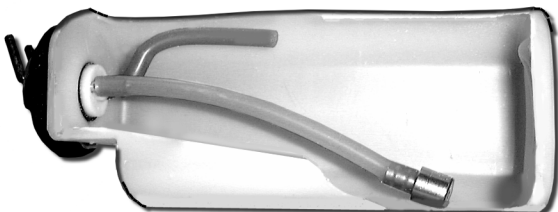
❑ 4.1.2 Remove the stopper assembly from the tank and extract the clunk.

❑ 4.1.3 Using the 100 mm (4 in.) and the 50 mm (2 in.) pieces of tubing and the stopper assembly, assemble the tubing, stopper assembly and clunk as shown below. Note that the 100 mm (4 in.) piece of fuel tubing is applied to the straight end of one of the metal tubes and the clunk is inserted into the other end of the medium fuel tubing.

STOPPER & PRE-BENT METAL FUEL TUBING ASSEMBLY

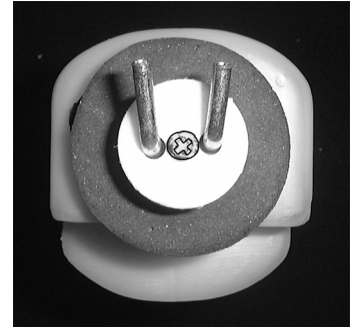


❑ 4.1.4 Insert the clunk and tubing assembly into the fuel tank such that the external pre-bent metal tubes are both pointing up and the tubing inside is oriented as illustrated in the cutaway depiction shown below.



❑ 4.1.5 Push the stopper firmly into the neck of the tank until the shoulder of the black stopper contacts the neck of the tank.

❑ 4.1.6 Ensure that the external metal tubes are pointing upwards as depicted here and then tighten the cinch bolt in the centre of the stopper until the external plastic disk begins to dimple inwards.



❑ 4.1.7 Attach a loose piece of tubing to each of the external metal tubes. Pinch one closed while blowing into the other. You should see the tank bulge slightly under pressure. Listen for air escaping while you continue to blow and keep the tank pressurized. If you hear any air leaking from around the stopper, back off the cinch bolt slightly, rotate the stopper slightly to and fro and then re-tighten the cinch bolt slightly more securely. Test with air pressure again.

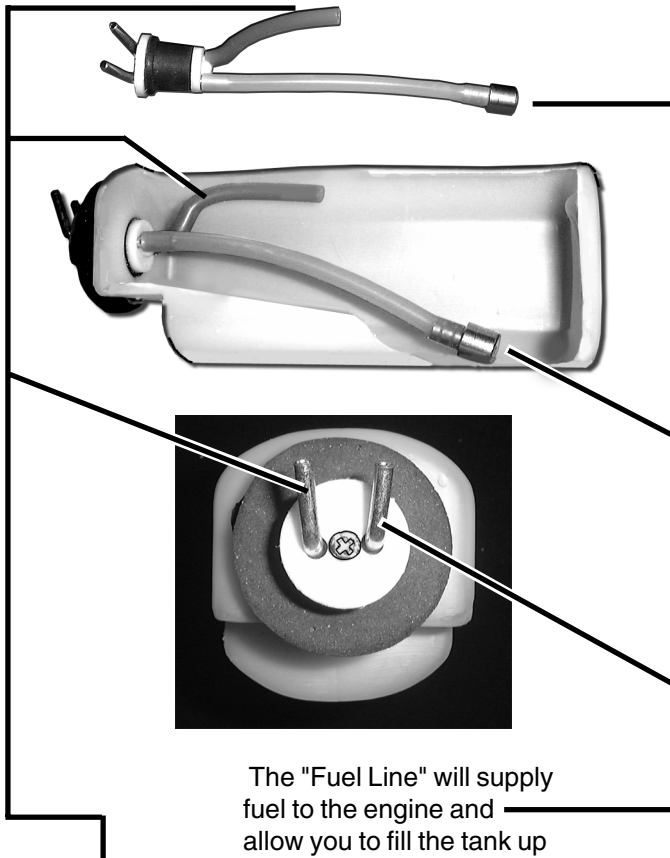
❑ 4.1.8 Hold the tank with the stopper end pointing upwards. Back light the tank assembly with a strong light from behind. You should see a ghost like image of the tubing and the clunk. Ensure the tubing has stayed oriented as per the cutaway depiction of step 4.1.4 and that the clunk swings freely to and fro when you move the tank from side to side. While holding the tank vertically with the stopper end upwards, the clunk should be approximately 10 mm (3/8 in.) from the end of the tank opposite the stopper.

❑ STEP 4.2 - INSTALLING THE FUEL TANK.

❑ 4.2.1 Before installing the fuel tank into your Challenger, please note that:

- One of the pre-bent metal tubes will supply fuel to the engine and allow you to fill the tank up. We call this the "Fuel Line".
- The other pre-bent metal tube will be connected to the muffler of your engine and serves to bring engine pressure into the tank to help force fuel out the fuel line into the engine. We call this line that is normally connected to your muffler the "Pressure Line". It also serves as a fuel overflow vent when topping the tank up with fuel.

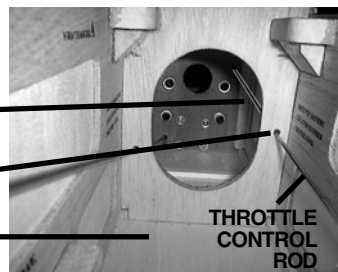
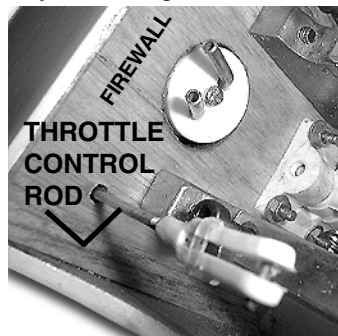
See the following depiction that illustrates the location and orientation of the fuel and pressure lines.



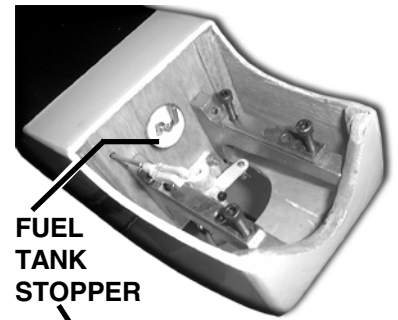
The "Pressure Line" is connected to the muffler of your engine and serves to bring engine pressure into the tank to help force fuel out the fuel line into the engine. It also serves as a fuel overflow vent when topping the tank up with fuel.

❑ **4.2.2** Remove the Servo Tray Parts Bag from the fuselage [FS].

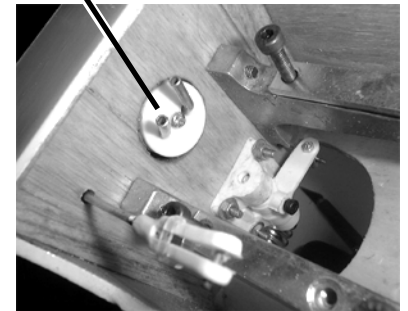
❑ **4.2.3** Locate the two piece throttle control rod [CRT] that was shipped attached to the Servo Tray Parts Bag. Loosen the collar set screws and separate the two rods. From the front, insert one of the control rods, metal end first through the hole in the right side of the firewall and back through the right hand side of the tank compartment and through the hole in the bulkhead separating the tank and radio compartments.



❑ **4.2.4** Trial fit the tank by inserting it from within the fuselage radio compartment, stopper end first with the metal tubes pointing up and pushing the tank gently forward until the metal tubes and stopper pass through the firewall.



Adjust the angle of the metal tubes so that they still point upwards and clear the firewall with sufficient clearance to allow you to push the fuel tubing on to and over the metal tubes.



❑ **4.2.5** When you are satisfied with the fit of the tank and the metal tubing, we suggest also trial fitting your engine and ensuring that the tank metal tubing clears the back of the engine with sufficient clearance.

❑ **4.2.6** Remove the tank and place about 50 mm (2 in.) of medium tubing over the metal tubes so that the tubing temporarily joins the metal tubes and seals them off against dust, debris and sealant.

You will temporarily reinstall the tank again in Step 4.4 after locating the battery pack and then finally seal the tank into position in Step 8.2 after balancing the aircraft and getting the CG right.

❑ **STEP 4.3 - INSTALLING THE RECEIVER BATTERY PACK.**

❑ **4.3.1** Consult your radio manual for instructions about hooking up your receiver battery, receiver and switch harness.

❑ **4.3.2** We recommend locating the battery under the fuel tank before the fuel tank final install is completed.

❑ **4.3.3** Wrap the battery pack securely in foam suitable for RC equipment and wrap the foam insulated pack in a plastic bag or cling wrap. Immobilize the pack from moving side to side or front to back with chunks of foam.



❑ STEP 4.3 - INSTALLING THE RECEIVER BATTERY PACK *cont'd.*

❑ 4.3.4 Thread the battery pack connector and wire back from the fuel compartment to the radio compartment.

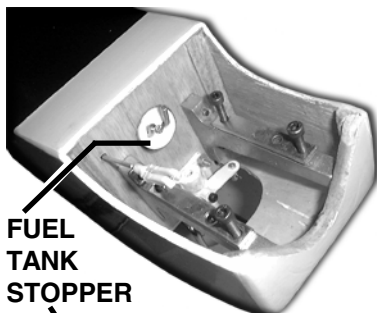


❑ 4.3.5 Later you will hook up the battery connector to your radio system according to your radio instruction manual. For now tape it down to the floor of the radio compartment with masking tape to keep it out of the way.

❑ STEP 4.4 FUEL TANK TEMPORARY RE-INSTALL.

After completing the installation of your receiver battery pack you should temporarily re-install the fuel tank.

❑ 4.4.1 Remove the protective fuel tubing that you applied to the external metal pipes



❑ 4.4.2 Re-install the tank by inserting it from within the fuselage radio compartment, stopper end first with the metal tubes pointing up and pushing the tank gently forward above the battery pack until the metal tubes and stopper pass through the firewall.



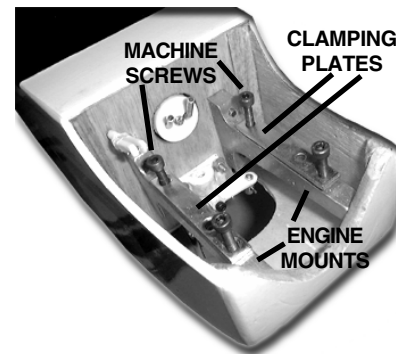
❑ PHASE 5 - INSTALLING THE ENGINE.

Engines vary quite a bit in sizes, styles and brands but most have mounting lugs, a carburettor with a throttle (speed) control arm, a prop washer, a prop nut and a muffler. The procedure we describe here assumes that you are mounting a 2-stroke engine that has a side exhaust on the right (when viewed from behind looking forward) and a throttle control arm on the right.

❑ STEP 5.1 - MOUNTING THE ENGINE.

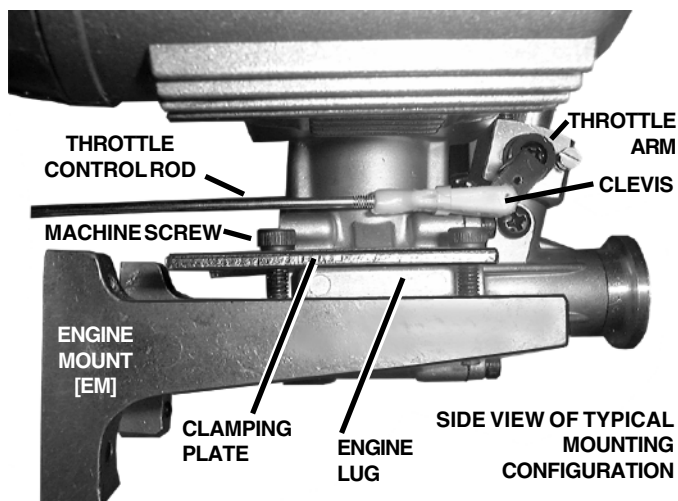
❑ 5.1.1 Remove the muffler, prop nut and prop washer from your engine.

❑ 5.1.2 Use a 4 mm socket ball wrench or Allen wrench to remove the four black machine screws that work with the clamping plates on the metal engine mounts [EM] that have been pre-installed into your Challenger. Set the machine screws and the clamping plates aside for a moment.



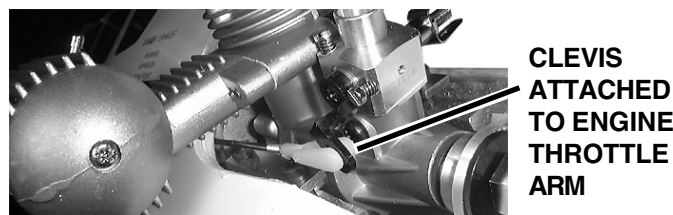
❑ 5.1.3 Position the engine on the engine mounts and confirm that the fuel tank metal tubes clear the back of the engine. Trial fit the engine temporarily into place with the four black machine screws and clamping plates. Tighten the screws only enough to tack the engine into place for now.

❑ 5.1.4 Check the position of the engine on the engine mount and ensure that the two metal clamping plates are above the engine lugs and that the black machine screws straddle the engine lugs two to a side.



❑ 5.1.5 Trial fit the muffler and the prop washer and the prop nut onto the engine.

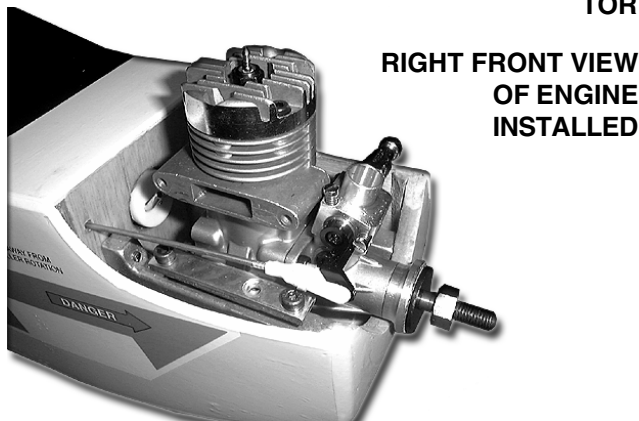
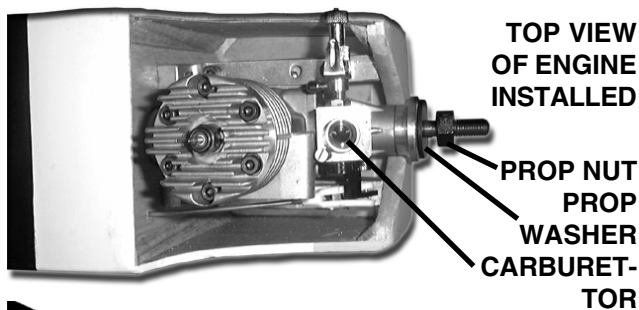
❑ 5.1.6 Trial fit the clevis on the throttle control rod to the throttle control arm on your engine.



❑ 5.1.7 Confirm that the engine has sufficient clearance for the fuel tank lines, muffler, prop, spinner and throttle control arm.

❑ 5.1.8 Align the engine so that it is straight ahead or pointing a couple of degrees to the right but NOT pointing to the left.

❑ 5.1.9 Confirm that the engine is aligned as explained above and then tighten the 4 black machine screws clamping the engine to the engine mount. .



❑ 5.1.10 Check that the throttle control rod can be moved forward and aft from the radio compartment.

❑ 5.1.11 Firmly tighten the engine mount black machine screws and engine clamps down securely.

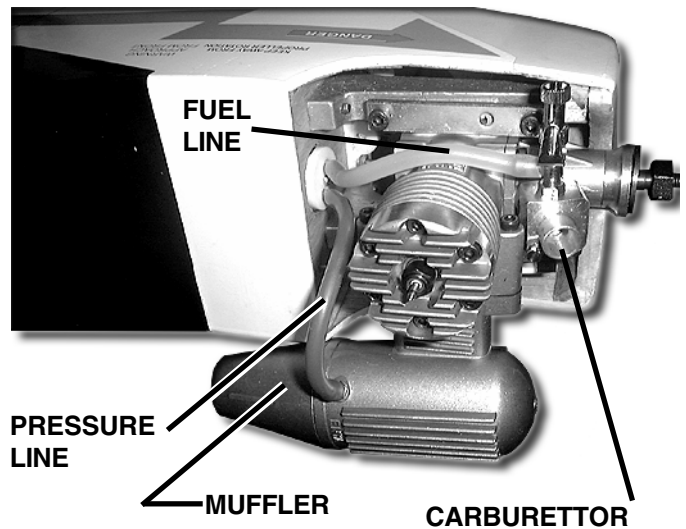
❑ 5.1.12 Install the muffler.

❑ STEP 5.2 - CONNECTING THE FUEL & PRESSURE LINES.

❑ 5.2.1 Connect fuel tubing from the tank metal fuel line to the carburettor

❑ 5.2.2 Connect fuel tubing from the tank metal pressure line to the muffler.

❑ 5.2.3 Double check that you have the metal fuel line from the tank connected to the carburettor and that the metal pressure line from the tank connected to the muffler.



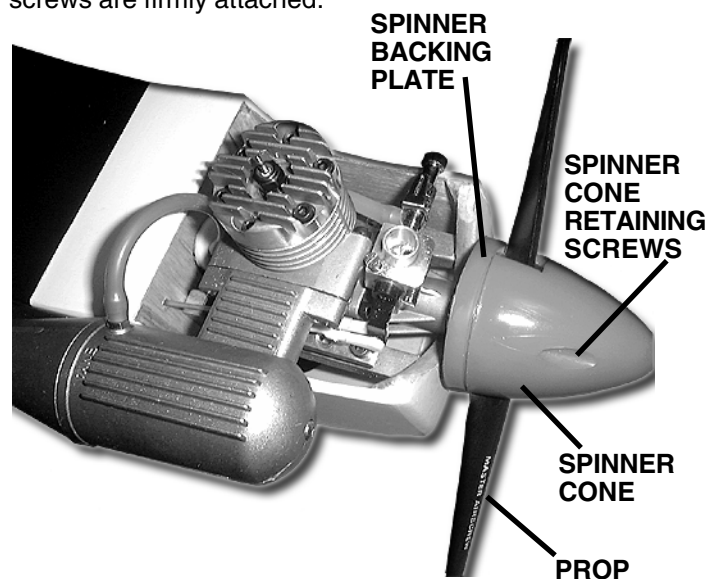
❑ STEP 5.3 - INSTALLING THE SPINNER AND PROPELLER.

❑ 5.3.1 Consult your engine manual and select a suitable propeller.

❑ 5.3.2 Install the thrust washer, the spinner backing plate, the propeller, the prop washer, and the prop nut. Ensure that they are all firmly attached.

❑ 5.3.3 Trial fit the spinner cone and spinner cone retaining screws. If necessary enlarge the cutouts in the spinner cone to allow adequate clearance for the propeller. The spinner should not touch the edges of the propeller.

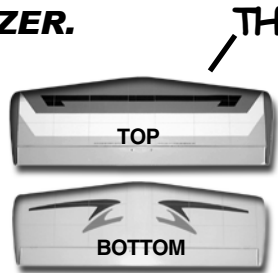
❑ 5.3.4 Double check that the spinner cone retaining screws are firmly attached.



❑ PHASE 6 - INSTALLING THE HORIZONTAL AND VERTICAL STABILIZERS

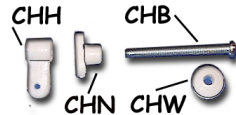
❑ STEP 6.1 - PREPARING THE HORIZONTAL STABILIZER.

❑ 6.1.1 Remove the horizontal stabilizer [TH] with pre-installed elevator from its shipping bag.



❑ 6.1.2 Locate a control horn set from the Control Horn Parts Bag. A control horn set consists of...

- ❑ 1 Metal bolt [CHB]
2.5 mm x 25-30 mm
(1 to 1-3/16 in.)
- ❑ 1 Plastic control horn [CHH]
- ❑ 1 Plastic bevelled washer [CHW]
- ❑ 1 Plastic T-nut [CHN]

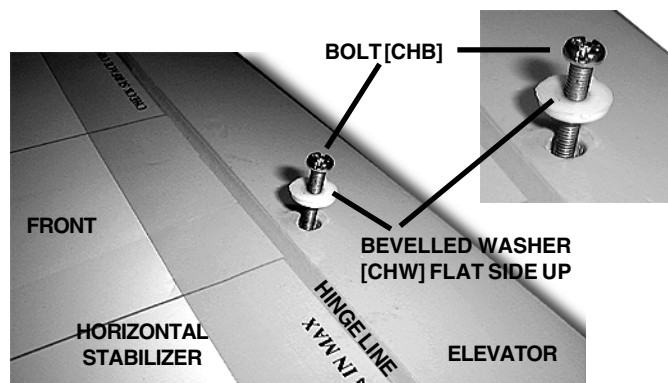


❑ 6.1.3 Position the horizontal stabilizer [TH] facing upwards.

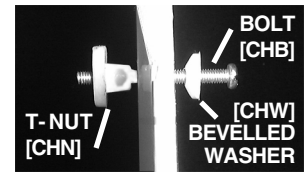
❑ 6.1.4 Locate the elevator control horn hole in the elevator. The hole is located in the elevator about 12 mm (1/2 in.) to the left of the centre of the elevator and about 10 mm (3/8 in.) back from the hinge line.

❑ 6.1.5 Place the plastic bevelled washer [CHW] on the metal bolt [CHB] so that the flat side of the bevelled washer is against the head of the bolt.

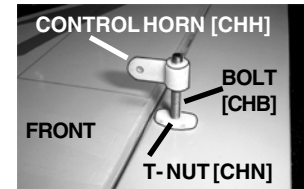
❑ 6.1.6 Put the bolt through the hole in the elevator from the top side of the elevator. The bevelled washer will now have its bevelled end facing the hole. The bevel will help centre the bolt in the hole as you tighten the bolt.



❑ 6.1.7 Hold the metal bolt and bevelled washer in place and thread the plastic T-nut [CHN] onto the threaded end of the bolt where it protrudes from the bottom of the elevator. Thread the narrow end of the T-nut on first. Use a Phillips screw driver to tighten the bolt and draw the narrow end of the T-nut into the hole in the elevator. Try to keep the T aligned fore and aft with respect to the fuselage. Tighten the bolt snugly so that the wood in the elevator is slightly compressed. Holding the "T" portion of the T-nut with a small Crescent wrench helps installation.



❑ 6.1.8 Thread the plastic control horn [CHH] onto the exposed threaded end of the bolt that is protruding from the bottom of the elevator. Screw the control horn on until the bolt end just protrudes from the control horn. Rotate the control horn so that it is "facing" towards the front.

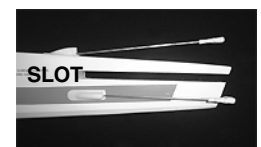


❑ 6.1.9 Gently move the elevator back and forth by hand a couple of times. Then move the control horn back and forth and you should see the elevator move up and down. Work the elevator back and forth a dozen times to loosen it up.

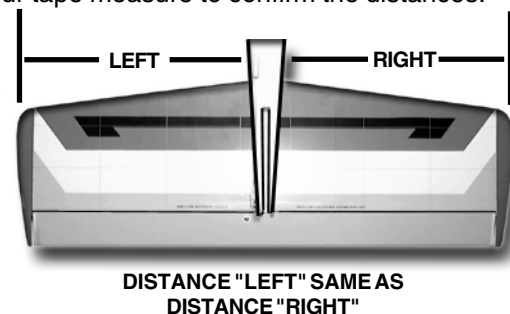
❑ 6.1.10 Apply masking tape across the elevator ends and around the tips of the horizontal stabilizer to immobilize the elevator in a neutral position. This will make setting up the controls much easier.

❑ 6.1.11 Lie the fuselage on its side. Check the slot in the fuselage that has been machined near the tail to accommodate the horizontal stabilizer. You may find a factory installed spacer in the slot. This will be a small piece of wood about 25 mm (1 in.) long. Remove the spacer. It was installed for shipping purposes and is no longer needed.

❑ 6.1.12 Trial fit the horizontal stabilizer into the slot for the horizontal stabilizer.



❑ 6.1.13 Centre and align the horizontal stabilizer in the slot so that the distance from the fuselage to the left tip is the same as the distance from the fuselage to the right tip. Use your tape measure to confirm the distances.



❑ STEP 6.2 - INSTALLING THE HORIZONTAL STABILIZER

❑ **6.2.1** Firmly attach the wing to the fuselage using the four plastic wing bolts. Tighten the bolts snugly but do not over tighten. Go to the front of the fuselage, centre yourself and look back across the wing to the horizontal stabilizer. Check that the wing and the horizontal stabilizer are parallel to each other.

❑ **6.2.2** Remove the wing and set it aside.

❑ **6.2.3** Precisely apply masking tape to the top of the horizontal stabilizer where the horizontal stabilizer meets the sides of the fuselage. The masking tape will serve as an alignment guide for later.

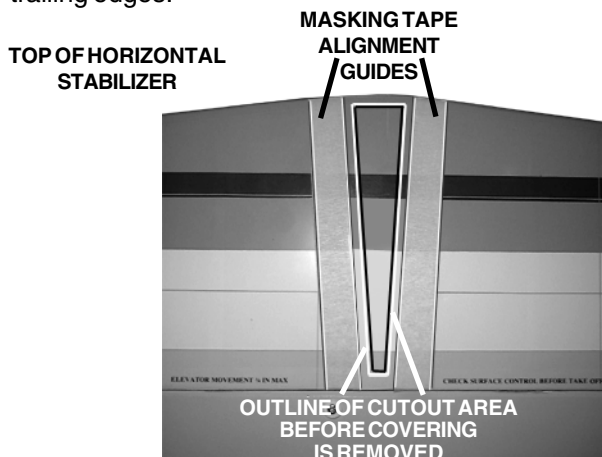
APPLY MASKING TAPE TO SERVE AS ALIGNMENT GUIDES



❑ **6.2.4** Carefully remove the horizontal stabilizer from the slot in the fuselage without disturbing the masking tape.

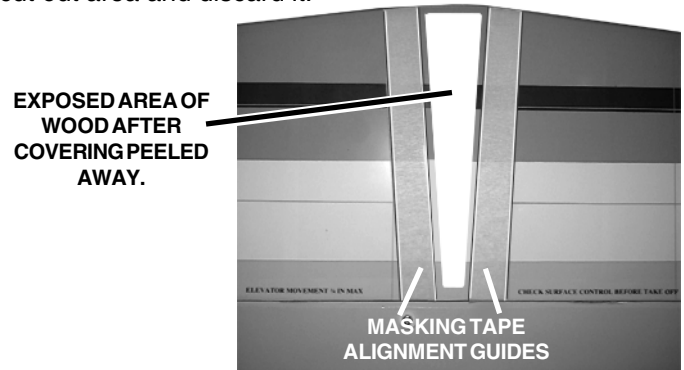
In order to glue the stabilizer to the fuselage you need to have an area of exposed wood on the top of the horizontal stabilizer. The wood is exposed by very carefully removing the plastic covering from a triangle shaped area that lies just inside the edge of the tape.

❑ **6.2.5** Use a ball point pen to draw a line 6 mm (1/4 in.) inside the edges of both pieces of tape and 6 mm (1/4 in.) offset from and parallel to the leading and trailing edges.



❑ **6.2.6** Use a light touch with a very sharp hobby knife to cut the covering along the pen lines. DO NOT CUT DOWN INTO THE WOOD. If you cut into the wood, you will weaken the stabilizer and this may result in stabilizer failure in flight.

❑ **6.2.7** Peel up the covering from the triangle shaped cut out area and discard it.



❑ **6.2.8** Wick thin CA glue around the edge of the cut out area where the exposed wood meets the remaining covering. Look carefully for any score lines in the wood and ensure that you apply CA into any score lines.

❑ **6.2.9** Mix up a batch of 30 Minute Epoxy. Make enough to thoroughly cover the exposed wood area where you peeled away the covering.

❑ **6.2.10** Apply 30 Minute Epoxy to the exposed wood area on the top of the horizontal stabilizer and beyond the exposed wood to almost the edges of the tape.

❑ **6.2.11** Apply 30 Minute Epoxy to the top and bottom faces of the horizontal stabilizer slot. Although we have not removed covering from the bottom of the stabilizer, apply some glue to the contact area on the bottom of the stabilizer.

❑ **6.2.12** Carefully slide the horizontal stabilizer into the slot in the fuselage. Move it forward and backward and wiggle slightly side to side as you slide it into the slot. You want to thoroughly spread the epoxy and create a good bond between the fuselage and the horizontal stabilizer. Carefully align the horizontal stabilizer to match the masking tape guides that you applied earlier.

❑ **6.2.13** Remove the masking tape and use a paper towel moistened with a touch of rubbing alcohol to wipe away any excess epoxy that is oozing out of the joint.

❑ **6.2.14** Check the tip to tip distances and then use a couple of strips of fresh masking tape to hold the horizontal stabilizer securely in place while the epoxy cures. Allow 60 minutes for the epoxy to cure.

❑ STEP 6.3 - PREPARING THE VERTICAL STABILIZER.

❑ 6.3.1 Remove the vertical stabilizer [TV] with pre-installed rudder from its shipping bag.



❑ 6.3.2 Locate a control horn set from the Control Horn Parts Bag. A control horn set consists of...

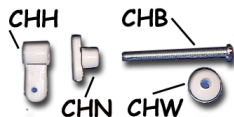
❑ 1 Metal bolt [CHB]

2.5 mm x 25-30 mm
(1 to 1-3/16 in.)

❑ 1 Plastic control horn [CHH]

❑ 1 Plastic bevelled washer [CHW]

❑ 1 Plastic T-nut [CHN]

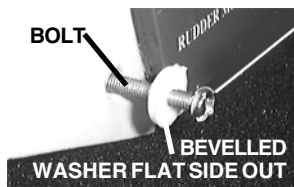


❑ 6.3.3 Position the vertical stabilizer [TV] so that it is upright with the pointed end facing away from you.

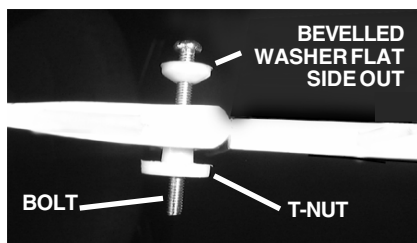
❑ 6.3.4 Locate the rudder control horn hole in the rudder. The hole is located about 15 mm (5/8 in.) from the bottom of the rudder and about 10 mm (3/8 in.) from the hinge line.

❑ 6.3.5 Place the plastic bevelled washer [CHW] on the metal bolt [CHB] so that the flat side of the bevelled washer is against the head of the bolt.

❑ 6.3.6 Put the bolt through the hole in the rudder from the right side of the rudder. The bevelled washer will now have its bevelled end facing the hole. The bevel will help centre the bolt in the hole as you tighten the bolt.

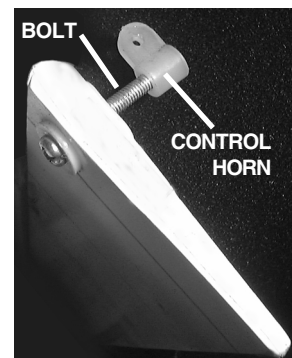


❑ 6.3.7 Hold the bolt and bevelled washer in place and thread the plastic T-nut [CHN] onto the threaded end of the bolt where it protrudes from the left side of the rudder.



Thread the narrow end of the T-nut on first. Use a Phillips screw driver to tighten the bolt and draw the narrow end of the T-nut into the hole in the rudder. Try to keep the T aligned fore and aft with respect to the fuselage. Tighten the bolt snugly so that the wood in the rudder is slightly compressed. Holding the "T" portion of the T-nut with a small Crescent wrench helps installation.

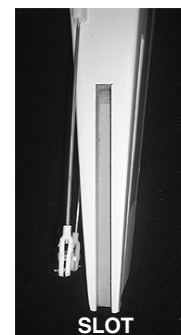
❑ 6.3.8 Thread the plastic control horn [CHH] onto the exposed threaded end of the bolt that is protruding from the left side of the rudder. Screw the control horn on until the bolt end just protrudes from the control horn. Rotate the control horn so that it is "facing" towards the front.



❑ 6.3.9 Gently move the control horn back and forth and you should see the rudder move with it. Work this back and forth a dozen times and it will loosen up.

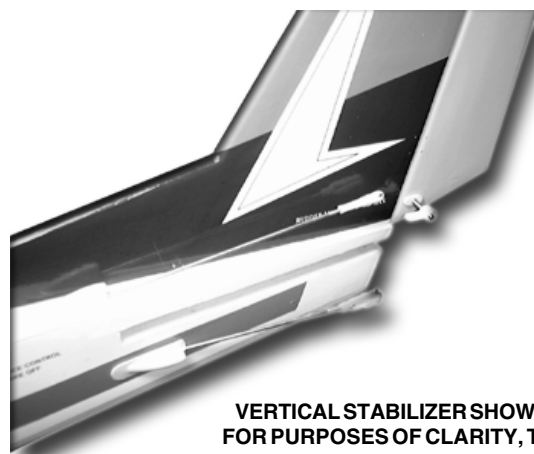
❑ 6.3.10 Apply masking tape across the rudder and the top of the vertical stabilizer to immobilize the rudder in a neutral position. This will make setting up the controls much easier later on.

❑ 6.3.11 Turn the fuselage right way up. Locate the slot that has been machined in the top of the fuselage to accommodate the vertical stabilizer.



❑ 6.3.12 Trial fit the vertical stabilizer into the slot in the top of the fuselage. Push the stabilizer all the way down into the slot so that it seats in the bottom of the slot and so that the fin protruding from the front of the stabilizer sits against the top of the fuselage.

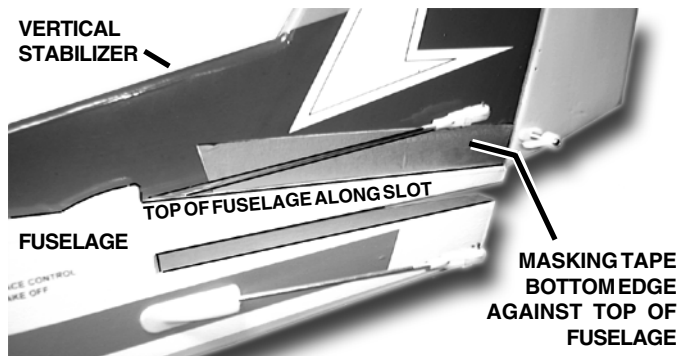
❑ 6.3.13 Use a Triangle or Square to align the vertical stabilizer with respect to the horizontal stabilizer. A few degrees of discrepancy is not an issue just verify that you can align the vertical stab at approximately 90 degrees with respect to the horizontal stabilizer.



VERTICAL STABILIZER SHOWN.
FOR PURPOSES OF CLARITY, THE
HORIZONTAL STABILIZER IS NOT SHOWN HERE

❑ STEP 6.4 - INSTALLING THE VERTICAL STABILIZER.

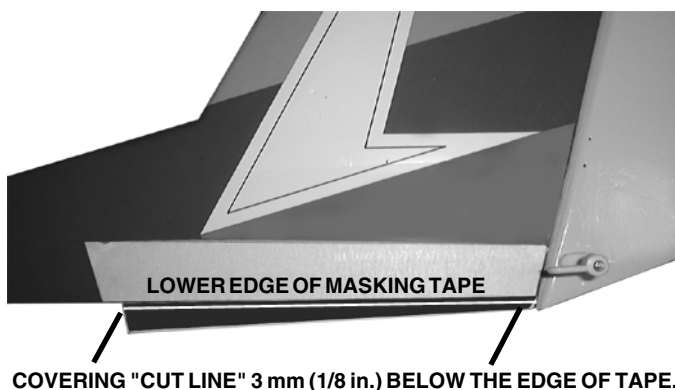
❑ 6.4.1 Precisely apply masking tape to the sides of the vertical stabilizer where the vertical stabilizer meets the top of the vertical slot in the fuselage. The masking tape will serve as an alignment guide for later.



❑ 6.4.2 Carefully remove the vertical stabilizer from the slot in the fuselage without disturbing the masking tape.

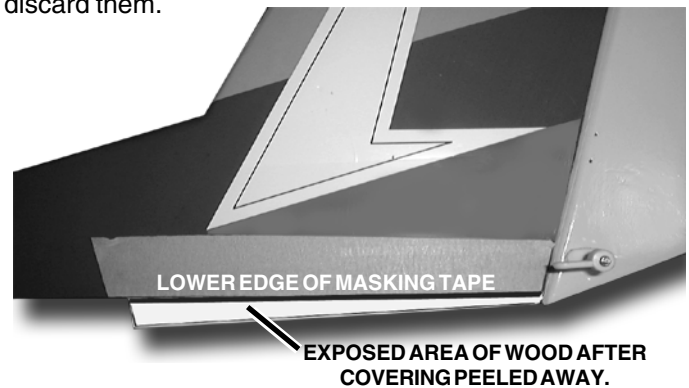
In order to glue the vertical stabilizer to the fuselage you need to have an area of exposed wood along the bottom edge where the vertical stabilizer is inserted into the slot in the fuselage. The wood is exposed by removing the plastic covering from a rectangular shaped strip that lies just below the masking tape line and along the bottom edge on both sides of the vertical stabilizer.

❑ 6.4.3 Use a ball point pen to draw a line 3 mm (1/8 in.) below the edges of both pieces of tape.



❑ 6.4.4 Use a light touch with a very sharp hobby knife to cut the covering along the pen lines. DO NOT CUT INTO THE WOOD. If you cut into the wood, you will weaken the stabilizer and this may result in stabilizer failure in flight.

❑ 6.4.5 Peel the covering from the rectangular shaped cut out strips on either side of the vertical stabilizer and discard them.



❑ 6.4.6 Wick thin CA glue around the edge of the cut out area where the exposed wood meets the remaining covering. Look carefully for any score lines in the wood and ensure that you apply CA into any score lines.

❑ 6.4.7 Mix up a batch of 30 Minute Epoxy. Make enough to thoroughly cover the exposed wood areas on both sides of the vertical stabilizer where you peeled away the covering.

❑ 6.4.8 Apply 30 Minute Epoxy to the exposed wood areas along the bottom edge of both sides of the vertical stabilizer. Also apply epoxy to the bottom edge itself.

❑ 6.4.9 Apply 30 Minute Epoxy into and along the exposed wood sides of the slot in the top of the fuselage.

❑ 6.4.10 Carefully slide the vertical stabilizer into the slot in the fuselage. Move it forward and back and wiggle it slightly up and down as you slide it into the slot. You want to thoroughly spread the epoxy and create a good bond between the fuselage and the vertical stabilizer.

❑ 6.4.11 Carefully push the vertical stabilizer down into the slot until it reaches the masking tape guides that you applied earlier.

❑ 6.4.12 Remove the masking tape and use a paper towel moistened with a touch of rubbing alcohol to wipe away any excess epoxy that is oozing out of the joint.

❑ 6.4.13 Use a Triangle or square to align the vertical stabilizer with respect to the horizontal stabilizer. Try to get as close to as possible to a 90 degree right angle between the horizontal and vertical stabilizers. Don't sweat small discrepancies... Perfection is nice but not essential!

❑ 6.4.14 Use a couple of strips of fresh masking tape to hold the vertical stabilizer in place while the epoxy cures. Allow 60 minutes for the epoxy to cure.

❑ 6.4.15 Attach the forward fin part of the vertical stabilizer to the top of the fuselage with CA glue.

❑ PHASE 7 - INSTALLING THE RADIO.

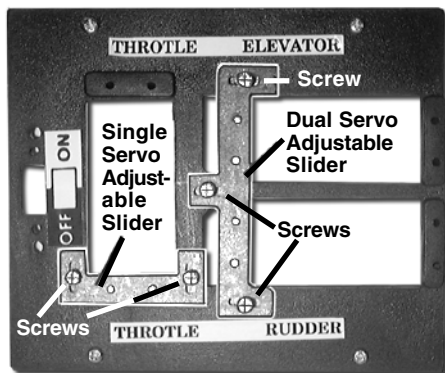
❑ STEP 7.1 - INSTALLING THE SWITCH HARNESS AND THE RUDDER, ELEVATOR & THROTTLE SERVO'S.

❑ 7.1.1 Locate the Servo Tray Parts Bag that you removed from the fuselage earlier.

❑ 7.1.2 Locate the screws that were used by the factory to attach the servo tray to the fuselage. These were removed earlier.

❑ 7.1.3 Carefully remove and retain the servo tray parts and screws that were included in the Servo Tray Parts Bag.

❑ 7.1.4 Install the dual servo and single servo black adjustment slider plates to the servo tray, flat side up, using three screws for the dual servo slider plate and two screws for the single servo slider plate.



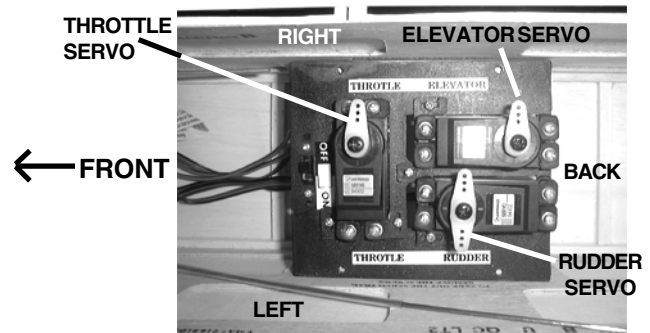
Tighten the screws but leave just enough slack to allow the adjustment plates to move to and fro.

❑ 7.1.5 If you have not already done so, remove any tape around the control rods in the radio compartment within the fuselage. Tape may have been used to keep the rods in place during shipping.

❑ 7.1.6 Install your receiver switch harness now. Take note of the ON/OFF switch orientation and the label on the servo tray. If your radio has provision for an external switch actuator it should be planned for now. (Tip: if your system does not come with an external switch actuator, consider using an after market one.)

❑ 7.1.7 Reinstall the servo tray into the fuselage with four screws and orient the tray so that the "ON/OFF" label is located towards the front of the fuselage. Ensure the control rods that run fore and aft from the radio compartment are above the tray before screwing the tray into place.

❑ 7.1.8 Mount the rudder servo first with the servo output shaft more towards the front of the fuselage. Note the rudder servo location label on the servo tray.



❑ 7.1.9 Mount the elevator servo second with the servo output arm more towards the back of the fuselage. Note the elevator servo location label on the servo tray.

❑ 7.1.10 Once the elevator and rudder servos have been mounted, tighten the servo mounting screws down according to the servo manufacturers specifications.

❑ 7.1.11 Tighten the three screws holding the larger dual servo slider plate so that the slider plate is attached firmly to the servo tray.

❑ 7.1.12 Mount the throttle servo with the servo output arm more towards the right side of the fuselage where the throttle control rod is located.

❑ 7.1.13 Once the throttle servo has been mounted, tighten the servo mounting screws down according to the servo manufacturers specifications.

❑ 7.1.14 Tighten the two screws holding the smaller single servo slider plate so that the slider plate is attached firmly to the servo tray.

❑ 7.1.15 Consult your radio manual and hook up the servos, receiver, battery pack and switch harness in a temporary configuration.

❑ 7.1.16 Turn on the transmitter and then the receiver and centre the rudder and elevator and throttle trim tabs. Move the throttle stick on the transmitter to the midway position representing half throttle.

❑ 7.1.17 Turn the receiver off first and then turn the transmitter off.

❑ STEP 7.2 - CONNECTING THE THROTTLE CONTROL RODS TO THE THROTTLE SERVO.

❑ 7.2.1 Secure the engine throttle arm at roughly half throttle. Look into the throat of the engine carburettor as you rotate the throttle arm and select a position where the throttle opening is about half what it is when fully open.

❑ 7.2.2 Locate the throttle control rod that you connected earlier to the throttle control arm and ran back through the firewall and the fuel tank compartment and into the radio compartment.

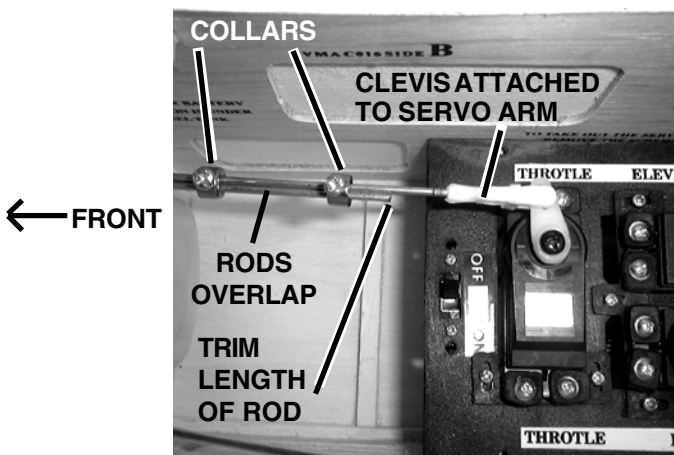
❑ 7.2.3 Using side cutters, cut the rod so that it extends back from the bulkhead between the tank and radio compartment to within about 12 mm (1/2 in.) of the forward edge of the servo tray.



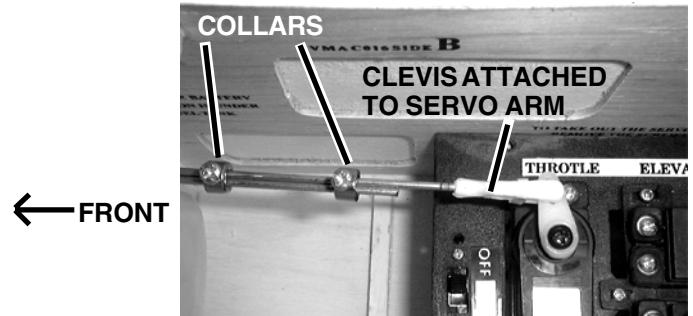
❑ 7.2.4 Locate the two collars [COL] that you removed from the throttle control rod assembly earlier.

❑ 7.2.5 Loosen the set screws in the collars and slide both collars onto the throttle control rod that you have cut to length. Loosely set the screws.

❑ 7.2.6 Locate the second throttle control rod with a clevis on one end. Attach the clevis of the second throttle control rod to the throttle servo arm and rotate the throttle arm forward. Use side cutters to trim the length of the second rod so that it parallels and overlaps the first throttle control rod by about 50 mm (2 in.)



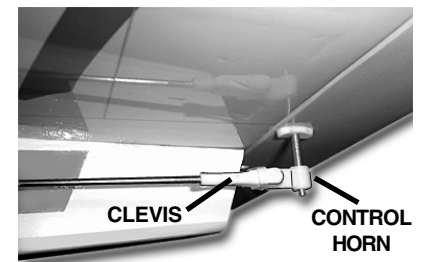
❑ 7.2.7 With the set screws facing upwards, loosen the set screws and slide the collars over both throttle control rods and tighten the two collars securely into place so that the two rods are joined firmly together. Ensure the collar set screws are facing upwards.



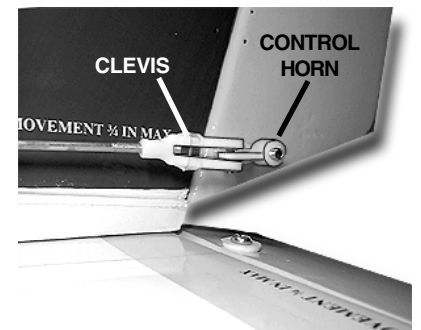
❑ STEP 7.3 - CONNECTING THE RUDDER & ELEVATOR CONTROL RODS.

❑ 7.3.1 If you have not already done so, use masking tape to tape the rudder and elevator. Tape the rudder at its neutral position... not left, not right. Tape the elevator at its neutral position... not up, not down.

Attach the clevis on the elevator control rod to the elevator control horn. Ensure that at least 6mm (1/4 in.) of clevis shank remains on the threaded portion of the rod.



Attach the clevis on the rudder control rod to the rudder control horn. Ensure that at least 6mm (1/4 in.) of clevis shank remains on the threaded portion of the rod.

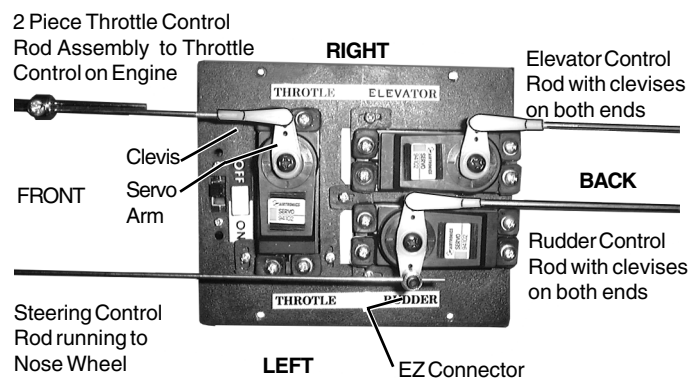


❑ 7.3.2 Confirm & ensure that all of the following are true:

- ❑ The elevator is taped at its neutral position and it is connected to the elevator control rod and clevis.
- ❑ The rudder is taped at its neutral position and it is connected to the rudder control rod and clevis.
- ❑ The engine throttle arm is secured at approximately mid throttle
- ❑ The transmitter trims for the throttle, rudder and elevator are set to a mid position.
- ❑ The transmitter throttle stick is at half power.

❑ STEP 7.4 - CONNECTING THE CONTROL RODS TO THE RUDDER AND ELEVATOR SERVOS.

❑ 7.4.1 Consult the following illustration that shows how the throttle, rudder and elevator servos are positioned and connected to their respective control rods. The illustration also shows how the nose gear steering is connected to the rudder servo.



❑ 7.4.2 Remove the servo arms from your servos one at a time and orient them to match that depicted in 7.4.1

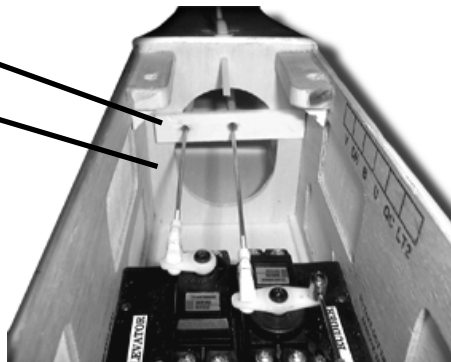
❑ 7.4.3 Connect the plastic clevises to the middle holes of the servo arms and screw the clevises in or out on the rods so that they can be connected to the servo arms. Ensure that at least 6 mm (1/4 in.) of clevis shank remains on the threaded rods at all times.

❑ 7.4.4 If necessary do a final adjustment to the length of the two piece throttle control rod assembly installed earlier by using the two collars and set screws. This two piece arrangement can accommodate a wide range of different engine throttles.

❑ 7.4.5 Snap the clevises firmly closed in a middle hole of the appropriate servo arm.

❑ 7.4.6 Position and secure with CA glue the floating wooden guide that holds the rudder and elevator outer guide tubes.

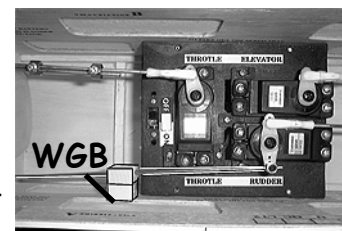
Attach the wooden guide to the nearby former at a level that keeps the rods level with the servo output arms. Ensure that the rods will not bind when moved.



❑ 7.4.7 Attach an EZ connector [EZ] to the servo arm opposite from the rudder. Centre the nose wheel and cinch down the EZ connector to the nose gear steering control rod.



❑ 7.4.8 Position and limit the side to side and up or down movement of the nose gear steering control rod using one or both of the small wooden guide blocks [WGB] provided. The guide blocks have a small groove in one side. Trial fit the blocks before gluing then tack the blocks down with CA glue and epoxy the outer plastic tube of the steering control rod into the groove of the outer block. You may need two of these to guide the nose gear steering rod properly.



❑ 7.4.9 Remove the tape from the rudder and the elevator and free up the throttle control arm.

❑ 7.4.10 Turn on your transmitter and then your receiver. Confirm that the neutral positions are sustained.

❑ 7.4.11 Move the transmitter throttle, rudder and elevator sticks and ensure that the appropriate control surfaces move accordingly and in the correct directions.

❑ Pulling the transmitter elevator stick towards you should raise the elevator,

❑ Pushing the transmitter elevator stick away from you should move the elevator down.

❑ Moving the transmitter rudder stick to the left should deflect the rudder to the left and turn the nose wheel to the left.

❑ Moving the transmitter rudder stick to the right should deflect the rudder to the right and turn the nose wheel to the right.

❑ Moving the transmitter throttle stick away from you should open the throttle wider (faster)

❑ Moving the transmitter throttle stick towards you should reduce the opening in the throttle (slower)

If any of these movements is reversed, consult your radio manual regarding servo reversing.

❑ **STEP 7.5 - ADJUST CONTROL SURFACE THROW LIMITS.**

Adjust the throw limits for the control surfaces to match the following guidelines.

- ❑ **ELEVATOR:** 10 mm (3/8 in.) up & 10 mm (3/8 in.) down
Total movement 20 mm (3/4 in.)
- ❑ **RUDDER:** 10 mm (3/8 in.) left & 10 mm (3/8 in.) right
Total movement 20 mm (3/4 in.)
- ❑ **AILERONS** (both left and right):
6 mm (1/4 in.) up & 6 mm (1/4 in.) down
Total movement 12 mm (1/2 in.)

Note: Throws are measured at the widest part of the elevator and rudder.

Do NOT exceed these control surface throw recommendations when you are using the Challenger as a trainer.

You can reduce the amount of throw by doing either or both of the following...

- From the servo end, move the clevis to a hole in the servo arm that is closer to the servo output shaft.
- From the control horn end, move the horn out further on the threaded shafts. Always confirm that the horn is still thoroughly engaged with the threaded shaft after you have adjusted it.

❑ **STEP 7.6 - INSTALLING THE RECEIVER.**

- ❑ **7.6.1** Consult your radio manual for instructions about hooking up your receiver, switch harness, battery pack and servos.
- ❑ **7.6.2** Plan where you are going to put the receiver with consideration for routing the antenna safely and connecting to your battery pack and servos. Consult your radio manual for their recommendations about receiver location.
- ❑ **7.6.3** Wrap the receiver securely in foam suitable for RC equipment and wrap the foam insulated receiver in a plastic bag or cling wrap.
- ❑ **7.6.4** Generally in the absence of specific instructions from the radio manufacturer, it is recommended that the receiver be placed where it is least likely to suffer damage from impact during a crash. Keep the battery pack and other heavy loose items ahead of the receiver.

❑ **STEP 7.7 - CONFIRM RADIO OPERATION.**

- ❑ **7.7.1** Consult your radio manual for instructions about testing and operating your radio system.
- ❑ **7.7.2** Pay particular attention to charging your radio system batteries and range testing the system before and after each flight.
- ❑ **7.7.3** Check that all controls are working correctly before and after each flight.

Caution: You are ultimately responsible for the mechanical, aeronautical and electrical integrity of your Challenger and it's structure, control surfaces, hinges, linkages, covering, engine, radio, wiring, battery and all other components. Check all components before and after each flight. Don't fly until it's right!

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☐ PHASE 8 - CHECK OUT

☐ STEP 8.1 - BALANCE THE AIRCRAFT.

The Centre of Gravity is often referred to as the "CG" and is the point at which an aircraft is balanced with as much weight aft of the point as it has weight forward of the point. For your Challenger the CG should be located at 89 to 108mm (3-1/2 to 4-1/4 in.) back from the leading edge of the wing when the wing has been attached to the fuselage.

Ideally we recommend that the CG be located at 95mm (3-3/4 in) back from the leading edge of the wing

The CG is measured with the engine, tank, radio gear and all other components installed but **WITH NO FUEL IN THE TANK.**

Set up the CG with the Challenger as it will be when you fly it **BUT WITH NO FUEL IN THE TANK.**

It is **VERY IMPORTANT** to have the CG correct. Flying your Challenger with the CG too far aft will likely lead to loss of control and a crash.

If you discover that after you have assembled your Challenger and installed your radio and engine that the CG is incorrect you must bring the CG to the correct location by doing the following **BEFORE FLYING**:

- ☐ Move the battery pack fore or aft, and/or
- ☐ Move other components fore or aft, and/or
- ☐ Change engines to a lighter or heavier model and/or
- ☐ Add weight to the nose or tail. If adding it to the nose, try to make it useful by going to a heavier duty engine or adding a spinner with a heavy metal backing plate. As a last resort, add stick on "dead" weight where appropriate.

Moving the battery pack fore or aft is the first step you should take to get the CG located correctly.

If your engine is a plain bushing or lighter weight sport type engine, you may find that the Challenger is nose heavy with the CG too far forward. To correct this, gently remove the fuel tank and extract the battery pack from where it was located earlier under the fuel tank. Reposition the battery pack further aft into the radio compartment. Pad the battery pack securely into place with chunks of foam. Relocate the tank back into position and check the CG again. Do this repeatedly with small movements of the battery pack until you get the CG right. If you still cannot get the CG correct by moving the battery pack, you will need to consider some of the other alternatives outlined above.

☐ STEP 8.2 - SEALING THE FUEL TANK INTO POSITION.

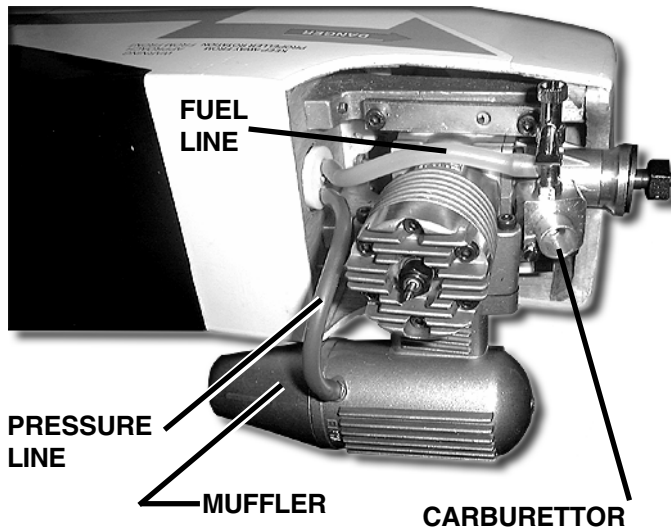
After balancing your Challenger and possibly moving the battery pack in order to get the CG right, you should seal the fuel tank into position with silicone based sealant.

- ☐ **8.2.1** Gently remove the tank from the Challenger.
- ☐ **8.2.2** Note carefully which silicone fuel tube is applied to which external metal pipe.
- ☐ **8.2.3** Remove the silicone fuel tubes.
- ☐ **8.2.4** Re-install a 50 mm (2 in.) piece of protective fuel tubing from one pipe to another. This will serve to protect the pipes from becoming contaminated with dust or sealant.
- ☐ **8.2.5** Remove the black rubber ring from the tank. Apply a bead of silicone based sealant to the front face of the tank in a circle around the stopper and put the black rubber ring back on the tank.
- ☐ **8.2.6** Apply a second bead of sealant to the front face of the black rubber ring. Seal all the way around the neck and onto the face of the rubber ring but don't over do it.
- ☐ **8.2.7** Slip the tank carefully back into the fuselage and fuel tank compartment keeping the metal tubes pointing upwards and gently push the tubing and neck through the firewall and snake the tubing out between the engine mounts.
- ☐ **8.2.8** Push the tank firmly forward to squish the sealant against the backside of the firewall and out into the hole in the firewall.
- ☐ **8.2.9** Remove the protective piece of silicone tubing that you installed between the metal pipes.

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❑ **8.2.10** Carefully re-install the two pieces of silicone tubing that run from the tank metal pipes to the engine and muffler. Ensure you install each piece on the correct metal pipe.



❑ **8.2.11** Double check that you have the metal fuel line from the tank connected to the carburettor and that the metal pressure line from the tank connected to the muffler.

❑ **8.2.12** Hold the tank firmly in position with the back end slightly lower than the front end until the sealant has cured.

❑ **STEP 8.3 - CONFIRM FUNCTIONAL INTEGRITY.**

❑ **8.3.1** Once you have confirmed that the CG is correct, you should do a thorough review of the entire model BEFORE YOUR FIRST FLIGHT. Check everything twice! Every hook up, every coupling, everything! **Do the "TUG TEST"! Tug on all control surfaces, hinges, clevises and rods! Do it twice! DO IT BEFORE YOUR FIRST FLIGHT!**

❑ **8.3.2** BEFORE YOUR FIRST FLIGHT have an experienced remote control model aircraft flyer review your work. Don't fly your Challenger until it has been checked out by an experienced second party who knows how to fly a remote control model aircraft and how to set up a trainer.

❑ **8.3.3** Once you've completed your first flight, get in the habit of checking all components of your Challenger over BEFORE AND AFTER EACH FLIGHT! **Do the "TUG TEST"! Tug on all control surfaces, hinges, clevises and rods!** Don't fly without checking and don't fly if you find something that is not right!

CAUTION

You are ultimately responsible for the mechanical, aeronautical and electrical integrity of your Challenger and it's structure, control surfaces, hinges, linkages, covering, engine, radio, wiring, battery and all other components. Check all components before and after each flight. Don't fly until it's right!

REPLACEMENT PARTS.

If you have damaged or lost something or had what we call an "uncontrolled flight" into terrain and pranged your model, don't panic! We can probably help! Please see the separate listing of Accessories, Options and Spare Parts available in your market area.

MORE INFORMATION

Please visit our web site at www.richmondrc.com/vmar for more information about your Challenger related to:

- Troubleshooting and Tips
- Spare and Replacement Parts
- Accessories and Support Equipment
- Discussion Groups

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MANUAL - CHANGE LOG

First Edition: 1999 11 30

The entire Assembly and Operations Manual was last updated 1999 11 30

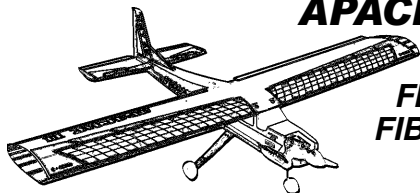
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OTHER VMAR PRODUCTS

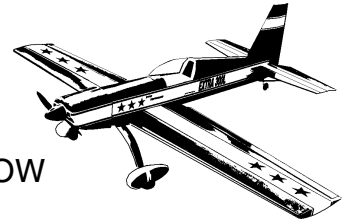


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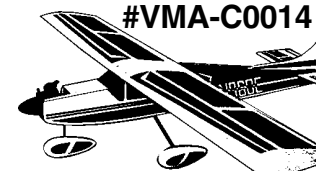
**EXTRA 300L
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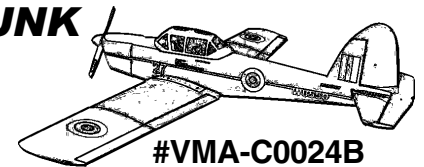
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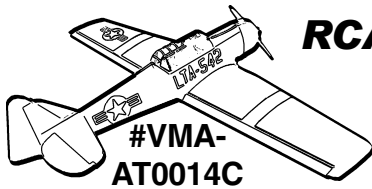
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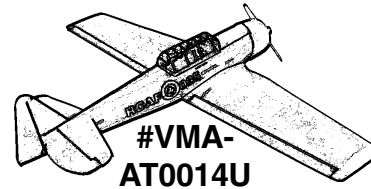
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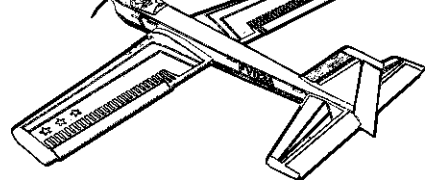
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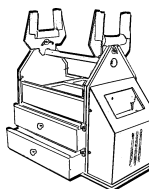
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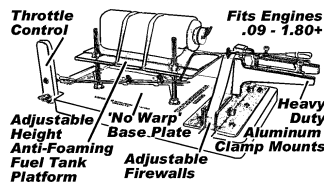
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