# MIG 29 arf plus

Assembly and Operational Instructions Manual



**Manual by Morne Nortier** 



#### Office Taiwan:

No.9.39 Lane, Yuag-Chang 2nd Street, Ren-Wu Hsiang, Kaohsiung Hsien, 814, Taiwan, R.O.C.

TEL: +886 9 3299 7923 FAX: +886 7373 1215 upport: likai701030@yahoo

Tech support: likai701030@yahoo.com

For any further information and updates please visit www.skymasterjet.com

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#### INTRODUCTION

Thank you for purchasing Skymaster MIG29! We have put a lot of effort and time into this model. We at Skymaster strive to be a market leader in the ARF— jet market. We were the first company to produce ARF—jets in the world and we would like to continue being amongst the best. Although we have made every effort that this model was fit for shipping, we would like you to inspect the contends and call your nearest dealer immediately if any defects or missing parts are spotted! This manual will allow you to duplicate the factory prototypes.

#### LIABILITY

You have acquired a kit, which can be assembled into a fully working R/C model when fitted out with suitable accessories, as described in the instruction manual with the kit. However, as manufacturers, we at Skymaster are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the Skymaster company to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

It is important to understand that Skymaster, is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at Skymaster are unable to guarantee, or provide, a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model.

#### **WARNING**

This 'jet' aircraft is a high-end product and can create an enormous risk for both pilot and spectators, if not handled with care, and used according to the instructions. Make sure that you operate your MIG29 according to the AMA rules, or those laws and regulations governing model flying in the country of use. The engine, landing gear, servos, linkages and control surfaces have to be attached properly. Please use only the recommended servos and accessories. Make sure that the 'Centre of Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights. A tail heavy plane can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries, very securely into the plane. Make sure that the plane is secured properly when you start the engine. Have a helper hold your plane from the nose before you start the engine. Make sure that all spectators are far behind, or far in front, of the aircraft when running up the engine. Make sure that you range check your R/C system thoroughly before the 1st flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted, and check the distance you can walk before 'fail-safe' occurs. Then start the engine, run at about half throttle and repeat this range check. Make sure that there is no range reduction before 'failsafe' occurs. If the range with engine running is less then with the engine off, please DON'T FLY at that time. Make sure that your wing spar tube is not damaged. Check that the anti-rotation dowels for the wings are not loose. Check that the wing, stab, fin and nose retaining bolts are tight. Please don't ignore our warnings, or those provided by other manufacturers. They refer to things and processes which, if ignored, could result in permanent damage or fatal injury. Secure the plane before starting engine.





#### ARF Paint

The color finish on your Skymaster MIG29 model was applied out of the mould. We have used only the highest standard automotive paints to finish your model.

Should you damage the finish, Skymaster stock the color paint and hardener required for the repair. A good automotive spray painter should also be able to mix and supply the correct samples for repair.

If you have no experience in the use of these paints, it will be best to seek assistance.

Do not leave your model unprotected in the sun! always cover your model or park it in the shade. Extreme temperatures will damage the paint!

#### Finishing Your All White MIG29 ARF

It is always best to fully assemble the model before painting. By doing so no damage or glue prints will ruin the paint.

The all white model will have some release agent on the surfaces.

Use #1000 wet and dry paper to sand the entire model. Mould lines can be sanded and filled using normal automotive fillers.

Please be extra careful when sanding near the hinge line! The hinges can easily be damaged. When masking and painting please make sure the control surfaces are not bend past 90—180 degrees extensively. This will cause the hinges to crack and may cause flutter.





#### HANDLING & TRANSPORTING

Composite models are very light but strong. These characteristics do have a down side! It is brittle.

Take care when handling your model. DO NOT ATTEMPT TO PICK UP AN FULLY FUELLED MODEL BY THE LEADING EDGE BY YOURSELF! The leading edges will crack and delaminate. Full size jets have specially marked access points for the hooks of cranes!

Inspect your model before and after a rough landing. Make sure all parts are safe and sound.

Inspect model before and after transport. A sudden stop can easily cause an unnoticed dent!

The wings and tails are very flight worthy structures. They are light and extremely strong, however, they will dent if mishandled. Always support these structures on clean soft foam rubber.

#### LIVE HINGE

Skymaster utilize this system of hinging control surfaces because it is a very strong hinge system and is accomplished at the factory.

Occasionally, because of climatic changes, the bottom surfaces may "catch" or interfere with control travel surface actuation. Should this happen, use a fine abrasive strip to further bevel the L.E. of the control surface.

CAUTIONS: Do not apply any primer or paint to the underside of the main surface trailing edge.

Prior to each flight, check that the ailerons and elevators actuate properly, up and down.





#### **TOOL LIST**

- 1. Perma-Grit sanding blocks
- 2. Perma-Grit small files
- 3. X-Acto Razor Saw
- 4. X-Acto hobby knife
- 5. Carbide Cutters (5/pk)
- 6. Set of ball end hex wrenches
- 7. Dremel Drum Sander
- 8. Dremel cut-off discs and mandrel
- 9. Dremel tool
- 10. A good set of small Phillips and slot end screwdrivers
- 11. Steel ruler
- 12. Pin vise to hold 1/16" drill bit
- 13. Soldering Iron
- 14. Solder
- 15. Cable ties
- 16. ZAP CA, epoxy, Aeropoxy
- 17. Microballoons
- 18. Resin mix
- 19. Polyester putty
- 20. Aeropoxy





#### HEALTH

Use a mask (available at auto paint stores) to protect from inhaling the glass or carbon fiber dust. Use this mask whenever you are sanding or cutting fiberglass or carbon fiber materials. Use a charcoal filter paint mask (available at auto paint supply stores) when spraying any primer or paint. Spray out of doors or in a properly vented spray booth. Use safety glasses any time rotary tools, such as Dremel cut-off disc or Perma-Grit cutters, are being used.

#### GENERAL ASSEMBLY TECHNIQUES

We recommend to wax the model before assembling. This will help protect the finish from an epoxy finger print. Wax will not help for CA glues! Extra glue, extra paint, extra resin will add up to a heavy model. Plan before you glue! The glass cloth side of parts to glue, should be sanded with #80 grit paper for best glue adhesion.

Support the fuselage on foam pads.

Skymaster makes every attempt to insure that the parts fit. However, due to manufacturing tolerances, some parts may fit a little tight. Always trial fit parts and adjust if needed.

Only use high quality adhesives such as the ZAP products from Pacer Technology.

For extremely high stress areas we recommend "Aeropoxy." It is the strongest and best gripping adhesive we have found.

If fuel or grease are on the surface, first clean with acetone or thinners.

Clean off all excess glue—excess glue is excess weight.

Always check the outside skin of the model to look for any glue residue and remove it with Acetone before it cures. "Aeropoxy" is tough to remove once it has thoroughly cured.





#### **Radio Equipment**

Failure to use the recommended servos, output arms, extensions, and hardware may result in a loss of control!

Throughout this manual we make use of various types of servos and radio equipment! We have used JR equipment during the installation process. If you make use of another manufacturer, please use equipment with similar specifications!

The MIG29 will require extension leads! Please use high quality extension leads. Make use of ceramic non ferrite cores if leads exceeds 1 meter.

The trend nowadays is to use dual battery management systems and dual RX equipment. With the introduction of 2.4 Ghz even quad RX systems are considered as normal for a jet model.

Always center and install the correct output arms while on the bench, once the servo is in the aircraft access to the servo arm screw is sometimes limited. The JR Matchbox makes this task very easy without using the complete radio system on the work bench.

Do not save any money when buying radio equipment. The price of servo's are far from the price of replacing the entire model.

REMEMBER: The best equipment is only as good as the weakest link. Ask yourself if this servo or link or lead etc is worthy of my trust to protect my very large investment...



**Assembly & Operation Manual** 

#### **COMPOSITE PARTS**



#### Photo 1

Mig29 Fuselage + Hatch + Canopy

Mig29 Nose Cone (radar dome)

Mig29 Nozzles (1pr)

Mig29 Tail Feathers (1pr)

Mig29 Left & Right Stabs

Mig29 Left & Right Fins incl Rudders

Mig29 Left & Right Wings incl Ailerons

Mig29 Gear Door Set



**Assembly & Operation Manual** 

#### **OPTIONAL PARTS**



Mig29 L/G feature oil damped oleos, self lock and unlocking cylinders, air inflatable tyres & Dual disc brakes. The L/G come factory assembled and oleo pressure is factory set.

Photo 2

- 3 x Air Tanks
- 1 x Retract Valve
- 2 x Filler & 2 x Pressure Gauges
- 1 x Electronic Brake Valve
- 5 x Air Tubing, 10 x Quick Disconnect
- 8 x T-pieces, 2 x 4 way



Photo 3



Fuel Accessories.

Pushrod Set
Mig29 Accessories

Fuel Tank (2)



Photo 4 Photo 5

Stainless Steel Tail Pipe & Vectoring



Airpower Optional 5 in 1 Electronic Valve & Sequencer

Control Brake, Gear and Doors





(depend option)
Cockpit (2)





Photo 8



#### **CONTROL LINKAGES**

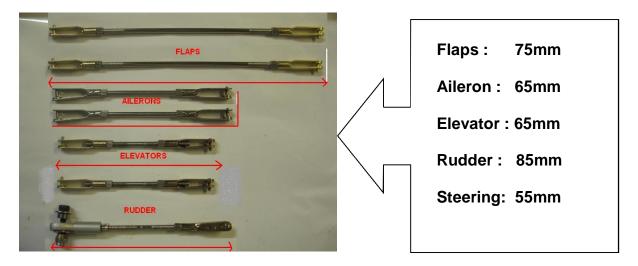


Photo 9

#### **WINGS**

**NOTE:** Make sure to have some sort of protective foam on the work bench. This will protect the paint surface from unwanted dents. Assemble both wings simultaneously. Mark  $\sqrt{\ }$  each step. If you have chose to only use tailerons on your Mig29, Skip this section. Glue flaps and ailerons permanently using aeropoxy. Make sure the control surfaces are all lined up before glue set.

Ц	Remove servo covers
	Inspect plywood mounts. Use CA to glue mounts if needed.
	Check operation of Flaps and Ailerons.
	Trim if needed. Make sure surfaces move freely.
	Check Kevlar hinges for any cracks.
	Trial fit wings to fuselage.
	Cut slot in root for servo wires.



#### **Assembly & Operation Manual**



Fit 2 L-shape servo brackets to 2 x JR DS8511.

The 2 servo's must be mounted back to front with servo horn closets to TE of wing.

Secure servo horns and centre servo's with TX.

Secure 2 x extension wires. Use safety clips on joint.

Photo 10

- ☐ Feed wire through ribs.
- Secure servo's to wing. Use 4 servo screws.
- ☐ Draw a line perpendicular to hinge line.
- Use masking tape to mask off area around control horns. This will help with inserting glue in slots.



Photo 11



- Mark location of horns. Make sure pivot point is directly above hinge line.
- Use Dremel to cut slot for control horns.
- Use 30 minute epoxy to glue control horns
  - After epoxy cured, insert pushrods.

Photo 12

- U Cut slots in servo cover to clear servo horns.
- Secure servo covers with 4, 1mm set screws.



Photo 13



Photo 14





#### **STABILIZERS**

**NOTE:** Make sure to have some sort of protective foam on the work bench. This will protect the paint surface from unwanted dents. Assemble both stabilizers simultaneously. If your stabs will act as elevons extra care should be taken when selecting servos and links. Make sure servos are not forced past its end points when max elevator and aileron are applied. Mark  $\sqrt{}$  each step.



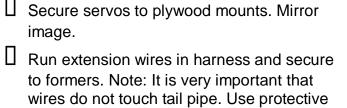
Inspect the surface for any damage

- Locate 2 x DS8711 servos and secure long HD plastic servo horn to servo.
- Connect both servos to RX and set up TX for dual elevators or elevons. Centre both servos.



Photo 16

sleeve if you feel like it, although the proto-



If using Sullivan clevises you need to drill servo horn. STD holes will be too big and flutter will occur. (Use bearing links for best results)

Insert Stab. Note that notch on shaft face bottom and plastic bearing between stab and fuselage.

Secure stabilizer horn to shaft. Use loctide on bolts.

☐ Fit Elevator pushrod, Use Sullivan safety clips.

Play on linkages will cause flutter and destroy your Mig! We recommend to mass balance each elevator with 45 grams of lead.

☐ Check operation if elevators.

type did not have.



**Assembly & Operation Manual** 

#### FIN & RUDDER

<u>NOTE:</u> Make sure you have some sort of protective foam on the work bench. This will protect the paint surface from unwanted dents. Complete both fins simultaneously. Mark  $\sqrt{\ }$  each step.

Fit L-brackets to DS8411 servos. Note servo horn face top and closets to trailing edge of fin. Installation of fins must be mirror image of each other.
 Remove servo cover. Inspect plywood mounts.
 Trial fit servo into fin & make sure horn clear skin.
 Drill 4 holes and secure servo to mounts.
 Mark location of rudder horn. Mask off area.
 Glue rudder horn in position. Check for free operation.
 Install long servo horn and centre servo.



Photo 17



Photo 18



Cut slot in servo cover for horn.

Photo 19

- Fit rudder links. Use Sullivan secure clips. Make sure all angles are 90 degrees.
- Secure extension wires inside fuselage. Make sure no wires touch tail pipe.



Photo 20

- Trial fit fin to fuselage. Test rudders to make sure no binding on fuselage.
- Secure fin with bolts to fuselage.





#### **NOSE GEAR & DOORS**

**NOTE:** If you have purchased the <u>ARF PLUS PRO KIT</u> proceed to page 19. On the pro kit all doors and LG already installed. Work on a secure and protective surface. This will protect the paint surface from unwanted dents. Mark  $\sqrt{\ }$  each step.



Photo 21 Photo 22 Photo 23

- Landing gear blocks should have all have blind nuts installed already by factory.
- Trial fit nose leg to mount. Make sure actuator move gear fully up and down.
- ☐ Make sure no binding of gear to fuselage.
- Remove actuator from gear. Fit steering servo to. Centre servo and fit pushrod. Fit air tubing to nipples. Secure nose leg to mounts with 4 bolts.
- Locate 2 nose gear doors. Align and sand to fit.
- Glue hinges to doors. Trial fit and glue to fuselage. Make sure it operates correctly.
- Glue cylinder mounts to door. Trial fit cylinders and secure in position.







Photo 24 Photo 25 Photo 26



**Assembly & Operation Manual** 







Photo 27 Photo 28 Photo 29

- Run all air tubing in harness. Make sure servo wires and air tubing do not interfere with operation.
- Refit actuator and secure with 4 screws.
- Locate front door. Make plywood brackets and secure to actuator. Glue door to plywood structure. Check operation. Make sure door is flush when gear is up.







Photo 30 Photo 31 Photo 32

#### **MAIN GEAR & DOORS**





Photo 33



Photo 34

**Assembly & Operation Manual** 







Photo 35 Photo 36 Photo 37

- Holes should have factory installed blind nuts. Trail fit and sand fuselage if needed.
- ☐ Secure landing gear. Make sure gear can fully retract and lock in down position.
- Locate door 1. Trial fit and sand to shape. Manufacture hinge extensions from glass board and glue to door. Glue hinges to extensions.
- Trial fit door to fuselage and glue in position.







Photo 38 Photo 39 Photo 40

Glue cylinder mount to wing tube insert and gear door. Fit cylinder.







Photo 41 Photo 42 Photo 43

- Locate door 2. Trial fit and sand to shape.
- Glue 2 steel pins as hinges. Glue cylinder mount to door.



**Assembly & Operation Manual** 

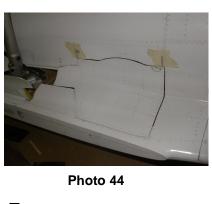






Photo 44 Photo 45 Photo 46

- ☐ Tape door in position and glue 2 slotted plywood blocks to form hinge.
- ☐ When happy with fit manufacture collapsible hinge support. (page48)
- $\sqcup$  Fit cylinder and check operation.







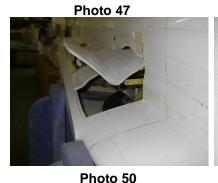




Photo 51









Photo 52

Photo 53 Photo 54 Photo 55

- Locate door 3 and glue plywood former to door. Manufacture hinge from ball joint.
- Cable tie door to actuating arm. Close all doors and adjust correct fit.



#### TAIL PIPE

This section is for conventional bifurcated tail pipe. If you are installing the thrust vectoring tail pipe, please skip to next page.



Photo 56 Photo 57 Photo 58

- Slide the tail pipe into the fuselage.
- Align tail pipe so that bellmouth sits just behind rear former.
- Secure tail pipe to rear former.
- Secure bellmouth with silicon to pipe.



Photo 59 Photo 60 Photo 61

- Slide nozzle over rear pipe and bolt to former.
- Glue former in tail feathers. Secure tail feather to pipe.
- Make sure all parts line up and are in straight line.
- The rear tailpipe must slide over tail pipe.
- Bolt rear nozzle to fuselage using 3 bolts.





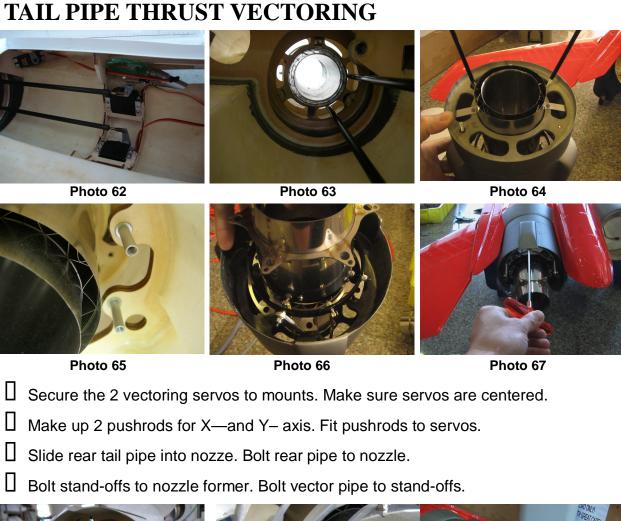








Photo 68 Photo 69 Photo 70

- ☐ Slide nozzle over tail pipe and secure to fuselage with 3 bolts. Make sure pushrods move freely through nozzle section.
- Fit pushrods and use incidents meter to check 0 degree when servo horn is 90 degree.









Photo 71 Photo 72 Photo 73

- When happy with movement, remove vectoring pipe.
- ☐ Fit former to vectoring pipe
- Trail fit tail feather to former. Check clearance at nozzle. Tail feathers must be able to move 360 degrees.
- When happy glue with 30 minute epoxy.
- Refit vectoring pipe and check operation. Pipe should be able to move on X-Y axis.







Photo 74 Photo 75 Photo 76

Repeat for other nozzle.



**Assembly & Operation Manual** 

#### **FUEL CELLS**

The fuel system is very important. A good installation will ensure trouble free operation and no flame outs due to air bubbles. Make use of an air trap. We recommend BVM UAT.



Photo 78

Rinse tanks and make sure no foreign objects from manufacturing process stayed behind in tank.

Do a pressure test and see if tank is secure no cracks on seam lines.

Mark the top of tank . Also draw arrows to show direction of flow.



Make up 3 x fuel fittings. Make sure clunk will reach all

corners of tank.



Photo 80

- When you cut copper pipe, make sure to ream ends for better operation.
- ☐ Fit fitting to tank. Tighten bolt and do an air test. Make sure no leaks are present. Do not over tighten bolt.
- Silicon glue tank to bottom of fuselage and inlet duct.
- ☐ Install UAT in cockpit area of fuselage.



Photo 81

- ☐ Plumb tanks with tygon tubing.
- Fill and drain tanks! Check that no air are trapped in tanks. UAT must drain last and stay full of fuel all the time during draining.
  - Paint bottom of fuselage and tank with heat resistant paint.



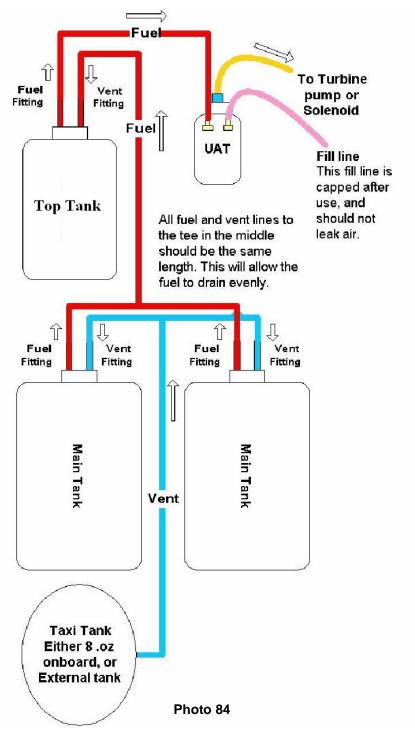
Photo 82



Photo 83



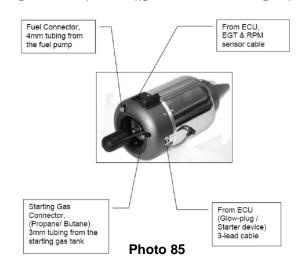
#### **FUEL CELL DIAGRAM**



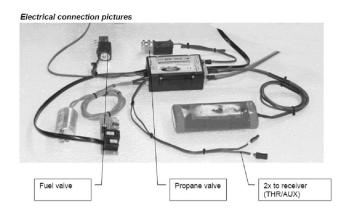


**Assembly & Operation Manual** 

#### TURBINE INSTALLATION



- Please follow the instructions supplied with your turbine.
- Secure turbine to turbine rail via hatch on top of fuselage. Leave gap of 25mm between NGV and tailpipe.
- Run all turbine wires and power cables on opposite side of servo wires.
- Always secure all wires in harness. I would suggest you install a FOD. This will save you money in the long run.
- Install fuel pump close to UAT. We recommend to make use of a mechanical shut off valve as well.
- Secure all Festo pipes with cable ties. Make sure fuel filter and gas canister are mounted vertical.
- Install NiCad or LiPo battery in nose. I always put a fuse holder inline with power cable.



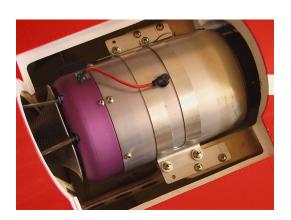


Photo 86 Photo 87



#### **Assembly & Operation Manual**

#### **AIR SYSTEM**



Glue the air tanks with silicon to fuselage. I have installed the 2 large tanks for operation of gears, doors and brakes.

Fit the 2 filler valves and 2 pressure gauges onto accessory tray.

Plumb the landing gear, door and brake system by using color air tubing. T all same color tubing together until a single pipe emerge.

Route all 5 pipes to the accessory tray in front

The air system will consist of: Air up, Air down retracts (2) Air up, Air down doors (2) Air out brakes (1)

Photo 88



Total of 7 pipes

There are 2 options available for the air system: Mechanical Valves or Electronic Valves

For mechanical valves you will need 2 x 2 way valves and 1 x 1way valve with 3 servos and sequencer.

Photo 89

The electronic EV5U will do all the above in a single unit. This will make installation much simpler and save space. Air leaks can damage your model! Please do a thorough check for air leaks. Make sure the system can hold pressure for at least an hour in the up and down position. ☐ Do not rush this installation.





### **AIR DIAGRAM**

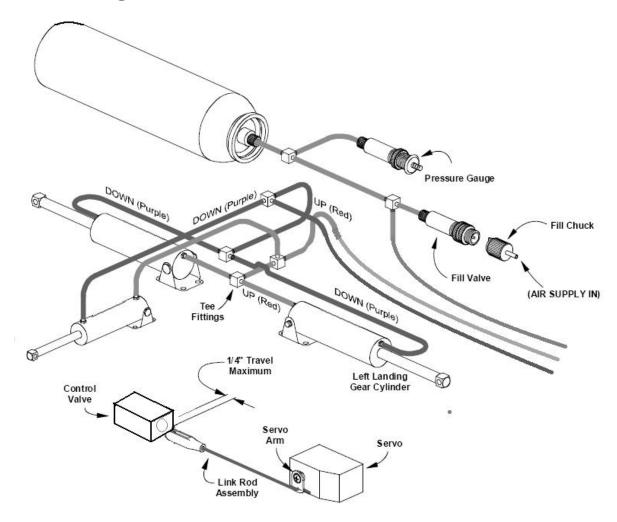


Photo 90 Diagram for retracts





#### **COCKPIT AND CANOPY**

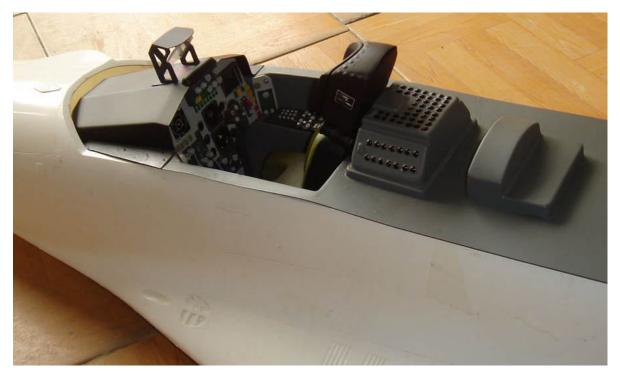


Photo 91

- Slide cockpit in position. Use Dremel drum sander to sand fuselage canopy frame to clear cockpit.
- Cut cockpit to size.
- $\ \square$  Use small 2mm self tap screws to secure cockpit in position.





#### **EQUIPMENT INSTALLATION INTO VIPERJET**

- Equipment installation is a personal venture. There is one golden rule: Do it as neat and logical as possible! This will make faultfinding and service of components easier. The Viper basically consist of 6 circuits!
- 1. Servo wires
- 2. Power cables
- 3. Data cables
- 4. Pneumatic pipes
- 5. Fuel pipes
- 6. RX cable



Photo 92

Please try and separate these circuits as far as possible. It is advisable not to run RX cables near any kind of electrical fields.

Make all switches and filler valves and charging sockets easy accessible.



Photo 95



Photo 93



Photo 94





#### **BEFORE YOU FLY**

It is assumed that the builder of this kit has acquired the basic skills and knowledge necessary to make a safe and functional radio control installation into a model. Therefore, these notes are intended only to assist that experience.

	Travel adjust measured at root.			
2. 3. 4. 5.	Elevator Rudder Aileron Flaps take off Flaps landing VT	40mm 30mm 25mm 15 degrees 45 degrees 20 degrees each way		
NOTE: Make sure flaps travel same. Use Powerbox or Matchbox to match travel. Flaps should be deployed in landing circuit only below 90mph				
	CG	220mm—230mm from leading edge at root. Empty tanks, UAT full and wheels down.		
	Weight	Dry weight will be between 28 and 35 lbs depending equipment.		
	PSI	80—100 psi for pneumatic system		
	Power	JR equipment operates on 4.8V. If you use 5 cell packs please use a voltage regulator. I prefer 4 cell 2400mA RX packs. Lipo packs are standard with Powerbox installations		
	TX RX	Do a complete range check before flight. Do this with turbine running. Follow manufacturers instructions.		
	Speed	Set the maximum speed to 180mph! The prototype were tested with Jetcat P-160 and P-180 turbines. More powerful turbines require extra care and extra reinforcing.		
	Timer	A timer can safe your model. Get into the habit of programming		



the timer.



#### Take-Off

Do some taxi tests before your flight! Make sure you are familiar with all settings and make sure the model track straight on the ground without rudder input.

Choose a fine day for the maiden flight. Do not force a maiden flight! Murphy will visit you!

Select take off flap or flight mode 1 and open throttle. Gently pull back on stick 30m down the runway. The MIG will be in the air faster than you expect. Raise the flaps and gear at safe altitude and let the model sit on rails.

#### **Slow Flight**

Most of the first flight should be utilized to get familiar with the slow speed flight characteristics. Select the flaps to the takeoff position; there should be no pitch change. Extend the gear and select full landing flaps; adjust the power to maintain level flight and a speed of about 80—90mph.

Climb to a safe altitude and slow the model to the edge of a stall to know where that edge is.

#### Landing

Fly a complete circuit before landing. Approach from the downwind side and lower the LG. Fly a complete circuit getting use to the power required. On the next circuit lower the flaps. If you have a headwind be very careful not to get below the power curve on the downwind side.

Align the model and use throttle to control the descent! The elevators will stay very active even at low speed. Flare the model just before touch down. Let the model roll out and apply brakes.

Taxi back and do necessary adjustments to customize MIG for your need!

We at Skymaster wish you many happy flights with your MIG29!

Regards,

Anton Lin and Skymaster Team!

