MiG21

READY TO FLY ALMOST TRUE ARF

ASSEMBLY & OPERATIONS MANUAL

Please review this manual thoroughly before assembling or operating this model

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

Model airplanes, model engines, model engine fuel, propellers and related accessories, tools and equipment can be hazardous if improperly used. Be cautious and follow all safety recommendations when using your VMAR model airplane. 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.

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 entirely 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!

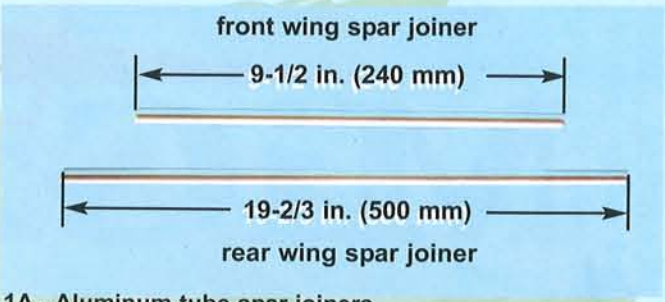
VCOTE 2-3DS
3D DETAILING SYSTEM

STAGE 1 WING ASSEMBLY - ATTACH TO THE FUSELAGE

Parts needed

- Right & left wing panels
- 1 front aluminum tube spar joiner 9-1/2 in. (240 mm) long and 2/3 in. (16mm) diameter
- 1 rear aluminum tube spar joiner 19-2/3 in. (500mm) long and 2/3 in. (16mm) diameter
- 4 flat washers
- 4 lock nuts
- Four 4mm steel butterfly nuts
- 2 wing root foam gaskets

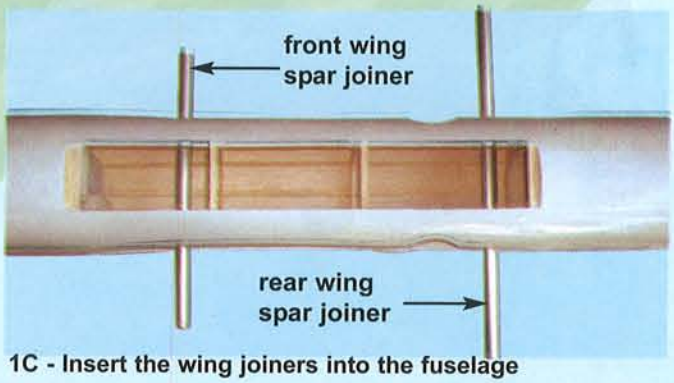
Step 1.1 Turn over the fuselage and remove the hatch cover. See 1B



1A - Aluminum tube spar joiners

Step 1.2 Insert the front wing spar joiner and then the rear spar joiner. See 1C

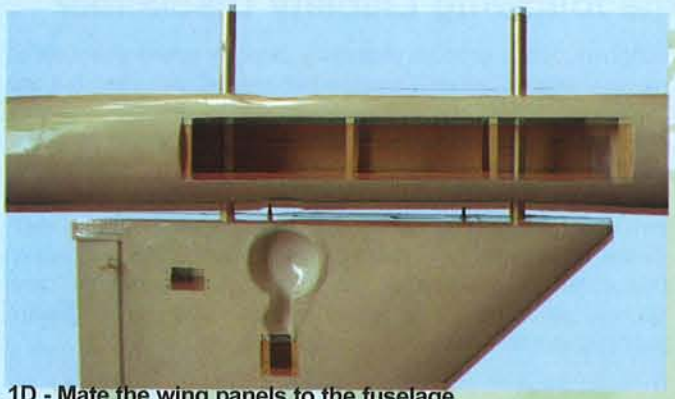
1B - Bottom hatch cover removed



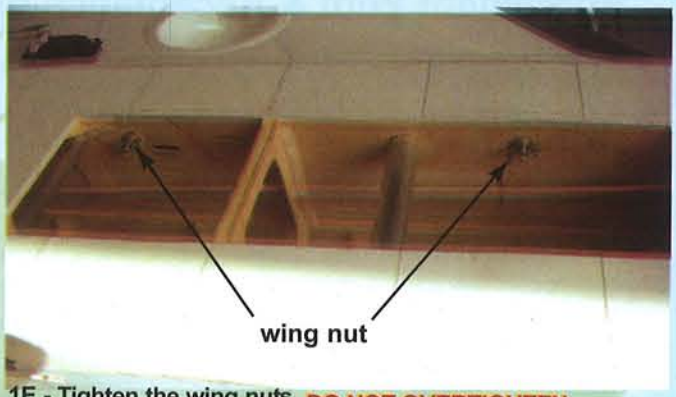
1C - Insert the wing joiners into the fuselage

Step 1.3 Fit the Foam Gaskets into place on the Wing Roots. Tack into place with Silicone Adhesive. While holding the aluminum tubes centered in the fuselage, carefully slide each wing half onto the tubes and flush the wing root against the side of the fuselage. See 1D

Step 1.4 Place flat washers over the wing bolts and then install the butterfly nuts. **DO NOT OVERTIGHTEN**. For double security also install the lock nuts. See 1E



1D - Mate the wing panels to the fuselage



1E - Tighten the wing nuts. DO NOT OVERTIGHTEN

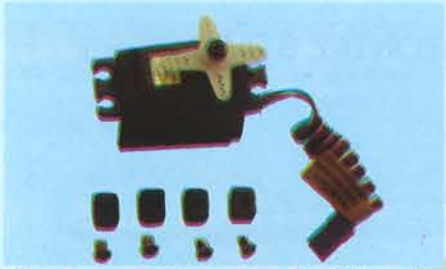
STAGE 2 INSTALLING THE AILERON SERVOS INTO THE WING

To install the aileron servos into the wing you will need the following items:

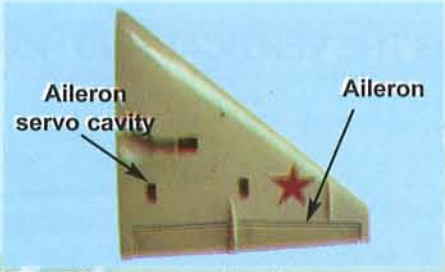
- Servos
- Servo mounting screws and grommets as supplied with servos
- Servo control arms as supplied with servos
- Two aileron control rod assemblies supplied with the kit The assemblies consist of a metal rod with a clevis on each end
- Low tack masking tape
- 2 aileron control horn assemblies

Step 2.1 Turn the wings upside down and locate the aileron servo cavities. See 2B

Step 2.2 Trial fit the aileron servo into the servo mounting cavity. 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 output shaft closer to one end than the other. We recommend locating the servo so that the output shaft is as close to the rear of the wing as possible.



2A - Prepare the servos by fitting the rubber grommets & ferrules supplied with your servos



2B - Aileron servo location

2C - Mount the aileron servo into the wing

Step 2.3 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. See 2C

Step 2.4 Fasten the screws down according to the servo manufacturers recommended tightness.

Step 2.5 Repeat this procedure for both wing servos.

STAGE 3 INSTALLING THE AILERON CONTROL SYSTEM

Step 3.1 Consult your radio instruction manual and center each aileron servo by plugging it into the aileron channel in the receiver. Turn on the transmitter and then the receiver. Center the aileron trim lever on the transmitter. Remove the servo arm mounting screw and the servo arm.

Step 3.2 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. Locate the two aileron control rods in the hardware bag. Ensure the clevises are screwed well onto the threaded portion of the rod. Rotate and tug aggressively on the clevises and ensure that they are not loose on the rods. 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.

Step 3.3 Ensure that the aileron control horns are screwed onto the threaded aileron control horn bolts and that both control horns are in approximately the same place on their respective bolts.

Step 3.4 Connect the control rod to the servo output arm using a clevis.

Step 3.5 Connect the other end of the control rod to the control horn using the second clevis

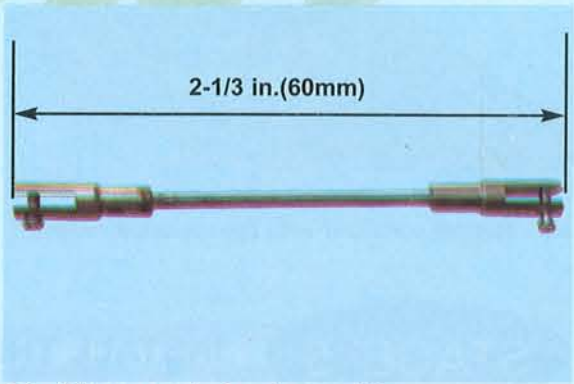
Step 3.6 Remove the masking tape holding the aileron.

Step 3.7 In the case of computer radios couple the servos together electronically by connecting them to the appropriate receiver channels. In the case of analog radios couple the servos together using a Y harness.

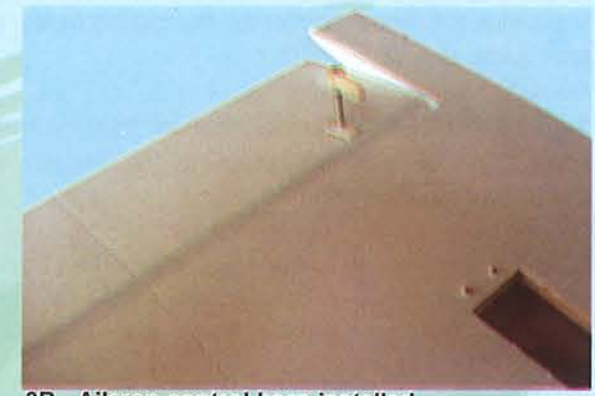
Step 3.8 Turn on your radio and activate the ailerons, using the aileron stick and ensure that a smooth full motion can be achieved.

Step 3.9 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. (Counterclockwise roll of the wing when viewed from the back).

Step 3.10 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.



3A - Aileron control rod assembly

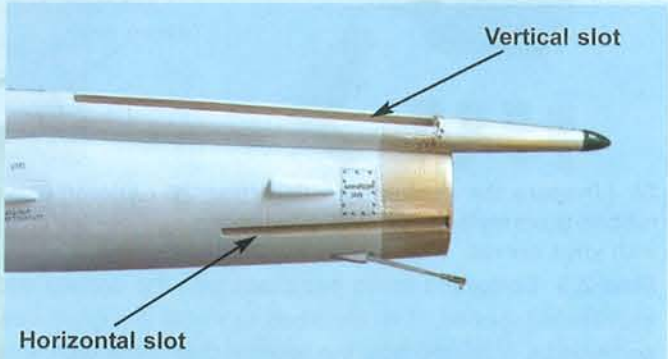


3B - Aileron control horn installed

3C- Aileron control rod installed

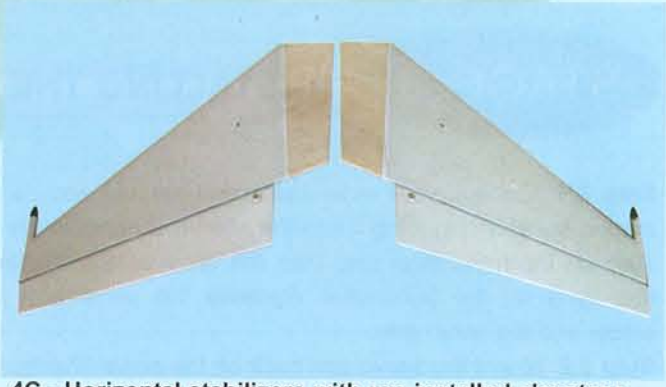
STAGE 4 FITTING THE VERTICAL AND HORIZONTAL STABILIZERS

3To install the stabilizers into the fuselage you will need:
- Fuselage
- Vertical stabilizer with pre-installed rudder
- Right and left horizontal stabilizer with pre-installed elevators



4A - The fuselage slots for the vertical & horizontal stabilizers

4B - Vertical stabilizer with pre-installed rudder



4C - Horizontal stabilizers with pre-installed elevators

STAGE 5 INSTALL THE VERTICAL STABILIZER

Step 5.1 Check the fit of the vertical stabilizer in its slot. Make sure the rudder control rod fits into the rudder plastic tube guide. See 5B and 5C

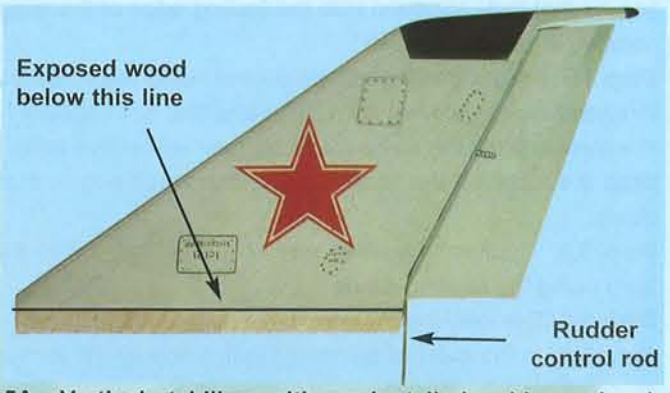
Do not glue anything yet!

Step 5.2 Remove the vertical stabilizer from the fuselage. Apply plenty of 30 minute epoxy into the fuselage slot for the vertical stabilizer. See 5D

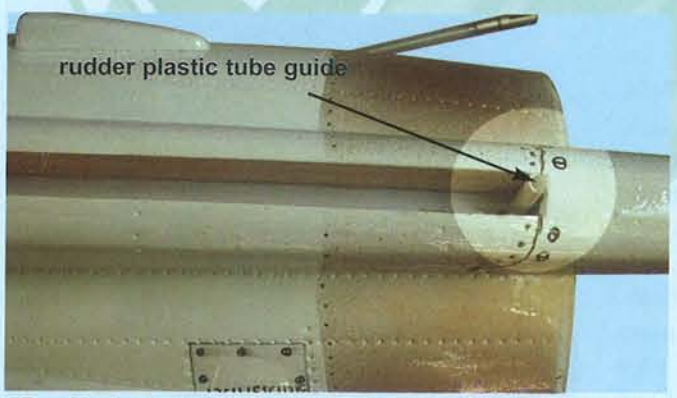
Do not apply epoxy near the rudder plastic tube guide

Step 5.3 Apply epoxy to the exposed wood on both sides of the vertical stabilizer. Use 30 minute epoxy to ensure a strong bond and give yourself plenty of working time. See 5E

Do not apply epoxy near the rudder control rod



5A - Vertical stabilizer with pre-installed rudder and rudder control rod



5B - Vertical slot with pre-installed rudder plastic tube guide

5C - Trial fit the vertical stabilizer in its slot

5D - Apply plenty of epoxy into the fuselage slot for the vertical stabilizer

5E - Apply plenty of epoxy to the exposed wood on both sides

5F - Slide the vertical stabilizer into place. Wipe off any excess epoxy

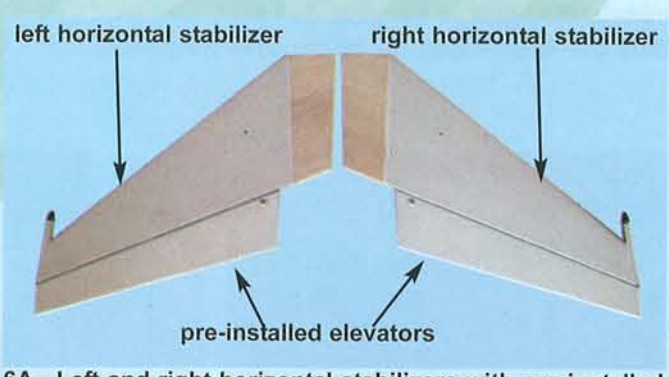
STAGE 6 INSTALL THE HORIZONTAL STABILIZERS

Step 6.1 Locate the left and right horizontal stabilizers. See 6A

Step 6.2 Trial fit the left and right horizontal stabilizers into the slots in the fuselage. See 6B and 6D. Ensure equitable angles with respect to the vertical stabilizer and wing. Sand slots to align if required.

Step 6.3 Remove both horizontal stabilizers. Apply sufficient epoxy to the exposed wood on both sides of the left horizontal stabilizer and into the left slot in the fuselage. Use 30 minute epoxy to ensure a strong bond and give yourself plenty of working time. See 6C

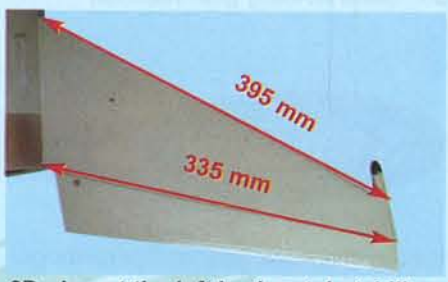
Step 6.4 Insert the left horizontal stabilizer into the fuselage slot and adjust to match the distances shown in 6D.



6A - Left and right horizontal stabilizers with pre-installed elevators

6B - Trial fit the horizontal stabilizers into the fuselage slots

6C - Apply sufficient epoxy to the exposed wood area on both sides and into the fuselage slot



6D - Insert the left horizontal stabilizer into the fuselage and adjust the distance

Step 6.5 Apply sufficient 30 minute epoxy to the exposed wood on both sides of the right horizontal stabilizer and into the right slot in the fuselage. Insert the right horizontal stabilizer into the fuselage slot and adjust to match the distances shown in 6D.

Step 6.6 Wipe off the excess epoxy. See 6E

6E - Wipe off the excess epoxy

6F - Vertical and horizontal stabilizer installed

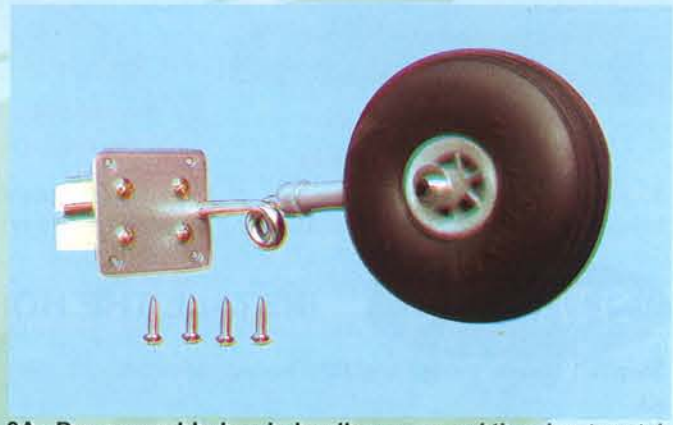
STAGE 7 INSTALL THE LANDING GEAR

The MiG21 has a tricycle gear configuration (trike gear) using a steerable nose wheel and main landing gear

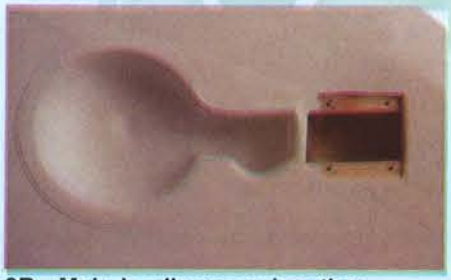
STAGE 8 INSTALLING THE MAIN LANDING GEAR

Identify the main landing gear components shown below:
- 2 pre-bent main landing gear sets pre-assembled with struts, wheels and mounting plates.
- 8 sheet metal screws (3x15 mm)

Step 8.1 Turn over the wing panels to locate the pre-drilled main landing gear mounting cavities. See 8B
Step 8.2 Insert the pre-assembled main landing gear into place. Use 4 of the sheet metal screws to mount each of the main landing gear to the wing. See 8C
Step 8.3 Repeat Step 8.2 for the other wing panel.

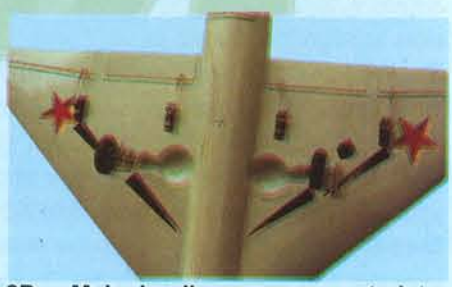


8A - Pre-assembled main landing gear and the sheet metal mounting screws



8B - Main landing gear location

8C - Mounting the main landing gear to the wing



8D - Main landing gear mounted to both wings

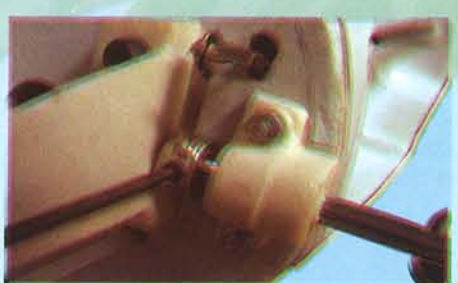
STAGE 9 INSTALLING THE NOSE GEAR

Identify the nose gear components per illustration 9A
- 1 completed nose gear assembly with strut and wheels
- 1 steering arm with pre-installed EZ-connector

Step 9.1 Remove the steering arm from the nose gear assembly. Insert the nose gear push rod through the EZ-connector. Do not tighten yet. See 9B
Step 9.2 Slide the nose gear wire through the nose gear bearing in the fuselage, passing the wire through the steering arm. Secure the steering arm to the nose gear wire by tightening the set screw. See 9C
Step 9.3 Secure the EZ-connector to the nose gear push rod by tightening the set screw. See 9D

9A - Nose gear assembly

9B - Insert the nose gear push rod through the steering arm EZ-connector. Do not tighten yet

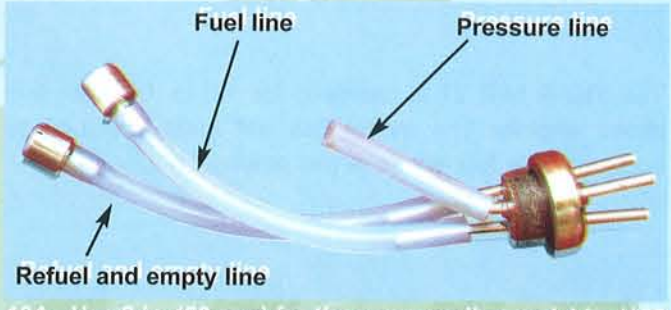


9C - Secure the steering arm to the nose gear wire by tightening the set screw

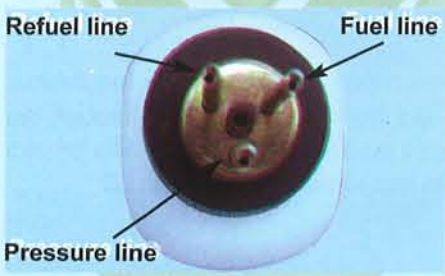
9D - Secure the EZ-connector to the nose gear push rod by tightening the set screw

STAGE 10 FITTING THE FUEL TANK

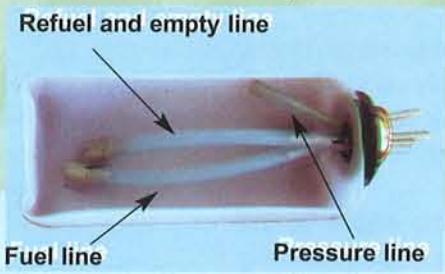
To assemble the fuel tank you will need the following items:
- The fuel tank and fuel stopper assembly (supplied)
- 2 clunks (supplied)
- About 10 in. (25.4 cm) of medium ID silicone fuel line (DUB-197 or DUB-222 or similar)



10A - Use 2 in. (50 mm) for the pressure line and 4 in. (100 mm) for the refuel line



10B - Fuel tank and stopper assembly (front view)

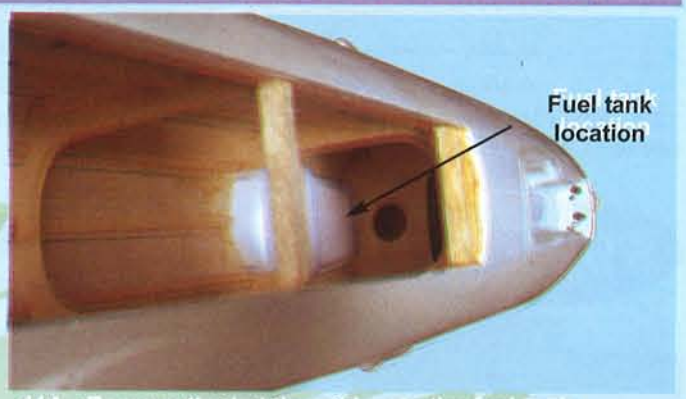


10C - Illustration of fuel line positioning inside cutaway of the tank

10D - Fuel tank installed into the fuselage after adding external fuel lines from tank forward to engine area

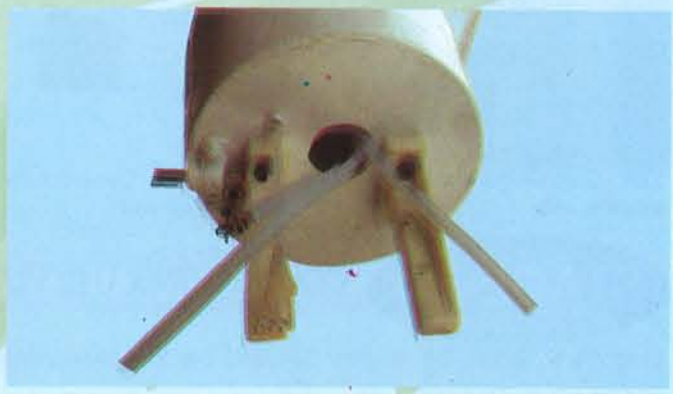
STAGE 11 INSTALLING THE FUEL TANK INTO THE FUSELAGE

Step 11.1 Install the fuel tank into the fuselage. Use foam sheeting (supplied) to cradle the tank. See 11A and 11B



11A - Remove the hatch and locate the fuel tank

11B - Fuel tank assembly in position



11C - Fuel line, pressure line and refuel line pass through the firewall

Step 11.3 Run external pressure, fuel and refuel lines through the firewall from the tank to the engine area. Protect the tubes from contamination See 11C

Step 11.4 After trial fitting the tank and tubing, apply silicone sealant to both sides of the black foam rubber like gasket and around neck of the tank. Press tank firmly against former with fuel and pressure lines closest to the cockpit opening. Hold in place until sealant cures.

STAGE 12 INSTALLING THE ENGINE

The VMAR MiG 21 is designed for .60 to .90 size two stroke engines. The model has not been designed to accommodate four stroke or gas powered engines.

12A - .60-.90 2 cycle engine. VMAX 61PRO shown

Step 12.1 Trial fit your engine to the engine mount. Check engine compartment clearances and modify using a Dremel tool to allow your engine to sit properly on the mounts. Ensure the spinner back plate to the firewall is 4-1/2 in. (115 mm). See 12B

Step 12.2 Once you have positioned the engine on the mounting beams, mark the location of the engine mounting holes. See 12C

Step 12.3 Center punch the hole locations on the beams. Drill 1/8 in. (3 mm) pilot holes at right angles through the beams. Put a drop of oil in each hole. Use four #4 x 25 mm sheet metal screws to mount the engine. See 12D

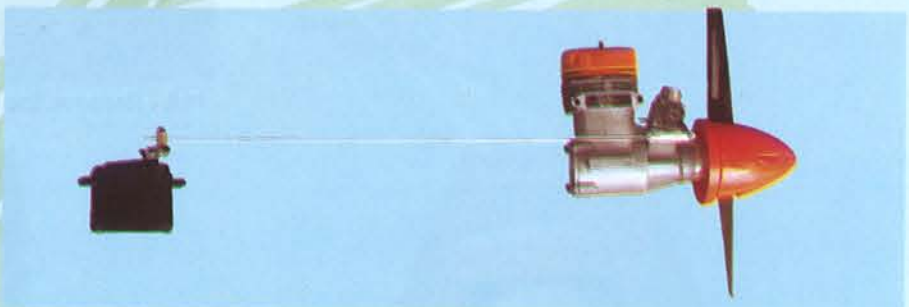
12B - Allow for gap between the spinner back plate and the fuselage


12C - Mark the location of the engine mounting holes


12D - Drill 1/8 in. (3 mm) pilot holes at right angles through the beams

STAGE 13 CONNECTING THE THROTTLE CONTROL ROD TO THE ENGINE


13A - Connect the clevis to the engine throttle arm


13B - Connect the servo arm to the engine throttle arm using the throttle control rod

STAGE 14 CONNECTING THE FUEL LINES

Step 14.1 Install the muffler. Connect the fuel tank pressure line to the muffler pressure nipple.

Step 14.2 Connect the fuel tank fuel line to the carburetor fuel inlet nipple.

Step 14.3 Double check that you have connected the fuel line from the tank to the carburetor and that you have connected the pressure line from the tank to the muffler.

Step 14.4 The fuel tank refueling line is used only when filling the tank. Keep the line plugged after fueling is completed.

STAGE 15 INSTALL THE PROPELLER AND THE SPINNER

Step 15.1 Consult your engine manual and select a suitable propeller.

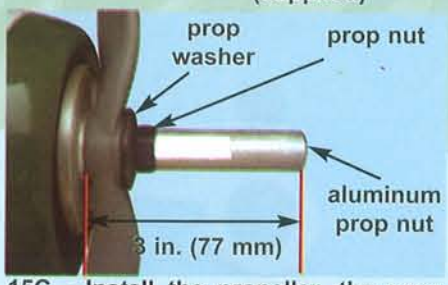
Step 15.2 Install the thrust washer, the spinner backing plate, the propeller, the prop washer, the prop nut and the aluminum prop nut supplied with the spinner. Ensure that they are all firmly attached. See 15B, 15C

Step 15.3 Trial fit the spinner cone and spinner cone retaining screw. If necessary enlarge the cutouts in the spinner cone to allow adequate clearance for the propeller. See 15D

Step 15.4 Double check that the spinner cone retaining screws are firmly attached.

15A - Aluminum spinner complete with all hardware (supplied)

15B - Install the spinner backing plate



15C - Install the propeller, the prop washer, the prop nut and the aluminum prop nut

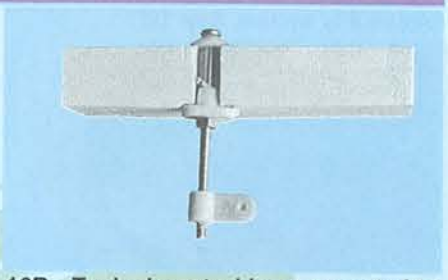
15D - Install the spinner cone using the retaining screw. Ensure the retaining screw is tight and secure

STAGE 16 FITTING ELEVATOR AND RUDDER CONTROL HORNS

The elevator control horns are installed through the elevators and protrude from the bottom of the elevators. Pierce the covering over the pre-drilled holes and install the control horns as shown. See 16B

The rudder control rod (arm) runs through the plastic rudder tube and exits into a cavity within the fuselage beneath the rudder. Install the supplied rudder control horn assembly. Loosely tighten the set screw only at this point. See 16D

16A - Control horn assembly



16B - Typical control horn mounted to the control surface

16C - Elevator control horns installed

16D - Rudder control horn installed

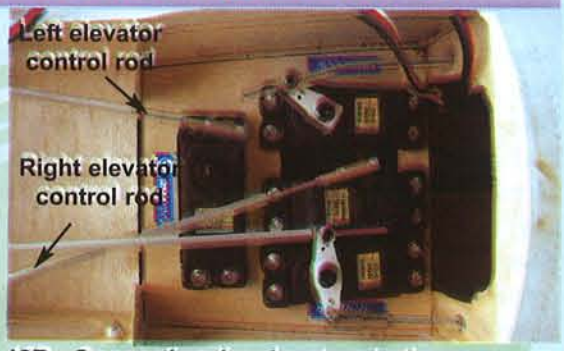
STAGE 17 INSTALLING THE SERVOS

Install the rubber servo grommets and brass ferrules supplied with your radio equipment. The 4 servos that control the 2 elevator surfaces, rudder and throttle are to be installed in the servo cavities located towards the back of the fuselage. See 17A

17A - Location of elevator (2), rudder and throttle

STAGE 18 CONNECTING THE PUSHRODS TO THE ELEVATOR

The MiG 21 has two separate elevators and two separate elevator control rods each running to an independent servo.



18B - Connecting the elevators to the servos

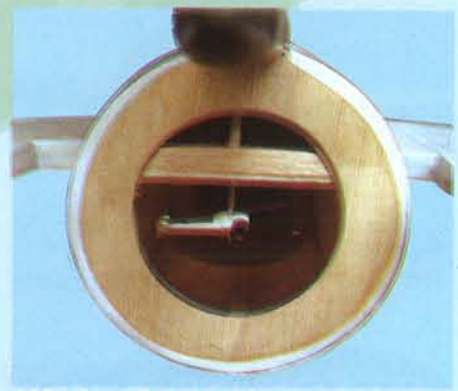
STAGE 19 CONNECTING THE PUSHROD TO THE RUDDER

Step 19.1 Review 19B. Align the rudder straight with the fuselage and the rudder control horn as shown.

Step 19.2 With the rudder aligned straight with the fuselage connect the rudder servo to the receiver and turn on your transmitter. Ensure the rudder servo is centered at neutral.

Step 19.3 Connect the rudder control rod between the rudder servo arm and the rudder control horn. Tighten the control horn set screw firmly and ensure it is secure. See 19D

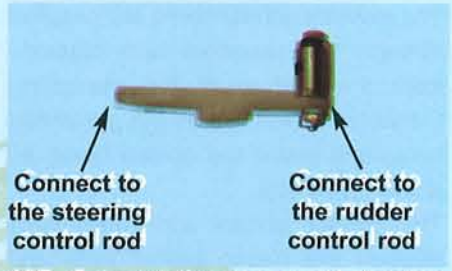
19A - Rudder control horn assembly



19B - Install the rudder control horn to the rudder control arm

19C - Connect the clevis to the control horn and then tighten the set screw securely

19D - Connect the rudder control rod to the rudder servo arm. Connect the nose gear steering rod to the opposite side of the rudder servo arm. See 19E

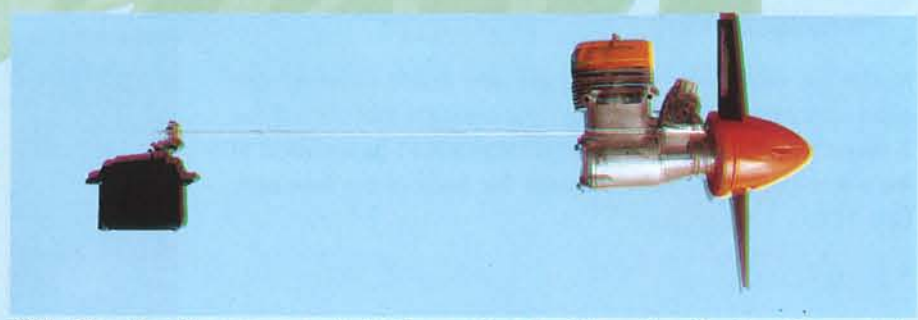


19E -Connect the nose gear steering rod. NOTE: Depending on your market area, some or all of the EZ connectors may have been replaced by clevises.

STAGE 20 ADJUSTING THE THROTTLE CONTROL

With the throttle control arm clevis connected to the engine throttle arm, move the throttle arm to roughly half throttle. Look into the throat of the engine carburetor as you rotate the throttle arm and select a position where the throttle opening is about haft what it is when fully open.

20A - The throttle arm and clevis connected to the engine throttle arm



20B - The throttle servo controls the engine throttle using the throttle control rod

STAGE 21 ADJUST CONTROL SURFACE THROW LIMITS

Adjust the deflection of the control surfaces to match the specifications on page 14. You can reduce the amount of throw by doing either or both of the following:

- From the servo end, move the clevis or EZ connector 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 bolts. Always confirm that the horn is still thoroughly engaged with the threaded bolt after you have adjusted it.

CAUTION: THE MIG 21 IS SUITABLE ONLY FOR EXPERIENCED RADIO CONTROL PILOTS.

STAGE 22 FINAL RC SET-UP

Step 22.1 Before starting the final set-up of the model, switch on the radio and ensure that all trims are in their neutral positions. Check that the aileron, elevator and rudder are centered. If any adjustments are needed, do these by uncoupling the relevant clevis and turning it clockwise to shorten the linkage or counter - clockwise to lengthen it. Only when each control surface has been centered mechanically in this way should you begin adjusting the surface movement (or throw).

Step 22.2 Now confirm that the control surfaces are moving in the correct direction. Use the servo reversing switches on your transmitter to reverse the direction of a servo if necessary.

STAGE 23 INSTALLING THE RECEIVER BATTERY

Step 23.1 Consult your radio manual for instructions about hooking up your receiver battery, receiver and switch harness.

Step 23.2 Wrap the battery pack securely in foam suitable for RC equipment and wrap the foam insulated pack in a plastic bag or cling wrap. Position the battery pack as shown in 24B.

Step 23.3 Thread the battery pack connector forward in preparation for connecting to your switch harness.

Step 23.4 Connect the battery pack connector to your switch harness according to your radio manual.

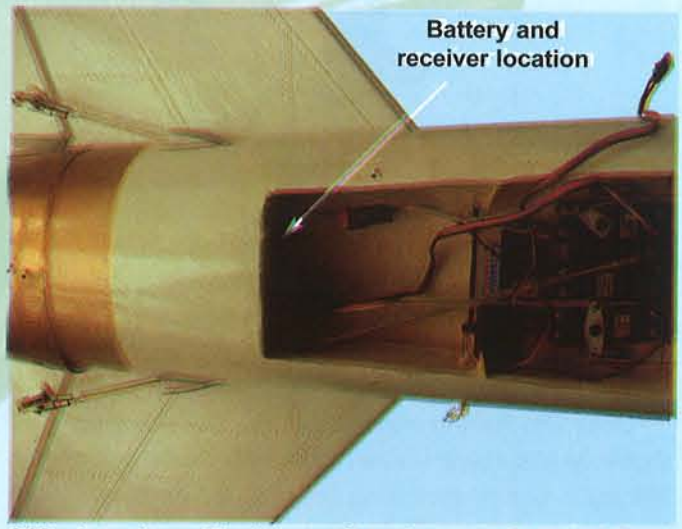
STAGE 24 INSTALLING THE RECEIVER

Step 24.1 Consult your radio manual for instructions about hooking up your receiver.

Step 24.2 Plan where you are going to put the receiver with consideration for routing the antenna safely.

Step 24.3 Wrap the receiver securely in foam suitable for RC equipment and wrap the foam insulated receiver in a plastic bag or cling wrap.

Step 24.4 Install your receiver near the aft end of the fuselage as shown in 24A.



24A - Location of battery and receiver at aft end of fuselage

STAGE 25 CONFIRM RADIO OPERATION

Step 25.1 Consult your radio manual for instructions about testing and operating your radio system.

Step 25.2 Pay particular attention to charging your radio system batteries and range testing the system before and after each flight.

Step 25.3 Check that all controls are working correctly before and after each flight.

STAGE 26 BALANCING THE AIRCRAFT

The CG for your MiG 21 is located at 9 in. to 10 in. (228 - 254 mm) back from the leading edge of the wing when the wing has been attached to the fuselage.

For the initial flight, the CG should be located at 9 in. (228mm) back from the leading edge of the wing when the wing has been attached to the fuselage.

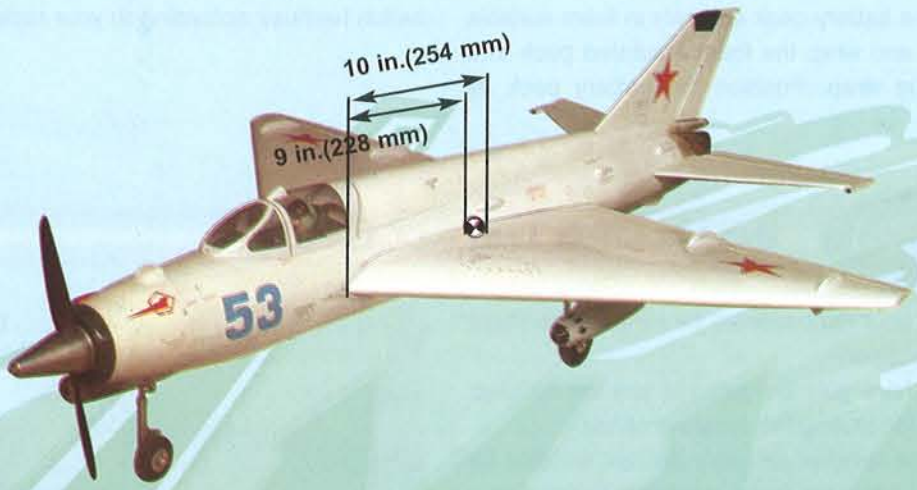
The CG is measured with the engine, radio gear and all other components installed but WITH NO FUEL IN THE TANK.

After gaining some experience flying the MiG 21 the location of the CG can be shifted slightly further aft to a location not more than 10 in. (254 mm). back from the leading edge of the wing when the wing has been attached to the fuselage. Set the CG with NO FUEL IN THE TANK.

It is very important to have the CG correct. Flying your model with the CG too far back (aft) will likely lead to loss of control and a crash. If you discover that after you have assembled your model and installed your radio and engine that the CG of your model is incorrect you must bring the CG to the correct location by doing the following BEFORE FLYING :

- Move the battery pack fore or aft.
- Move other components fore or aft.
- Change engine to a lighter or heavier model.
- 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.

CAUTION: THE MIG 21 IS SUITABLE ONLY FOR EXPERIENCED RADIO CONTROL PILOTS.



STAGE 27 CONFIRM MECHANICAL INTEGRITY

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 it twice!!

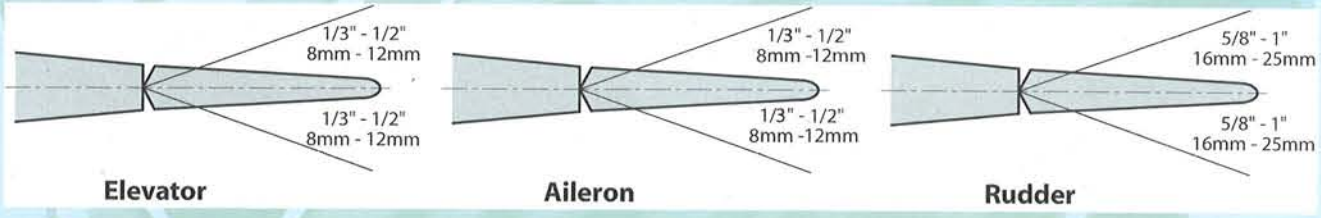
Before your first flight, have an experienced flyer review your work. Do not fly your model until it has been checked out by a third party who knows how to fly and how to set up a model aircraft. Do not fly alone. Seek experienced help.

Once you have completed your first flight, get in the habit of checking your model over before and after each flight! Don't fly if you find something that is not right!

CONTROL SURFACE THROW SPECIFICATIONS:

The throws are measured at the widest part of the control surface. Adjust the position of the pushrods at the control and/or servo horns to control the amount of throw. You may also use ATV's if your radio has them but the mechanical linkages should still be set so that the ATV's are near 100% for best servo resolution.

	Low rate		High rate	
ELEVATOR	1/3 " (8mm)	up	1/2" (12 mm)	up
	1/3 " (8mm)	down	1/2" (12 mm)	down
AILERON	1/3" (8 mm)	up	1/2" (12 mm)	up
	1/3" (8 mm)	down	1/2" (12 mm)	down
RUDDER	5/8 " (16 mm)	right	1" (25 mm)	right
	5/8 " (16 mm)	left	1" (25 mm)	left



STAGE 28 INSTALL LANDING GEAR CAVITY COVERS

The VMAR MiG 21 comes with fixed gear and is ready to accept Robart retracts if you wish (ROB-610 for the nose and ROB-608HD for the mains). See the retract instructions for correct installation.

If you are using the standard fixed gear please cover the retract cavities using the following procedure..

Step 28.1 Cut out the cavity covers using sharp scissors. See 28A

Step 28.2 Glue the cavity covers into place using CA glue. Use the glue sparingly and do not drip any CA onto the surface. Avoid fingerprints. See 28B and 28C

28A - Cut out the cavity covers using sharp scissors

28B - Glue the main gear cavity covers into place using CA glue

28C - Glue the nose gear cavity cover into place using CA glue

STAGE 29 INSTALL THE DUMMY ROCKET

The dummy fuel tanks can be mounted to the wings using the following procedure:

Step 29.1 Review 29B & 29C and mark the location of the mounting holes for the aluminum rack outboard of the main landing gear plates. Drill 5/64 in. (2mm) holes about 3/8 in. (10mm) deep.

Step 29.2 Use sheet metal screws to mount the aluminum rack to the wing. See 29C

Step 29.3 Mount the dummy tanks to the aluminum racks on both wings

29A - Dummy rockets launch and mounting racks

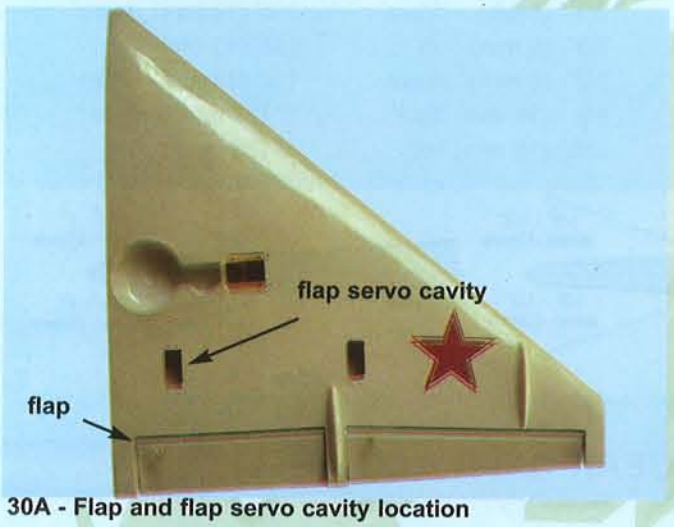
29B - Mark and drill mounting holes as indicated

29C - Mount the aluminum racks to the wings.

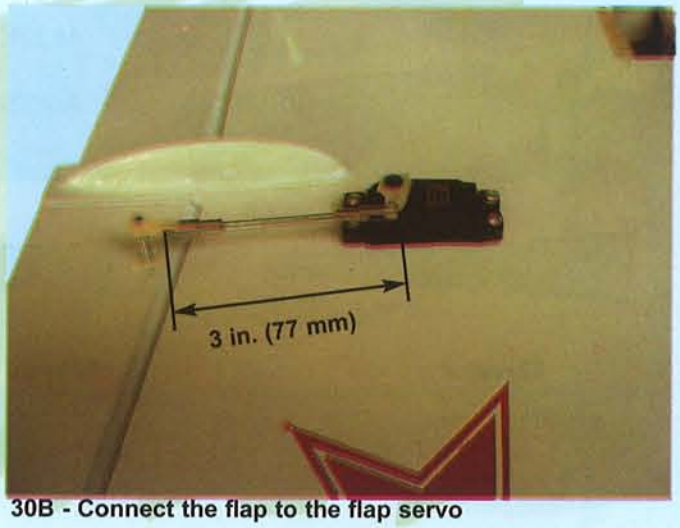
29D - Mount the dummy tanks to the aluminum racks on the wings

STAGE 30 INSTALLING THE FLAPS

The MIG 21 is flap ready. If you do not wish to use flaps they should be secured in a neutral position. If you do wish to use flaps, install the flap control horns and servos as shown in 30A and 30B.



30A - Flap and flap servo cavity location



30B - Connect the flap to the flap servo

For parts and support related to this product please visit us at www.richmondrc.com/support.htm
For more VMAR products please visit us at www.richmondrc.com

HAPPY FLYING!

Note

Note

Note