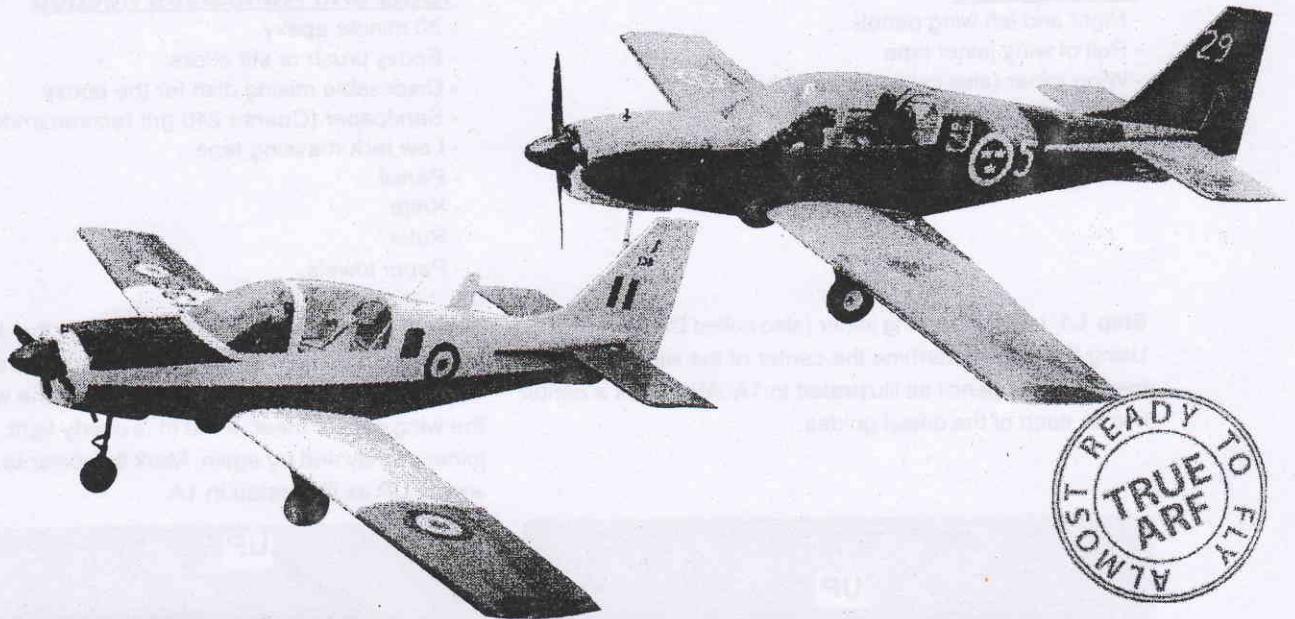


SK-61 BULLDOG



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

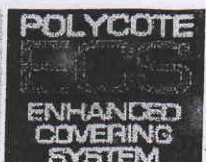
A Remote Control Model Aircraft is not a toy. It is a flying model that functions much like a full size airplane. If you do not assemble and operate this product properly you can cause injury to yourself and others and damage property. **DO NOT FLY** this model if you are not qualified. You are entirely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



POLYCOTE™ ECS
ENHANCED COVERING SYSTEM



The Graphics and Detailing are inside the POLYCOTE ECS!

STAGE 1

WING ASSEMBLY - JOINING THE WING HALVES

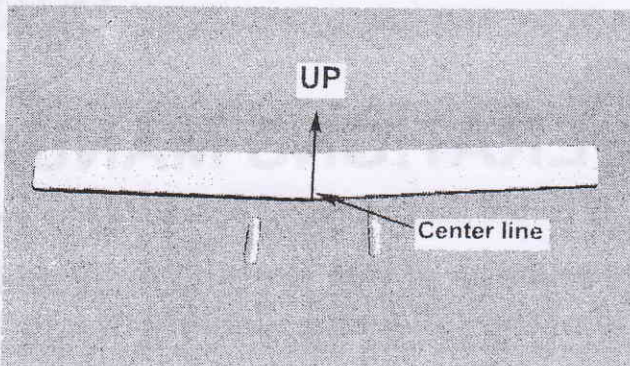
Parts needed

- Right and left wing panels
- Roll of wing joiner tape
- Wing joiner (also called dihedral brace)
- Two short dowel guides

Tools and Adhesives needed

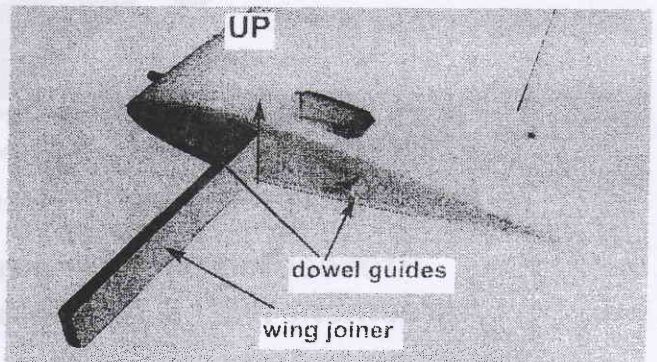
- 30 minute epoxy
- Epoxy brush or stir sticks
- Disposable mixing dish for the epoxy
- Sandpaper (Coarse 240 grit recommended)
- Low tack masking tape
- Pencil
- Knife
- Ruler
- Paper towels.

Step 1.1 Locate the wing joiner (also called Dihedral brace). Using the ruler, determine the center of the wing joiner and mark it with a pencil as illustrated in 1A. Also mark a center line on each of the dowel guides.



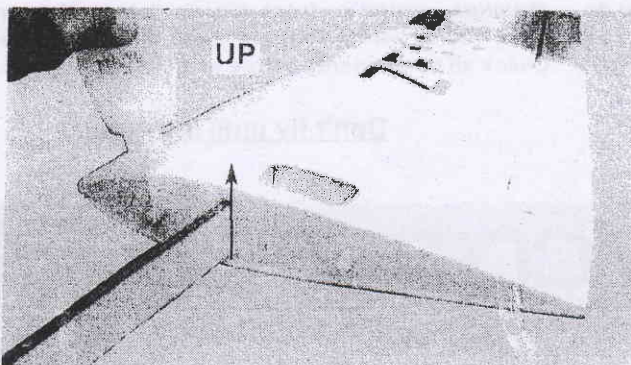
1A - Preparation of wing joiner and dowel guides.

Step 1.2 Trial fit the wing joiner into the wing panels. It should insert smoothly up to the center line as illustrated in 1B. Now slide the other wing panel onto the wing joiner until the wing panels meet. If the fit is overly tight, sand the wing joiner slightly and try again. Mark the joiner to indicate which way is UP as illustrated in 1A.



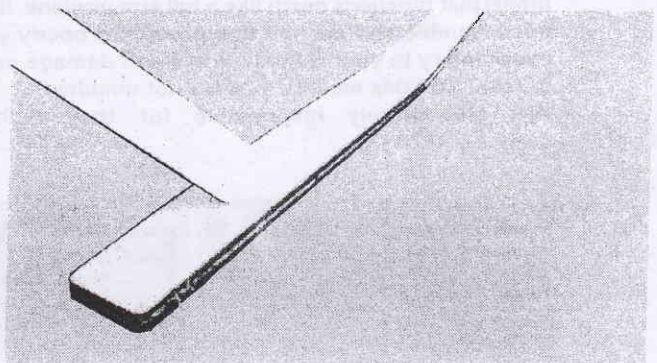
1B - Trial fit the wing joiner and dowel guides

Step 1.3 Insert the dowel guides into one of the wing panels all the way to the center lines. Apply CA glue to secure the dowels into their places as illustrated in 1B and 1C. Do not apply CA glue to the wing joiner.

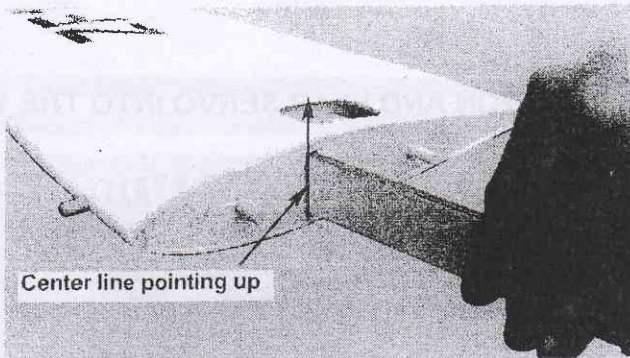


1C - Apply CA glue to secure dowels into their places

Step 1.4 Apply plenty of 30 minute epoxy to one end of the wing joiner, using a stir stick or epoxy brush. Carefully insert the joiner into the first wing panel as illustrated in 1D, 1E and 1F, then wipe off the excess epoxy that squeezes out of the joint with a cloth or tissue. Repeat this process several times to ensure that the wing joiner and cavity are well coated in epoxy. When the wing joiner & cavity are well coated with 30 minute epoxy, insert the joiner to the center line, wipe away any excess epoxy and let dry. (Note: Do not use 5 minute epoxy or CA to join the wings)

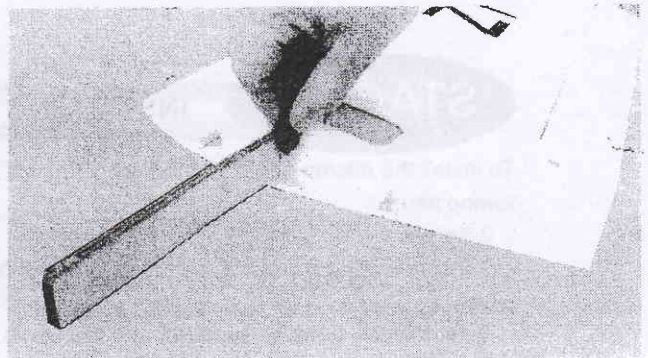


1D - Apply plenty of 30 minute epoxy to the wing joiner.



Center line pointing up

1E - Carefully insert the joiner all the way to the center line



1F - Wipe off the excess epoxy then allow to cure

STAGE 2

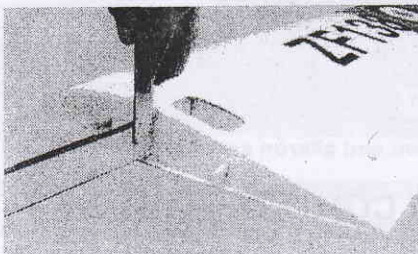
WING ASSEMBLY - JOINING THE WING HALVES (Cont.)

Step 2.1 When the epoxy has cured in Stage 1, trial fit the second wing panel onto the wing joiner first to ensure that the two panels fit without an excessive gap.

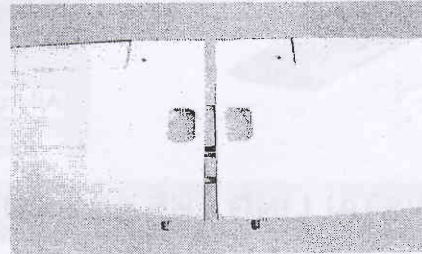
Step 2.2 Now apply plenty of epoxy to the wing joiner and wing root ribs of both wing panels. Use only 30 minute epoxy to ensure a strong bond and give yourself plenty of working time. As described in the Step 1.4, repeatedly apply epoxy

and insert into the wing joiner cavity, the epoxy should ooze from the joint and the excess should be cleaned off with a rag or tissue before it cures.

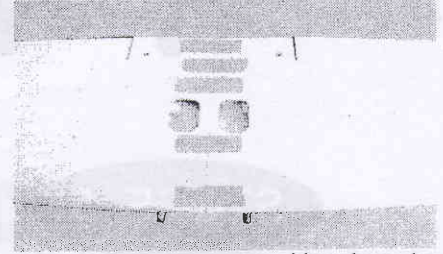
Step 2.3 Use low tack masking tape to hold the two wing panels together until the epoxy cures. See 2C



2A - Apply plenty of 30 minute epoxy glue to all surfaces



2B - Align the two wing panels and slowly close the gap until the wing root ends are firmly in contact with each other



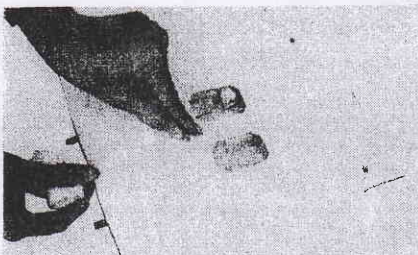
2C - Use low tack masking tape to hold tightly together

STAGE 3

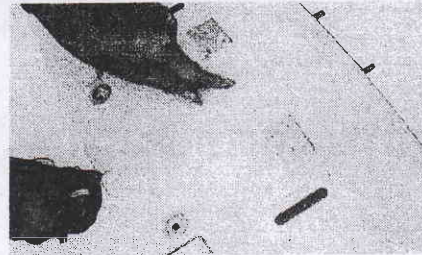
WING ASSEMBLY - JOINING THE WING HALVES (Cont.)

Step 3.1 Once the epoxy has cured completely (allow several hours at least), the tape can be carefully removed from the wing panels. Peel the tape back on itself... do not pull upright away from the wing. To seal and finish the joint in the wings, a roll of wing joiner tape has been supplied. Starting on the bottom side of the wing, stick the tape centrally

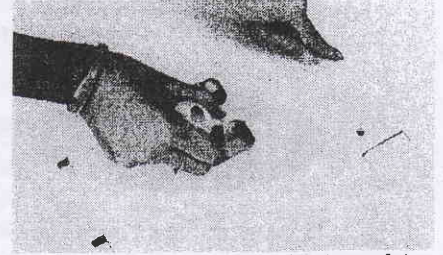
over the joint ensuring that it is pressed down firmly as you work around the wing. Wrap the tape all the way around the wing joint in one piece, starting and finishing at the servo mounting cavity in the bottom of the wing.



3A - Apply tape over the joint starting here on the bottom at the servo cavity



3B - Continue applying the tape over the top of the wing, pressing down firmly as you go



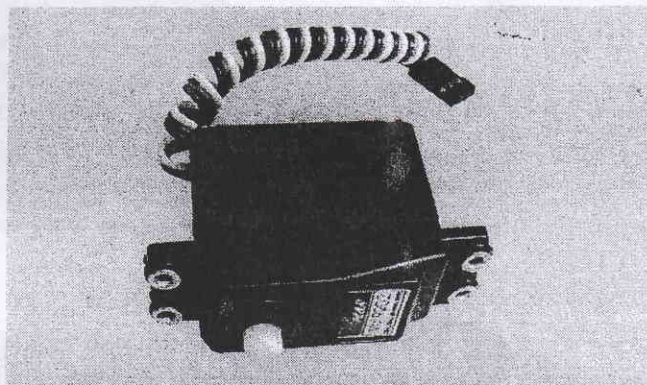
3C - Continue over to the bottom of the wing & along to the servo cavity and trim off the excess tape

STAGE 4

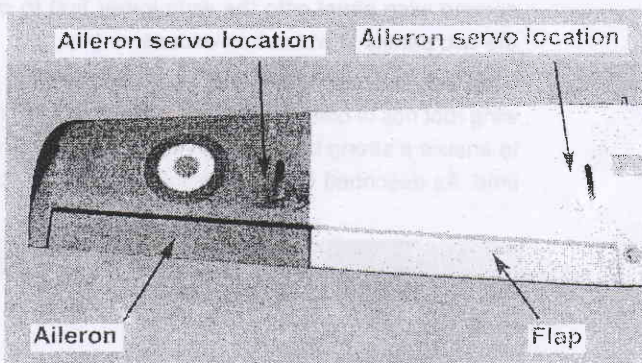
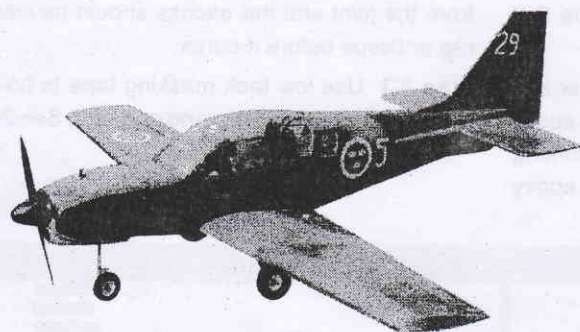
INSTALLING THE AILERON AND FLAP SERVO INTO THE WING.

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

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



4A - Prepare the servo by fitting the rubber grommets & ferrules supplied with your radio



4B - Aileron and aileron servo location

STAGE 5

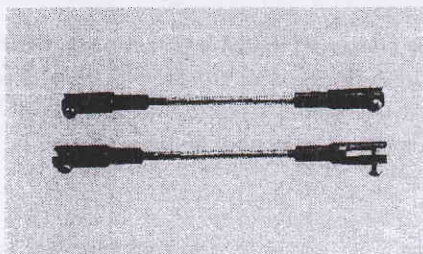
INSTALLING THE AILERON CONTROL SYSTEM

Step 5.1 Consult your radio instruction manual and center the 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.

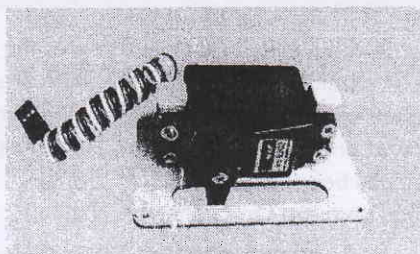
Step 5.2 Mount the servo to the aileron servo tray (see 5B)

Step 5.3 Mount the aileron servo tray to wing and connect the aileron control rod (see 5C)

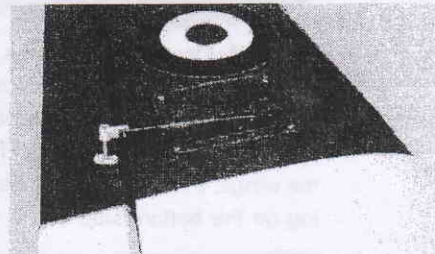
Step 5.4 Repeat step 5.2 to 5.3 to other side of the wing



5A - Aileron control rod assembly



5B - Aileron torque rod with control horn



5C - Aileron servo and control rods installed

STAGE 6

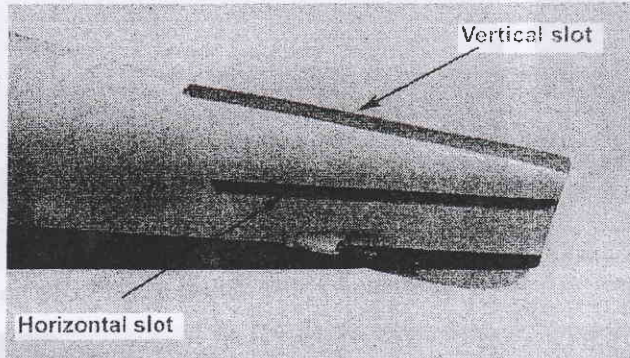
FITTING THE HORIZONTAL AND VERTICAL STABILIZERS

To install the stabilizers you will need:

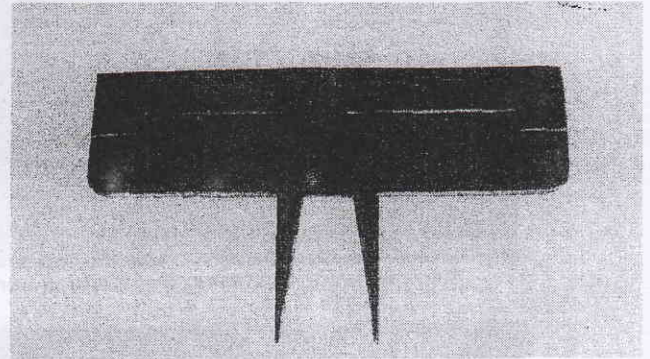
- Fuselage
- Vertical stabilizer with pre-installed rudder
- Horizontal stabilizer with pre-installed elevator

STAGE 7

FITTING THE HORIZONTAL STABILIZER

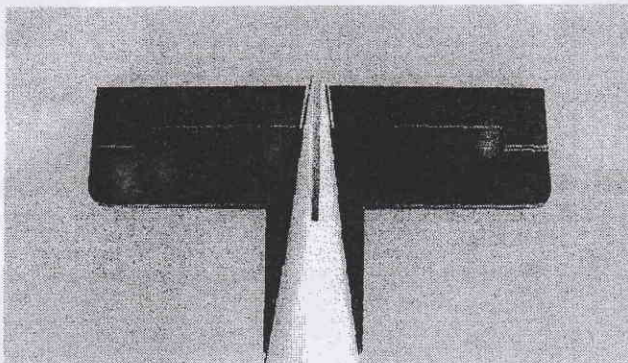


7A - The fuselage slots for the vertical & horizontal stabilizers

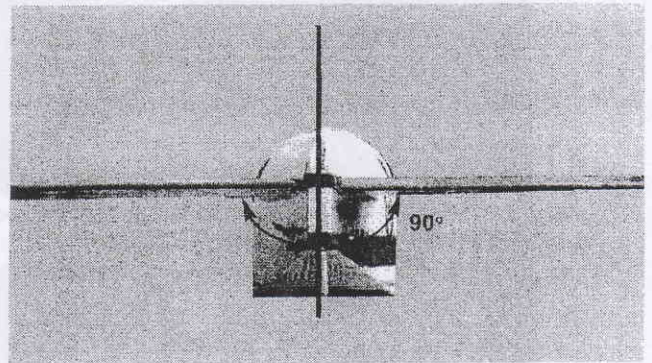


7B - Horizontal stabilizer with pre-installed rudders

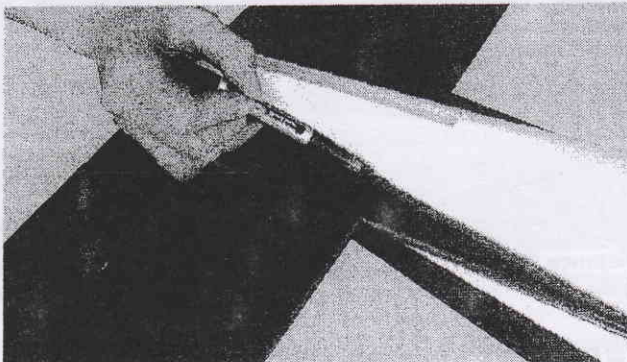
Mount the wing onto the fuselage first. The wing will be used as a reference point to align the horizontal stabilizer



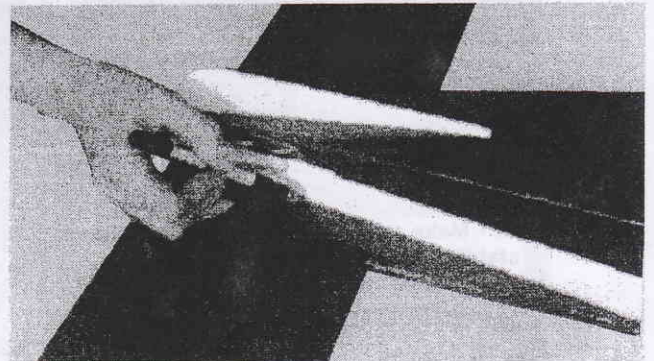
7C - Trial fit the horizontal stabilizer into the fuselage



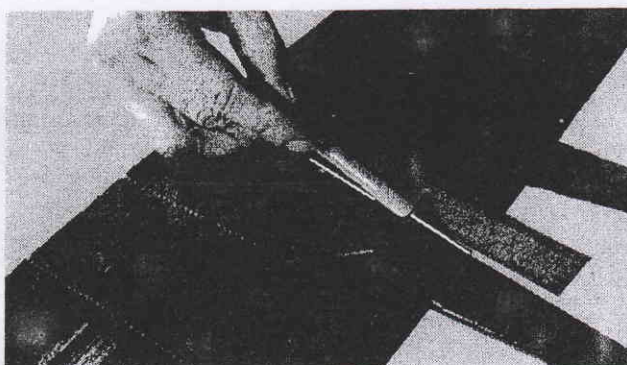
7D - Horizontal stabilizer align with 90 degree to the fuselage



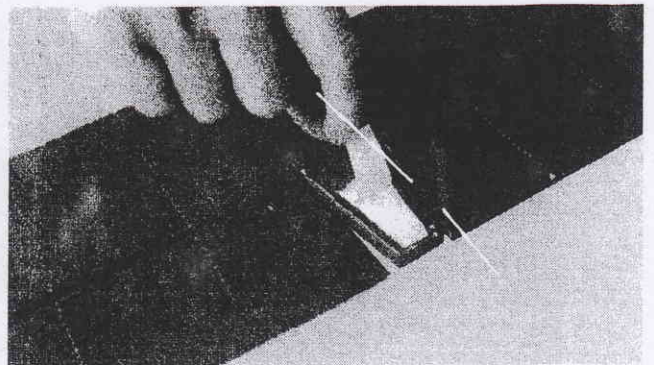
7E - Mark the top of the horizontal stabilizer



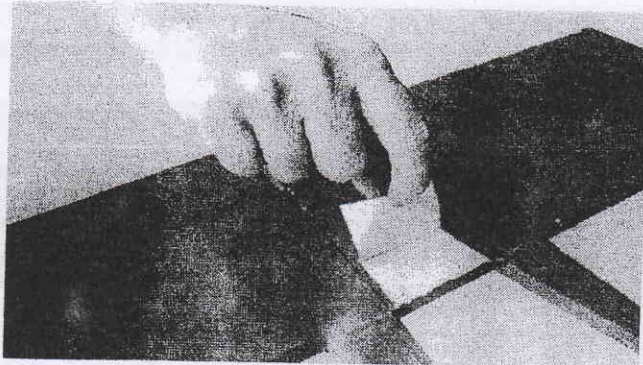
7F - ...And the bottom



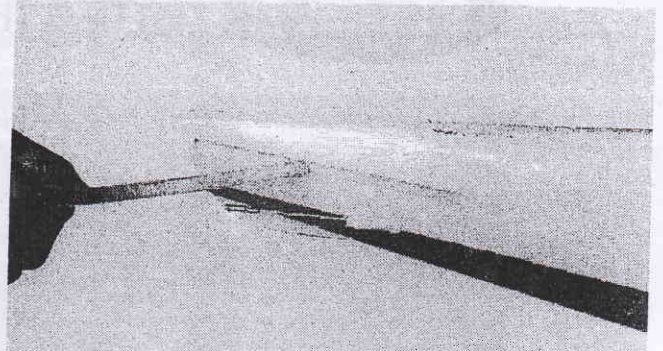
7G - Cutting inside the lines. DO NOT CUT THE WOOD



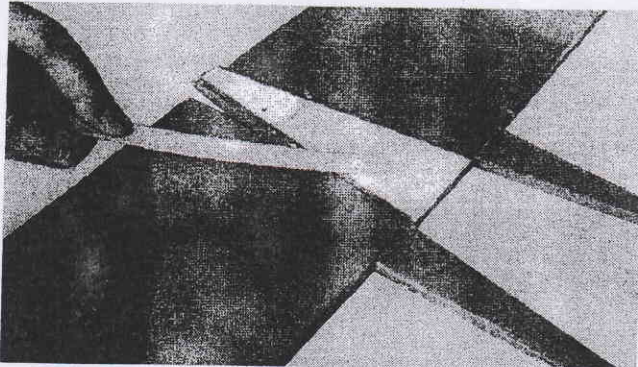
7H - Remove the covering from top surface



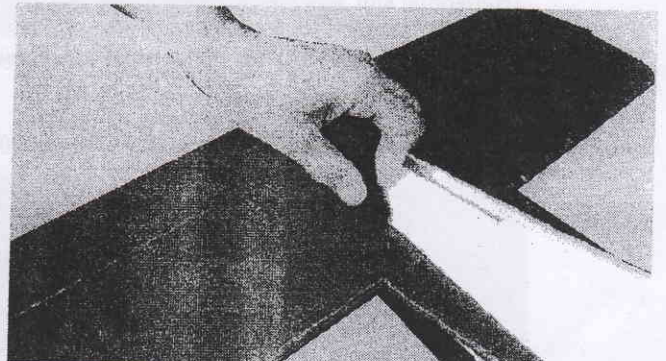
7I - Also remove the covering from bottom surface



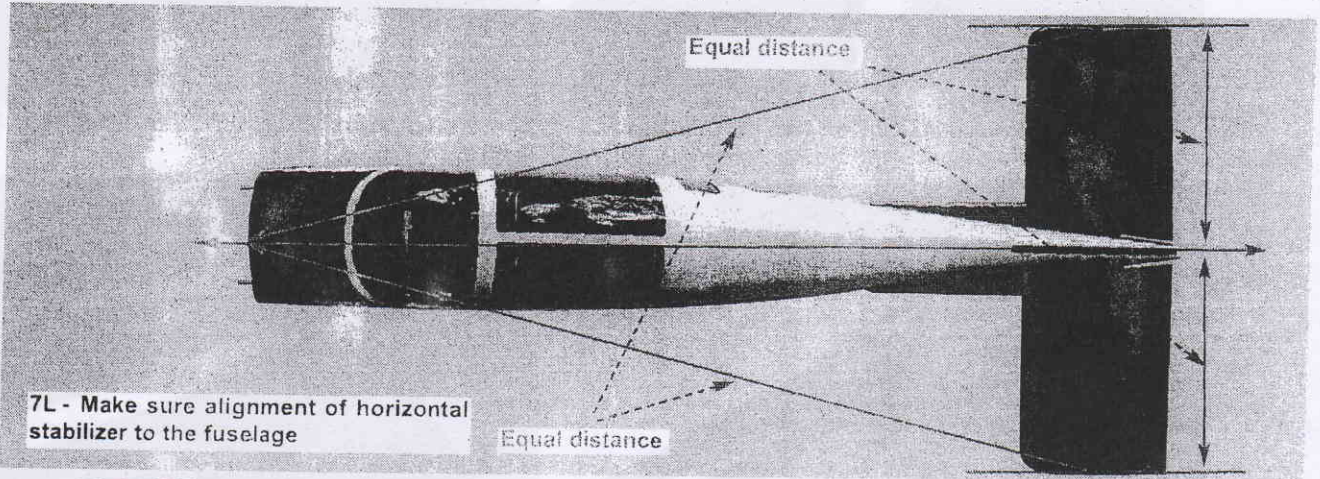
7I - Apply plenty of 30 minute epoxy to the horizontal slot



7J - Apply plenty of 30 minute epoxy to the expose wood area on both side of horizontal stabilizer



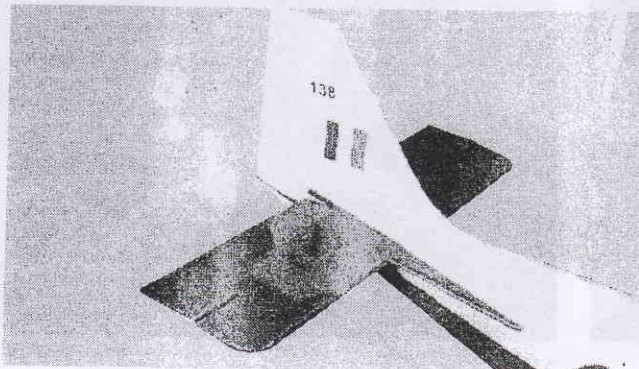
7K - Slide horizontal stabilizer to the slot,wipe off excess epoxy



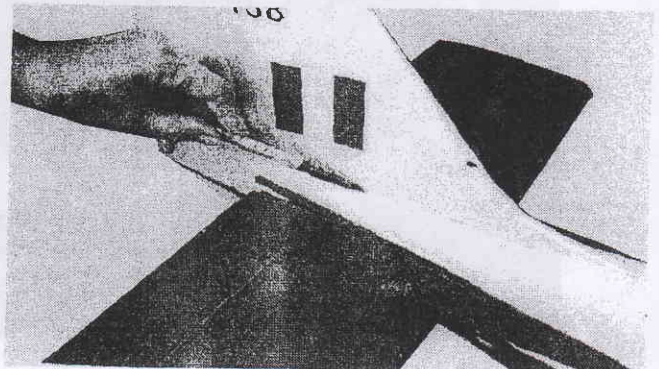
7L - Make sure alignment of horizontal stabilizer to the fuselage

STAGE 8

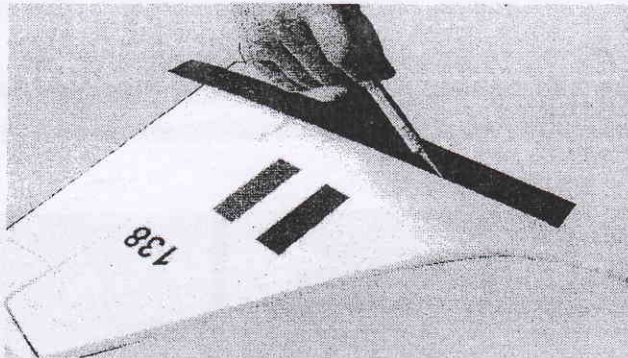
FITTING THE VERTICAL STABILIZER



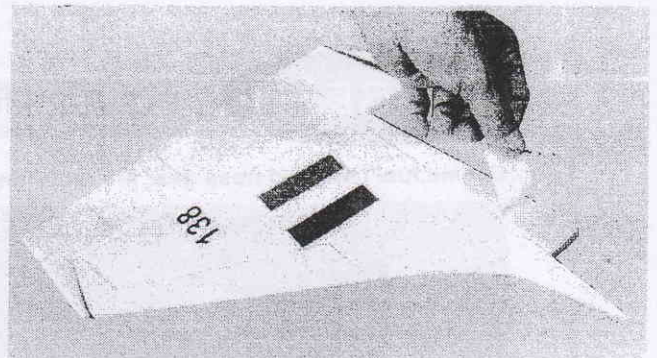
8A - Trial fit the vertical stabilizer into fuselage slot.



8B - Mark both sides of the vertical stabilizer



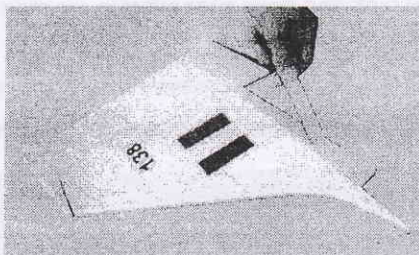
8C - Carefully cut through the covering. DO NOT CUT THE WOOD



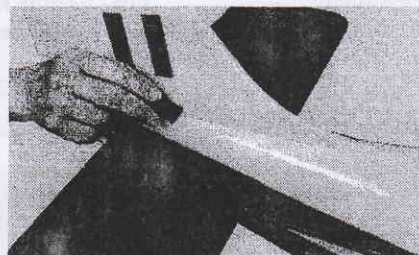
8D - Remove covering from both sides

STAGE 9

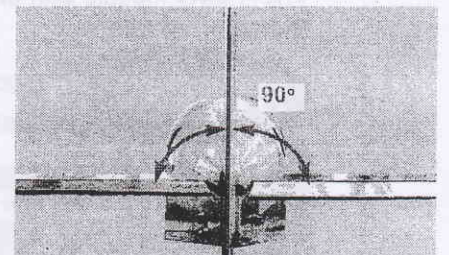
FITTING THE VERTICAL STABILIZER (Cont.)



9A - Apply plenty of 30 minute epoxy to the expose wood area on both side



9B - Slide the stab into place & remove excess epoxy



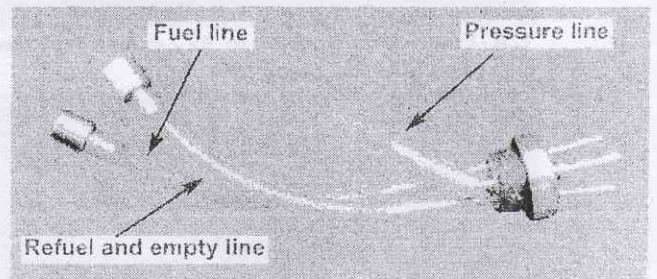
9C - 90 degree angle between the horizontal and vertical stabilizers

STAGE 10

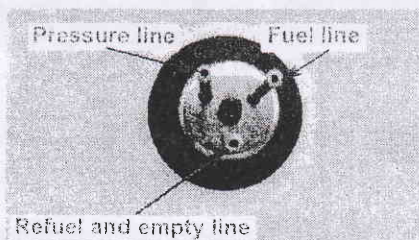
FITTING THE FUEL TANK

To assemble the fuel tank you will need the following items:

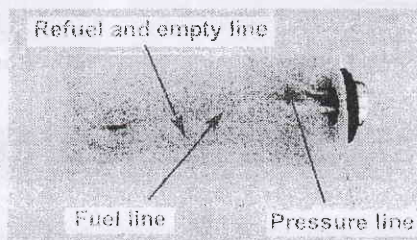
- The fuel tank and fuel stopper assembly (supplied)
- 2 clunks (supplied)
- About 10 in. (25.4 cm) of medium ID silicone fuel line (DUB-197 or DUB-222 or similar)



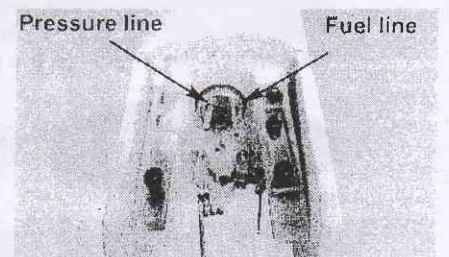
10A - Use 2 in. (50 mm) for the pressure line and 4 in. (100 mm) for the refuel line



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



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

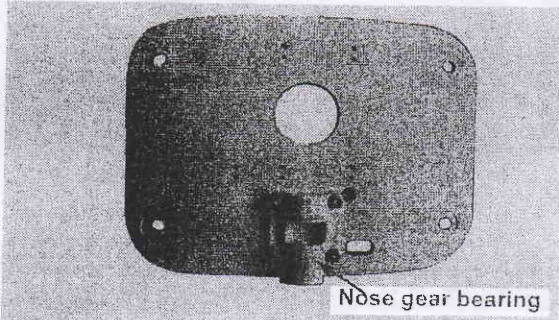


10D- Fuel tank installed into the fuselage

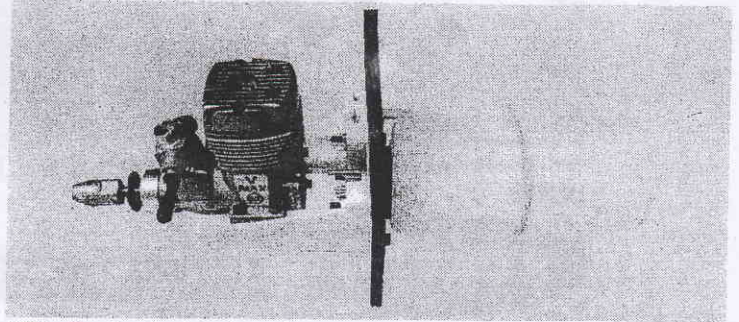
STAGE 11

POWER MODULE

Engine, fuel tank and nose gear are mounting on the power module



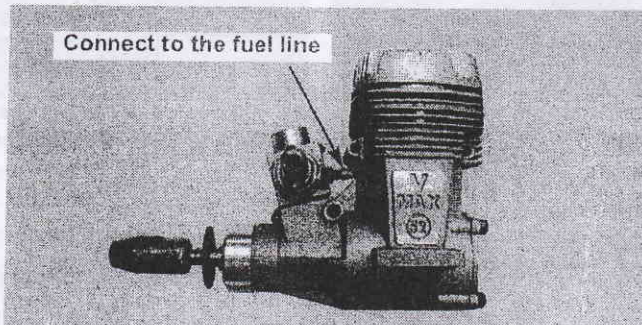
11A - Power module with pre-installed nose gear bearing



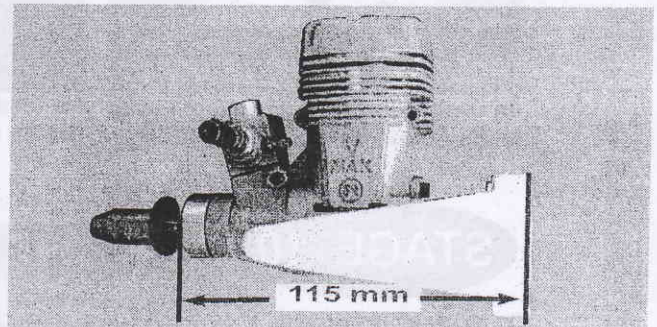
11B - Engine, fuel tank and nose gear system are mounting to the power module

STAGE 12

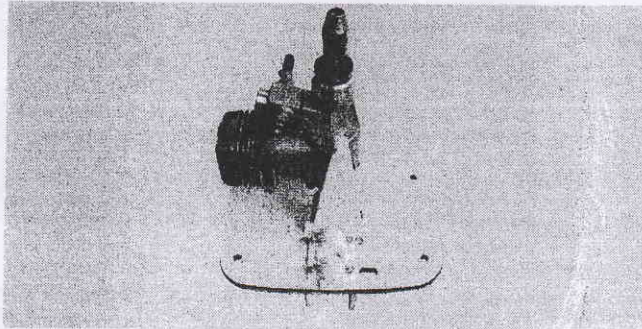
INSTALL ENGINE



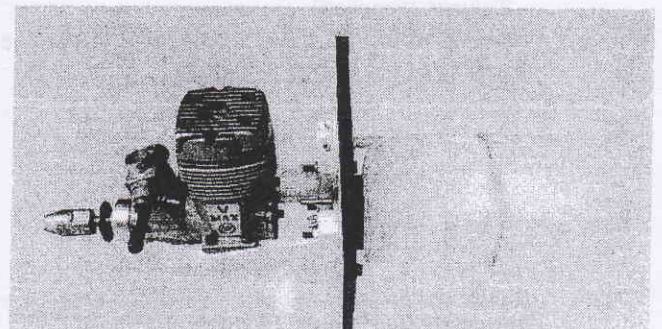
12A - Engine size from .46 to .62 2 cycles or .60 to .90 4 cycles (the VMAX .52 recommended)



12B - Mount the engine to the engine mount



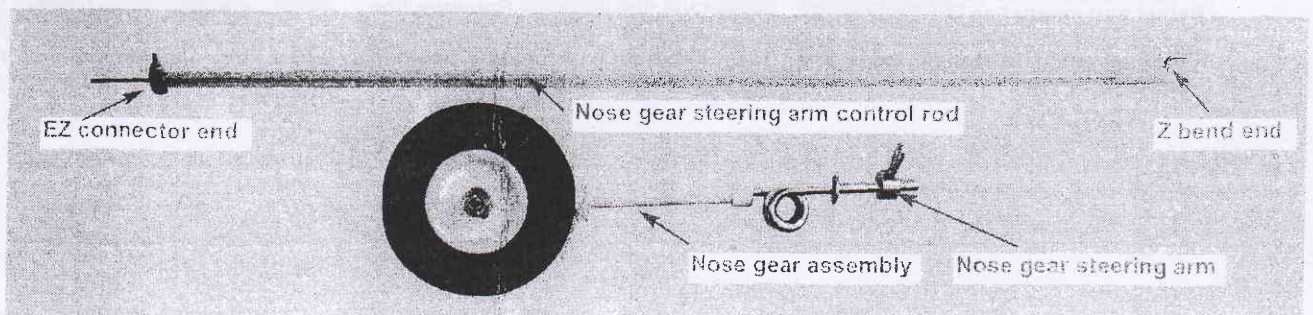
12C - Mount the engine to the power module



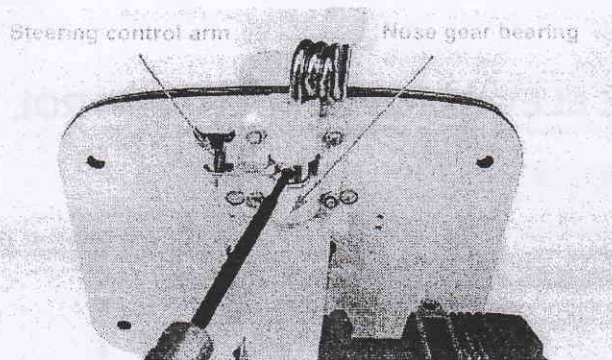
12D - Mount the fuel tank to the power module

STAGE 15

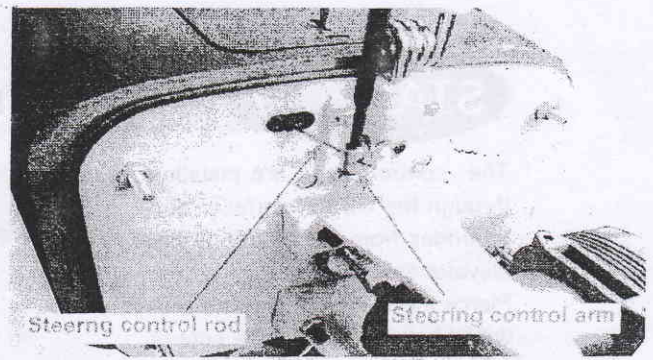
INSTALLING THE NOSE GEAR



13A - Nose gear assembly and nose gear steering control rod

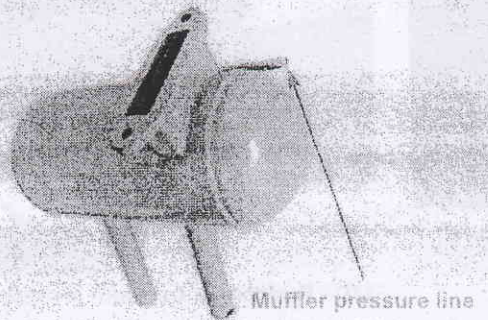


13B - insert the steering control arm to the nose gear bearing, then install the nose gear assembly to the nose gear bearing

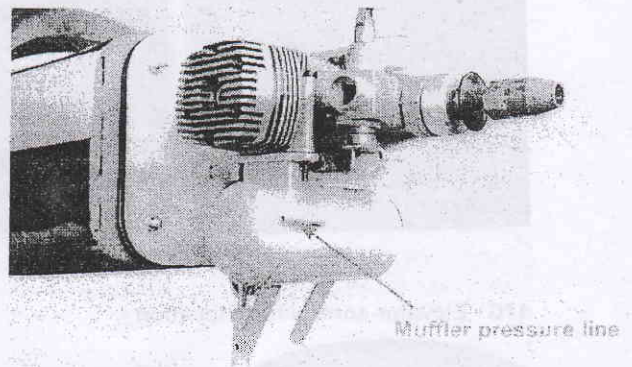


13C - Install power module to the fuselage, connect the steering control rod to the steering control arm

STAGE 14 INSTALL THE ENGINE MUFFLER

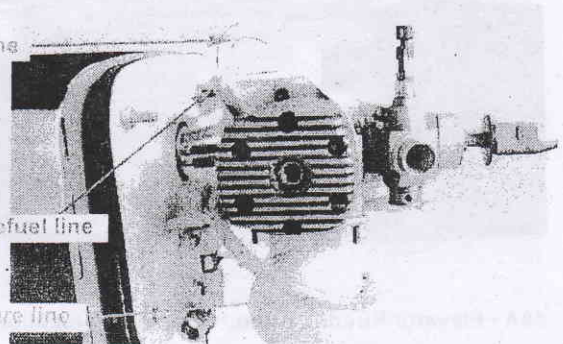
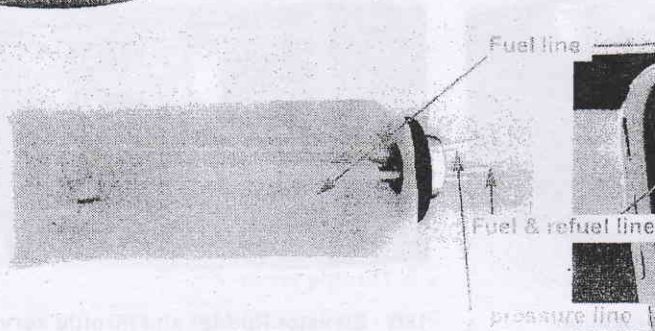


14A - VMAX .46-.55 2cycles incowl muffler



14B - Install muffler to the engine

STAGE 15 CONNECTING THE FUEL & PRESURE LINE

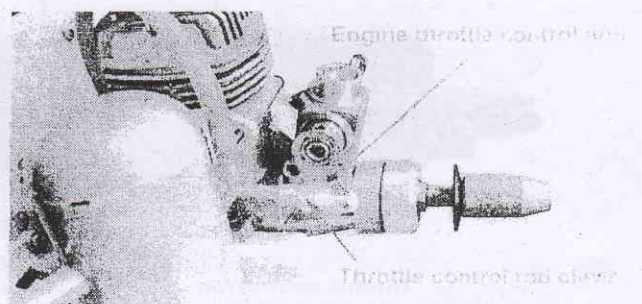


15A - Fuel line connected to the carburetor and pressure line connected to the muffler

STAGE 16 CONNECTING THROTTLE CONTROL ROD TO THE ENGINE



16A - Typical connecting the throttle control rod between throttle servo control arm to the engine throttle control arm



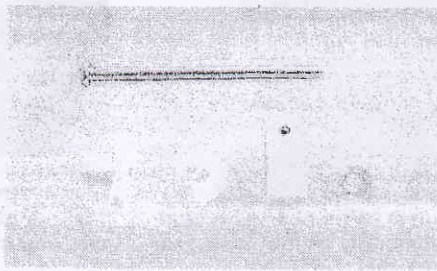
16A - Clevis attached to the engine throttle arm

STAGE 17

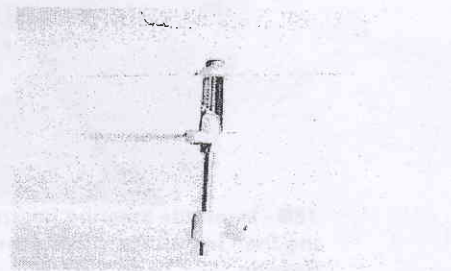
FITTING THE ELEVATOR & RUDDER CONTROL HORNS

The control horns are installed through the control surfer and protrudes from the bottom of the elevator or rudder.

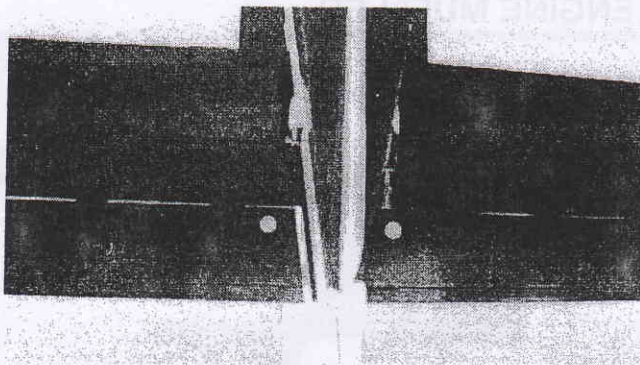
Pierce the covering over the pre-drilled hole and install the control horn as shown



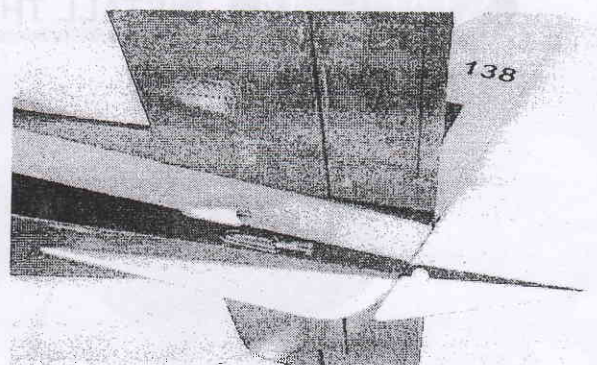
17A - Control horn assembly



17B - Typical control horn mounted to a control surface



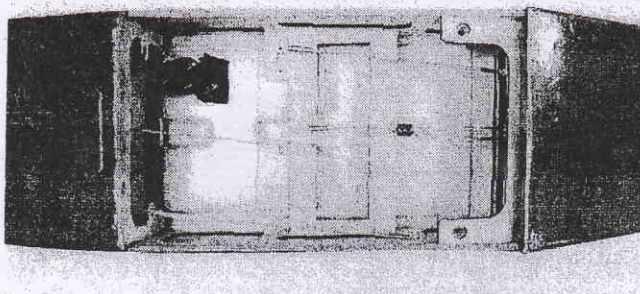
17C - Elevator control horn location



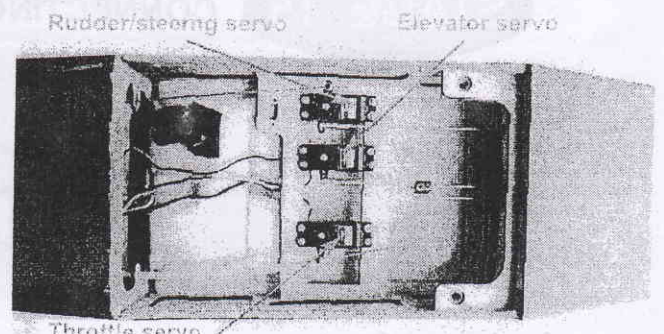
17D - Rudder control horn location

STAGE 18

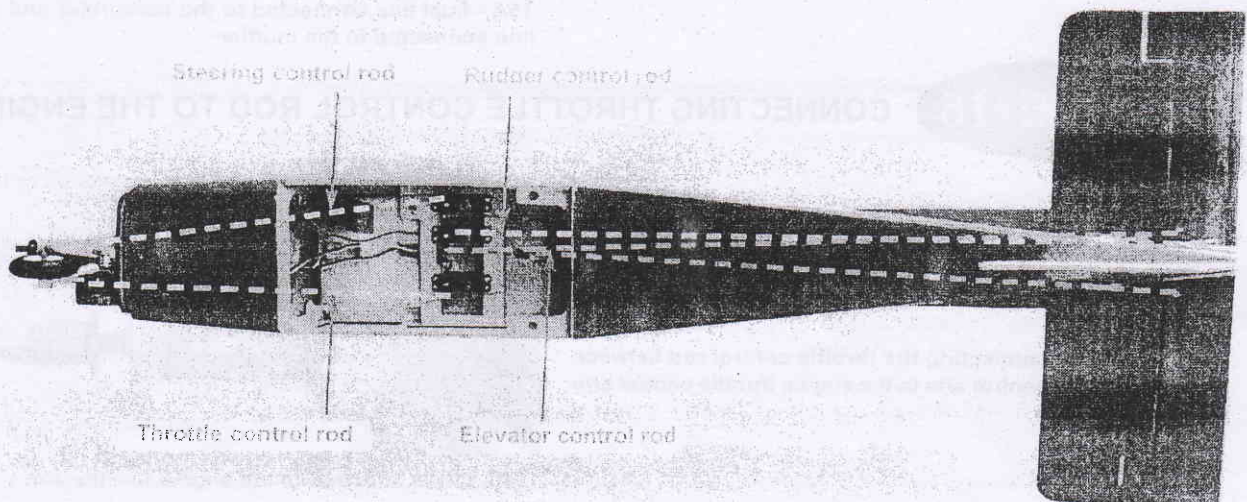
INSTALLING THE SERVOS



18A - Elevator, Rudder and throttle servos location



18B - Elevator, Rudder and throttle servos installed

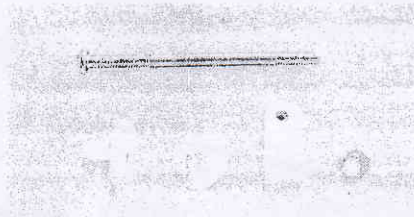


18C - Typical connecting between servos to rudder, elevator, nose gear steering and engine throttle

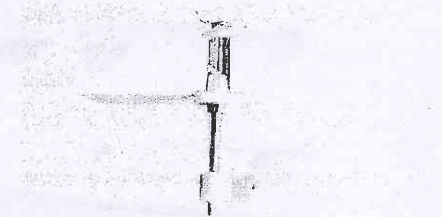
STAGE 19

FITTING THE ELEVATOR & RUDDER CONTROL HORNS

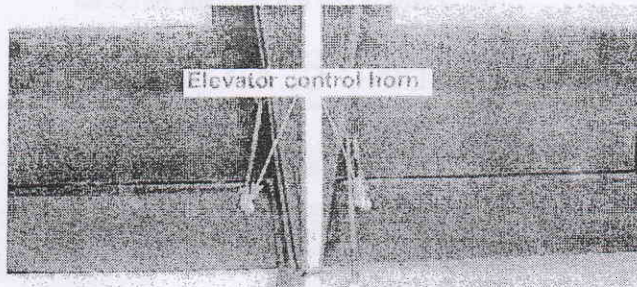
The elevator control horn is installed through the elevator and protrudes from the bottom of the elevator as shown in 21B and 21C. Pierce the covering over the pre-drilled hole and install the control horn as shown.



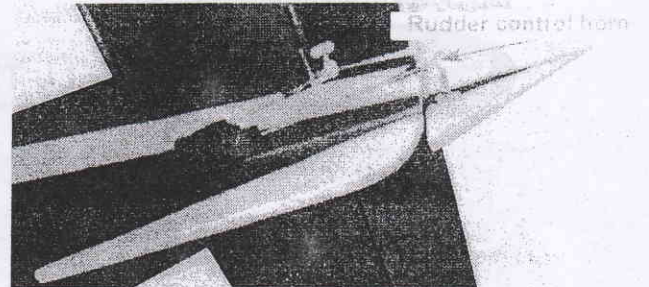
19A - Control horn assembly



19B - Typical control horn mounted to a control surface



19C - Elevator control rod connected to the elevator control horn

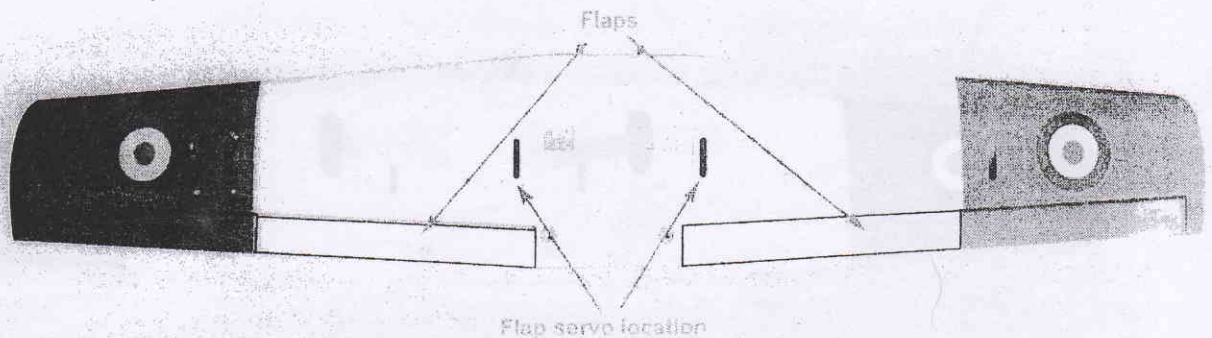


19D - Rudder control rod connected to the rudder control horn

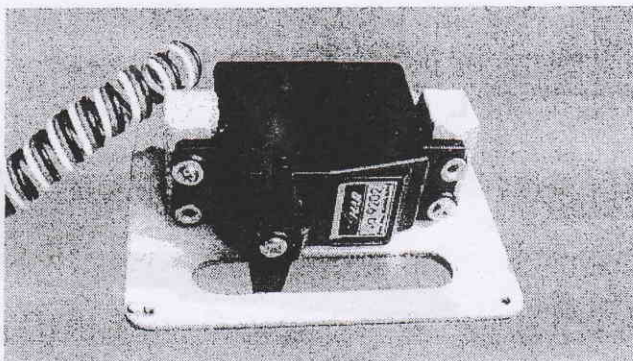
STAGE 20

INSTALL THE FLAPS SERVOS AND CONTROLS

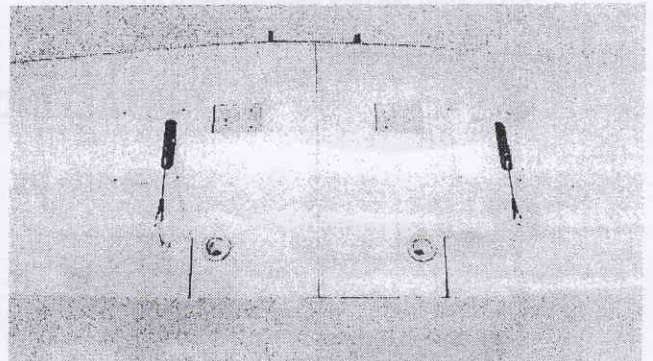
This VMAR model comes with flaps. If you do not plan on using the flaps, secure them in their neutral positions. To activate the flaps, install the control linkages and servos as show in



20A - Note the orientation and positions of the flaps and flaps servos location



20B - Install the flap servos to the servo mouth



20C - Install the flap control rods between the servos and the horns



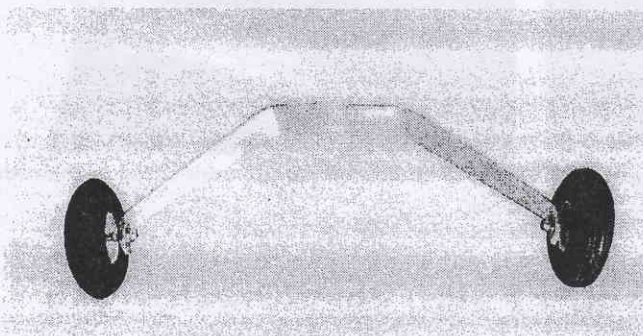
20D - Flaps in the neutral position



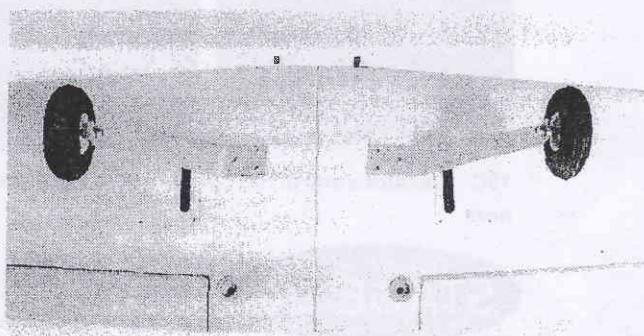
20E - Flaps in the full activate position

STAGE 21

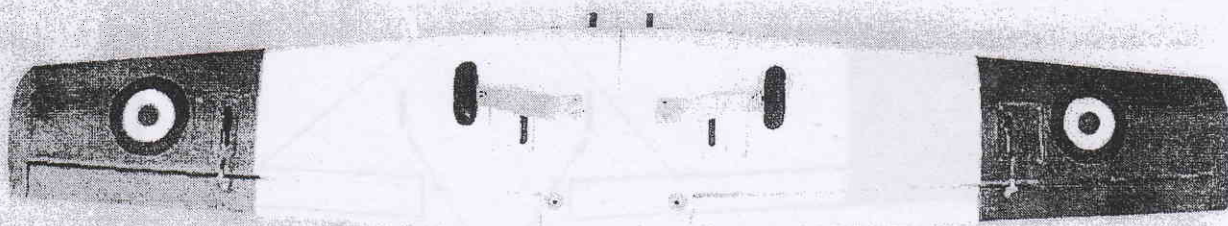
INSTALL THE MAIN LANDING GEAR



21A - Main landing gear



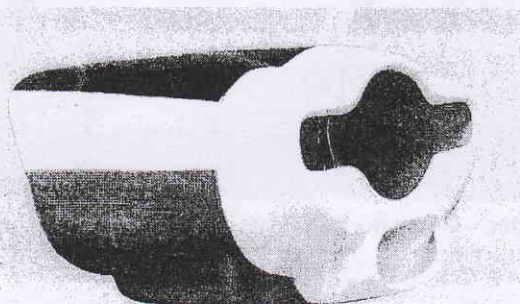
21B - Use six 3 x 15mm screws to mount the main landing gear to the wing



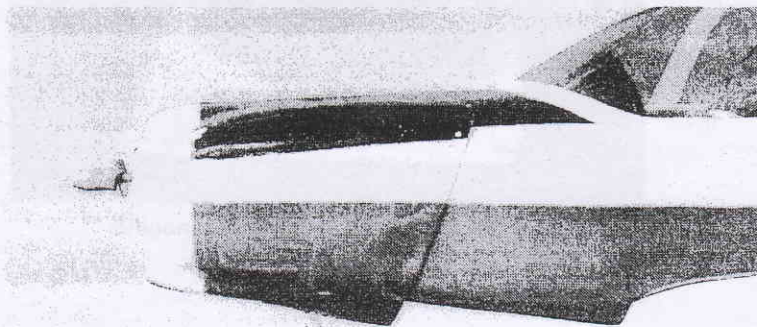
21D - Main landing gear installed to the wing

STAGE 22

INSTALLING THE COWL



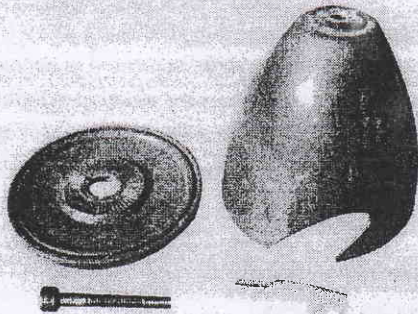
22A - Pre-painted cowl



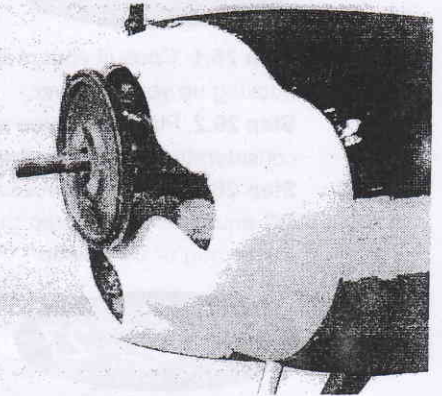
22B - Cut fit and mount the cowl to the fuselage

STAGE 23

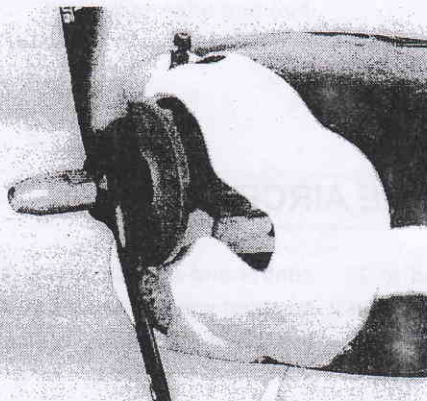
INSTALLING THE PROPELLER AND THE SPINNER



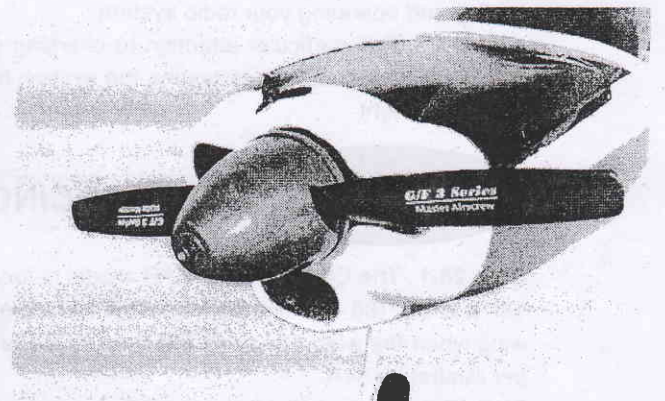
23A - Aluminum spinner completed with all hardware



23B - Install the spinner backing plate



23C - Install the propeller, the prop washer and the prop nut



23D - Install the spinner cone using the retaining hex bolt. Ensure the retaining bolt is tight and secure

STAGE 24

FINAL RC SET-UP

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 ailerons, 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).

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. The most popular transmitter mode (with the throttle on the left, with ailerons and elevator on the right) is shown here.

STAGE 25

INSTALLING THE RECEIVER BATTERY

Step 25.1 Consult your radio manual for instructions about hooking up your receiver battery, receiver and switch harness.

Step 25.2 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 under the fuel tank or nearby.

Step 25.3 Thread the battery pack connector back through from beneath the fuel tank to the radio compartment by passing the battery connector through an opening beside or beneath the fuel tank.

Step 25.4 Connect the battery connector to your radio system according to the radio manual.

STAGE 26

INSTALLING THE RECEIVER

Step 26.1 Consult your radio manual for instructions about hooking up your receiver.

Step 26.2 Plan where you are going to put the receiver with consideration for routing the antenna safely.

Step 26.3 Wrap the receiver securely in foam suitable for RC equipment and wrap the foam insulated receiver in a plastic bag or cling wrap.

Step 26.4 Generally in the absence of specific instructions from the radio manufacturer, it is recommended that the receiver should be placed where it is least likely to have impact during a crash. Keep the battery pack and other heavy loose items ahead of the receiver.

STAGE 27

CONFIRM RADIO OPERATION

Step 27.1 Consult your radio manual for instructions about testing and operating your radio system.

Step 27.2 Pay particular attention to charging your radio system batteries and range testing the system before and after each flight.

Step 27.3 Check that all controls are working correctly before and after each flight.

STAGE 28

BALANCING THE AIRCRAFT

Step 28.1 The CG for your VMAR model is located at 3-1/8" to 3-3/8" (80 - 85 mm) back from the leading edge of the wing when the wing has been attached to the fuselage as per illustration 34A.

Step 28.2 For the initial flight, the CG should be located at 3 1/8" (80mm) back from the leading edge of the wing when the wing has been attached to the fuselage.

Step 28.3 The CG is measured with the engine, radio gear and all other components installed but WITH NO FUEL IN THE TANK.

Step 28.4 Set up the CG as it will be when you fly it BUT WITH NO FUEL IN THE TANK.

Step 28.5 It is very important to have the CG correct. Flying your model with the CG too far back 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 weight 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.

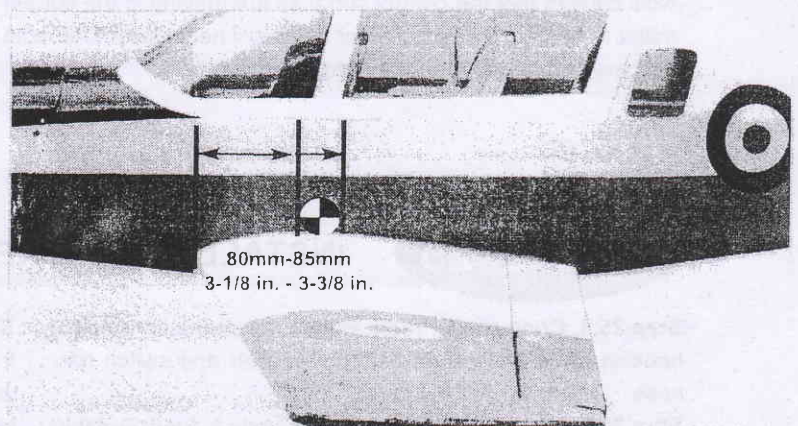
STAGE 29

CONFIRM MECHANICAL INTEGRITY

Step 29.1 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 it twice!!

Step 29.2 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.

Step 29.3 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!



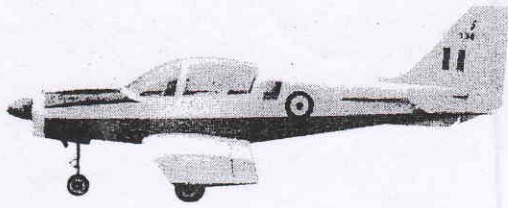
33A - CG location

WE RECOMMEND MEDIUM GRADE THREAD LOCKER BE APPLIED SPARINGLY TO ALL METAL TO METAL SCREW FASTENERS. DO NOT APPLY TO PLASTIC

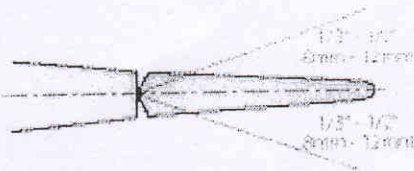
CONTROL SURFACE THROW SPECIFICATIONS:

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

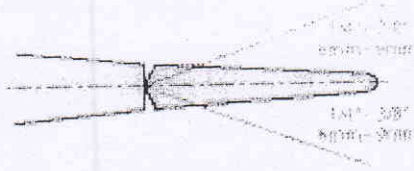
also use ATV's if your radio has them but the mechanical linkages should still be set so that the ATV's are near 100% for best servo resolution.



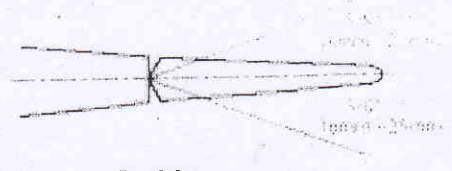
	Low rate	High rate
ELEVATOR	1/3" (8mm) up 1/3" (8mm) down	1/2" (12 mm) up 1/2" (12 mm) down
AILERON	1/4" (6 mm) up 1/4" (6 mm) down	3/8" (9 mm) up 3/8" (9 mm) down
RUDDER	5/8" (16 mm) right 5/8" (16 mm) left	1" (25 mm) right 1" (25 mm) left



Elevator



Aileron



Rudder

Note

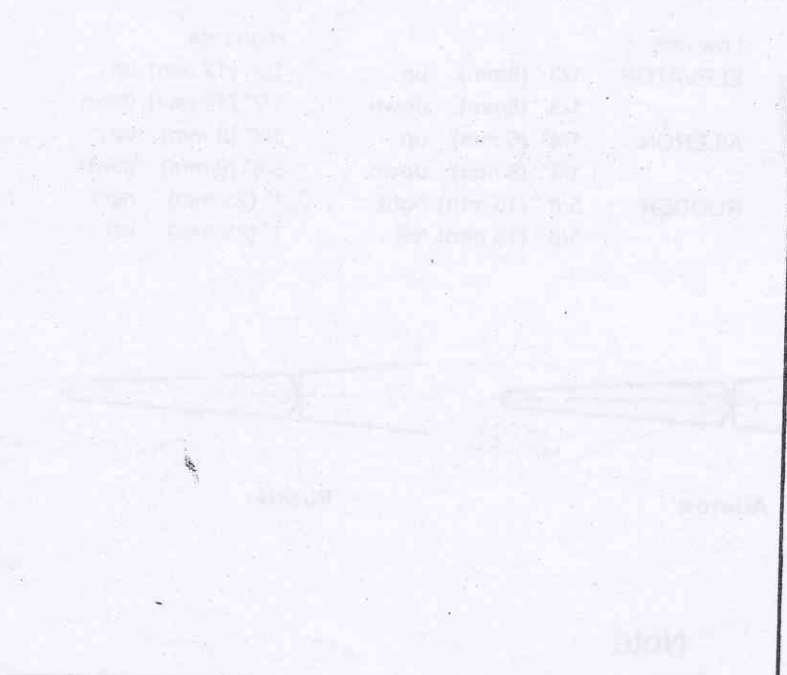
Parts for this VMAR Model

In the event that you require replacement parts for your VMAR - you can order parts from your retailer or from the VMAR On - line store at:
www.richmondrc.com/support.htm

For aftermarket parts and other information related to this model see the VMAR On - Line store at
www.richmondrc.com/support.htm

19

Note



VMAR, POLYCOTE, V-COTE 2-3DS, VMAX and VCA are Trademarks of VMAR Manufacturing Inc. and appointed agents worldwide
 Copyright VMAR Manufacturing Inc. 20080131

typical control horn installation

