ARF PLUS PRO PC21

1/4 Scale Almost-Ready-To-Fly RC Model
Assembly and operations manual

Spesifications

Scale :	1/4	Length :	112.5”: (2850mm)	Span :	90 ”: (2288mm)
Weight :	18Kg	Engine :	Jetcat SPT5	Radio :	12 Ch (8 servos)

The PC21 by Skymaster

The 1/4 PC21 produced by Skymaster is the result of years of R&D work and excessive testing. We are proud that you have decided to buy the best ARF 1/4 PC21 in the market today. We hope you enjoy your PC21 Please note that the photos show certain views from the prototypes. Some modifications and upgrades might have taken place by the release of the model. We have tried to produce a very scale replica of this turbo prop. This manual describes the assembling of “ PRO” model. Landing gear and doors are factory installed. Before you start building and setting-up your aircraft, please make sure you have read this instruction manual, and understood it. If you have any questions, please don’t hesitate to contact us. Below are the contact details:

Office Taiwan:
No.15, Min-San 3rd Street, Ren-Wu Area, Kaohsiung, 814, Taiwan, R.O.C.
TEL: +886 9 3299 7923
FAX: + 886 7373 1215
http://www.skymasterjet.com
Sales : skymasterjets@hotmail.com
Technical support : morne.m@pixie.co.za

Index:

PC21 arf pro

Assembly & Operation Manual

INTRODUCTION

Thank you for purchasing Skymaster arf pro pc21 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 judgment 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 jet 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 ‘fail-safe’ 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.

Skymaster ARF PLUS PRO

ARF Paint

The color finish on your Skymaster PC21 arf pro 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 PC21 ARF PRO

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.

The rudder and clear canopy are not installed. It is best to install these components after painting was done.

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 FUELED 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!

We recommend to REMOVE the elevators and wings for transport. It will only take a couple of seconds.

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.

Tools and Adhesives
Tools etc:

This is a fairly quick and easy plane to build, for a jet model, not requiring difficult techniques or special equipment, but even the building of Skymaster aircraft requires some suitable tools! You will probably have all these tools in your workshop anyway, but if not, they are available in all good hobby shops, or hardware stores like "Home Depot" or similar.

1. Sharp knife (X-Acto or similar)
2. Allen key set **(metric)** 2.5mm, 3mm & 5mm
3. Sharp scissors, curved type for canopy
4. Pliers (various types)
5. Wrenches **(metric)**
6. Slotted and Phillips screwdrivers (various sizes)
7. Drills of various sizes
8. Battery drill and Dremel tool (or similar) with cutting discs, sanding tools and mills
9. Sandpaper (various grits), and/or Permagrit sanding tools.
10. Carpet, bubble wrap or soft cloth to cover your work bench (most important !)
11. Car wax polish (clear)
12. Paper masking tape
13. Denaturized alcohol, Acetone, or similar (for cleaning)

Adhesives:

Not all types of glues are suited to working with composite parts. Here is a selection of what we normally use, and what we can truly recommend. Please don't use inferior quality glues - you will end up with an inferior quality plane, that is not so strong or safe. Jet models require good gluing techniques, due to the higher flying speeds, and hence higher loads on many of the joints. We highly recommend that you use a slow cured epoxy for gluing highly stressed joints, like the hinges and control horns, into position and the most commonly used is 'Aeropoxy' (Bob Violett Models, USA). The self-mixing nozzles make it easy to apply. It takes about 1 - 2 hours to start to harden so it also gives plenty of time for accurate assembly. Finally it gives a superb bond on all fibreglass and wood surfaces.

1. CA glue 'Thin' and 'Thick' types. We recommend ZAP, as this is a very high quality.
2. ZAP-O or Plasti-ZAP, odourless (for gluing the clear canopy)
3. 30 minute epoxy (stressed joints must be glued with 30 min and NOT 5 min epoxy).
4. Aeropoxy/Loctite Hysol 3462 or equivalent (optional, but highly recommended)
5. Epoxy laminating resin (12 - 24 hr cure) with hardener.
6. Milled glass fibre, for adding to slow epoxy for stronger joints.
7. Micro-balloons, for adding to epoxy for lightweight filling.
8. Thread-locking compound (Loctite, or equivalent)

At Skymaster we try our best to offer you a high quality kit, with outstanding value-for money, and as complete as possible. However, if you feel that some additional or different hardware should be included, please feel free to let us know.

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 have used JR equipment. If you make use of another manufacturer, please use equipment with similar specifications!

The model will require extension leads! Please use high quality extension leads.

The trend nowadays is to use dual battery management systems and dual RX equipment. Using S-bus or X-bus will simplify your installation. Consult your radio manufacturer for further detail.

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.

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...

Accessories

1. 2 DS8911 servo's for the elevator.
2. 2 DS 8911 for ailerons + 2 DS 8911 for Flaps
3. 1 DS8911 for rudder
4. 1 JR8511 steering servo.
5. 2 x 2way valve + 1 x 1way valves + sequencer for landing gear + doors + brakes
6. Powerbox Royal with build in matchbox function.
7. Pneumatic support set for landing gear
8. 1 x Turbo prop motors, with power 5kW with accessories.
9. Fuel tubing, Hopper tank (or BVM UAT), festo fittings, fuel filters, fuel tube etc
10. Cable ties in various lengths.
11. Radio system with S-bus or X-bus technology (will simplify the radio installation)

Did you understand everything in this manual completely?
Then, and only then, let's start assembling your model. If not, please read it again before you start the assembly.

PC21 arf pro

Assembly & Operation Manual

Kit Contents

Picture A

PC21 ARF PRO Contents:

Picture A
- Fuselage front and rear section.
- Fin + Rudders & engine hatch.
- Nose gear + Main gear + doors installed
- Wings left and right + flaps + aileron
- Elevator left and right
- Flap horns fearings
- Canopy assembly + glass
- Wing tube
- Stabilizer tubes (2)

OPTIONAL PARTS

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

Photo 2

Photo 3

Fuel Tank

Accessory Set

Photo 4

L/G hydrolic set

Photo 5

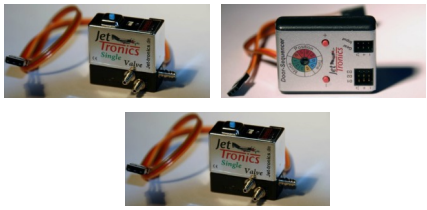


Photo 6

Jettronic 2way & 1 way valve & Sequencer

Control Brake, Gear and Doors

Photo 7

Cockpit + Pilot

5 Blade Prop

Photo 8

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 √ each step.


Photo 9

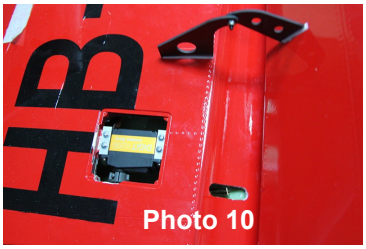


Photo 10


Photo 11

- ☐ Use masking tape to keep flap in position. Mask off area for carbon hinges.
- ☐ Assemble 2 pr carbon hinges and mark slots for carbon hinges onto wing.
- ☐ Dremel slots for hinges and glue hinges to both flap and wing.
- ☐ Make sure hinge points are all aligned and high of each hinge same.
- ☐ When dry—trail fit the hinge fairings. Glue in place.
- ☐ Secure flap servo with aluminum brackets.
- ☐ Mark slots for flap pushrod. Dremel slots to clear push-rods.
- ☐ Glue flap horn to flap—note—**make sure horn is secure into balsa in flap.**
- ☐ Install pushrod and check operation of flap. Set flap travel as shown. 38mm
- ☐ Secure aileron servo with 2 aluminum brackets.
- ☐ Cut slots for pushrods.(Note—Internal pushrods are shown. You may use external pushrods.)
- ☐ Glue aileron horn to aileron. **Make sure horn is glued into balsa block into aileron.**
- ☐ Fit pushrod and secure cover.
- ☐ Repeat for other wing.

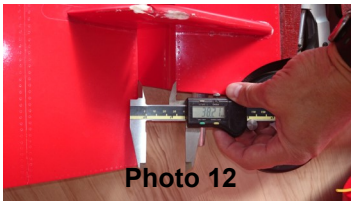


Photo 12

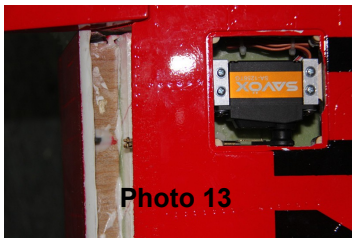


Photo 13


Photo 14

ELEVATORS & RUDDER

NOTE: Use some protective foam on the work bench to protect the paint surface from unwanted dents. A removable elevator mechanism is installed. Mark √ each step.

- ☐ Fit servo horn and centre servo using radio. Remove horn. Mark location of horn. Dremel hole to clear horn, refit horn.
- ☐ Fit horn to servo bracket via root of stab.
- ☐ Mark location for elevator horn.
- ☐ Cut slot for horn.
- ☐ Glue horn with 5 minute epoxy. Make sure the horn is glued into balsa block located inside elevator.
- ☐ Secure pushrod.
- ☐ Repeat for other stab and Fin.
- ☐ Fit stab with 2 carbon rods and secure with bolts
- ☐ Fit fin and secure by clamping carbon rod.
- ☐ Run 3 servo wires neatly in rear fuselage.

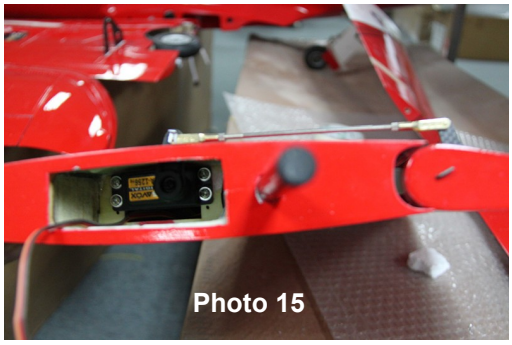


Photo 15

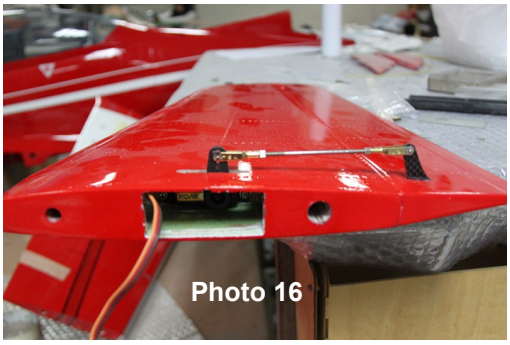


Photo 16

FUSELAGE


Photo 17

Photo 18

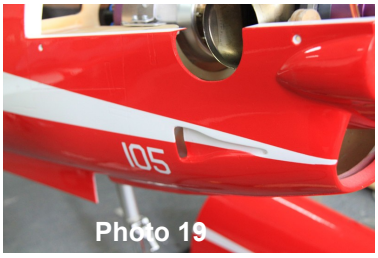


Photo 19

- Before joining the fuselage it is necessary to tidy up the servo wires. Make sure wires are secure .
- Tidy up the air line. Use quick disconnects between wing and fuselage.
- Check operation of landing gear and doors.
- Install JR DS8511 steering servo. Bolt with 4 x M3 bolts and lock nuts.
- Centre servo and connect to actuator.
- Secure rear fusealge with 6 screws.

FUEL CELLS

NOTE: Bad plumbing lead to flame outs. This will destroy your model. Please take your time and do a good job.

- ☐ Make up fuel line fittings. Make sure clunk moves freely and reaches all corners of inside of tanks.
- ☐ Fit to main tank. Mark pipes for “inlet” and “outlet”.
- ☐ Plumb tank using diagram on next page.
- ☐ Fill tank and check for leaks. Secure tank with ply bracket and 2 bolts.
- ☐ Drain tank with turbine fuel pump and check no air bubbles in system until last drop is drained. A good plumbing will secure good turbine operation.

SMOKE TANK:

Note : Optional smoke tank can be installed in front of turbine!

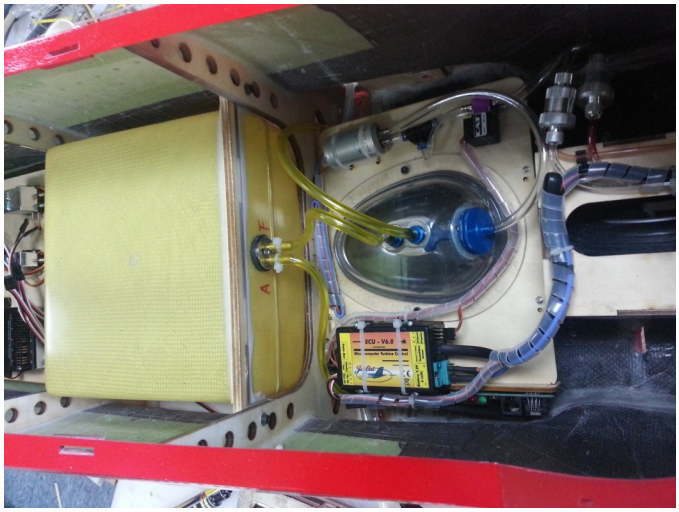


Photo 20

FUEL CELL DIAGRAM

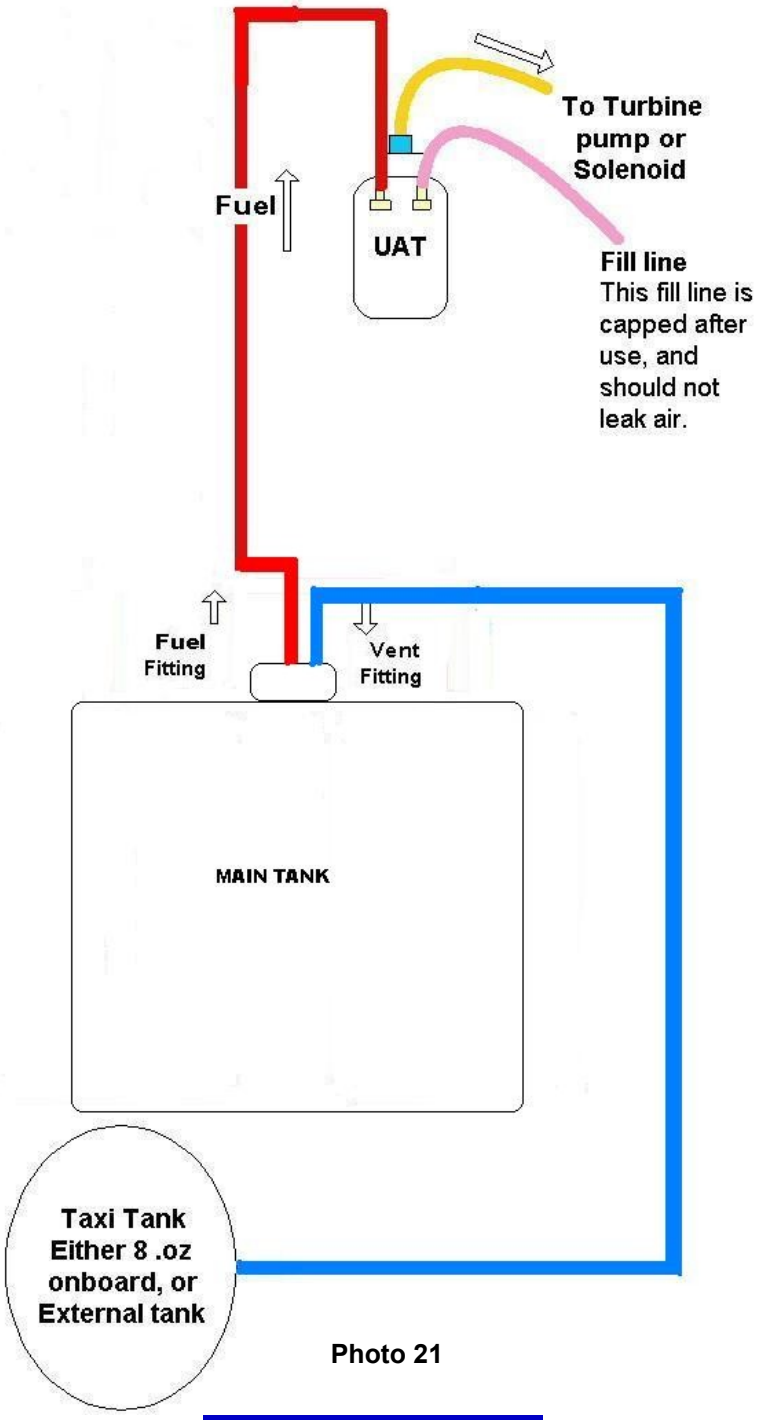


Photo 21

AIR SYSTEM

You will need 2 x 2way and 1x 1way + sequencer.
All work done at factory.

- Glue the air tanks (3) with silicon
- Use quick connectors on fuselage joints to help with break up of model if glued in tail.
- Fit the 3 filler valves and 3 pressure gauges onto plywood 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. Fit electronic valves + sequencers on tray.

Photo 22

- The air system will consist of :

  Air up, Air down retracts (2)
  Air up, Air down door (2)
  Air out brakes (1)
  Air filler input (3)

  Total of 8 pipes

- 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.

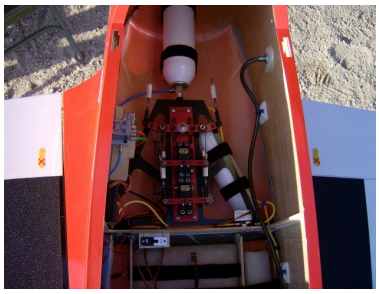
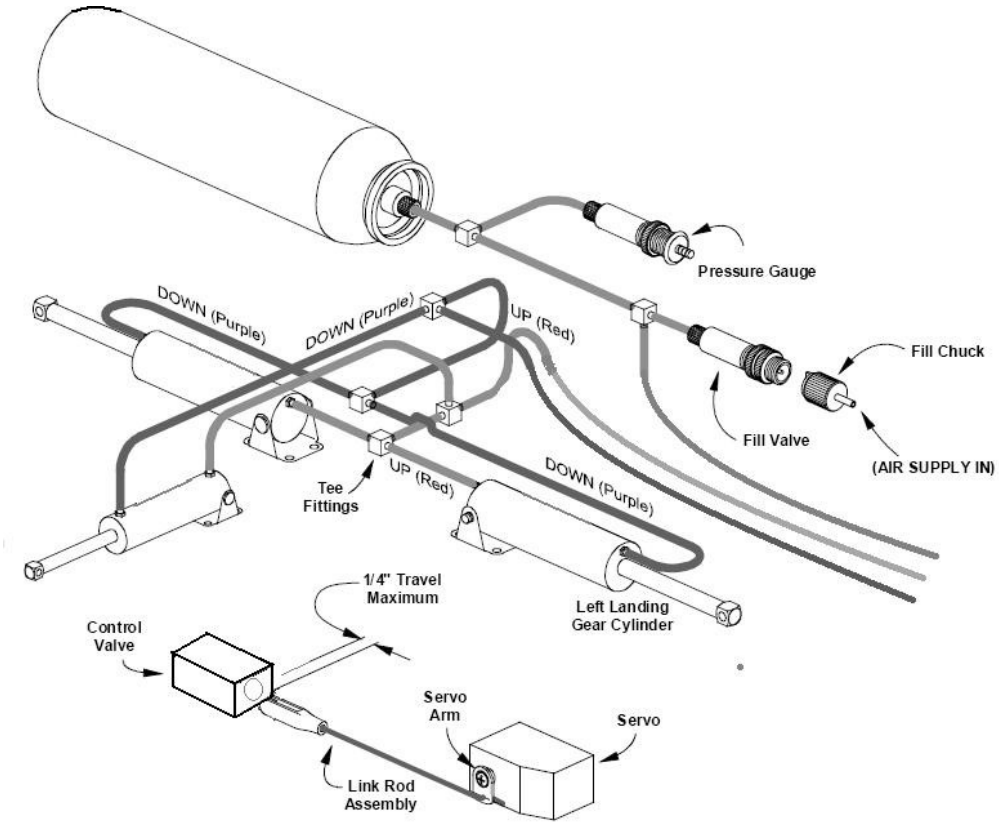


Photo 23

AIR DIAGRAM


Pressure Gauge
DOWN (Purple)
DOWN (Purple)
UP (Red)
Fill Chuck
Fill Valve
(AIR SUPPLY IN)
Tee
Fittings
UP (Red)
DOWN (Purple)
1/4" Travel
Maximum
Left Landing
Gear Cylinder
Control
Valve
Servo
Arm
Servo
Link Rod
Assembly

TURBINE INSTALLATION

You will need to cut fuselage to clear exhaust of turbo prop. Make sure spinner have enough clearance.

- Please follow the instructions supplied with your turbo prop.
- Run all turbine wires and power cables on opposite side of servo wires.
- Install fuel pump close to UAT. We recommend to make use of a mechanical shut off valve as well.
- Use correct propeller for your turbo prop.

Photo 24

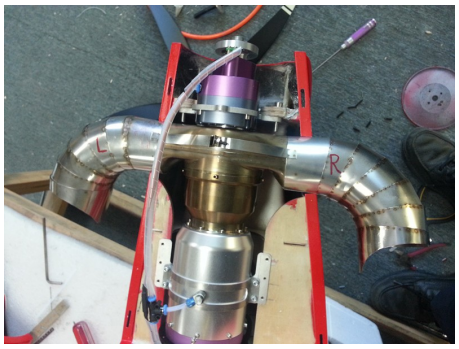


Photo 25

Photo 26

Photo 27

COCKPIT AND CANOPY (after painting)

Photo 28

Photo 29

Photo 30

Photo 31

- ☐ Cut cockpit to fit fuselage.
- ☐ Secure rear of cockpit with 2 screws.
- ☐ Check that canopy clear the cockpit. Trim if needed.
- ☐ Install pilot.
- ☐ If you ordered the all white—you will need to cut glass and glue after painting. Use non CA glue to glue glass to frame. Use canopy glue!

EQUIPMENT INSTALLATION INTO PC21

- Equipment installation is a personal venture. There is one golden rule: Do it as neat and logical as possible! This will make fault finding and service of components easier. The pc21 basically consist of 7 circuits!

1. Servo wires
2. Power cables
3. Data cables
4. Pneumatic pipes
5. Air pipes
6. Fuel pipes
7. RX cable / Satellite Receivers

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. If you use S-bus technology it will simplify installation.

.

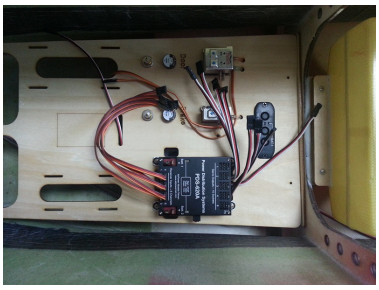


Photo 32

Photo 33

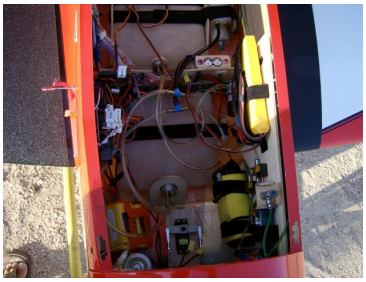


Photo 34

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 MAX SETTINGS:

1.	Elevator	37	mm at T/E
2.	Rudder	64	mm each way
3.	Aileron	20	mm each way
4.	Flap	38	mm see picture 12 page 11

Do not change location of CG unless you are experience and have some feel of model before! CG = 175mm from leading edge

- Dry weight will be between 40 and 45 lbs depending equipment.
- 100—120 psi for pneumatic system
- Make use of battery management system. Double up on batteries and make sure all wired can carry current needed to operate.
- Do a complete range check before flight. Do this with turbine running. Follow manufacturers instructions.
- Set the maximum speed to 160mph! The prototype were tested with Kingtech turbo prop turbines. This will be more than enough power for unlimited vertical performance.
- Set a timer . It can safe your model.

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. Select take off flap or flight mode 1 and open throttle. Gently pull back on stick 15m down the runway. Raise the flaps and gear at safe altitude. If the ailerons feel sluggish—select higher rate. Land and adjust to fit your need.

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. Just before touch down—pull more elevator to flare model. Let the model roll out and apply brakes.

Taxi back and do necessary adjustments to customize PC21.

We at Skymaster wish you many happy flights with your PC21! Add some landing lights for more realism.

Blue skies!

Anton Lin and Skymaster Team!