P-51D MUSTANG

Instruction Manual

Congratulations on your purchase of the Flying Legends P-51 Mustang!

The Flying Legends P-51D is a model designed for experienced pilots only. If you are not an experienced pilot that is comfortable with flying larger high-performance aircraft, do not continue.

These instructions are written with the experienced modeller in mind. They are not intended to be a step-by-step guide, but highlight a few of the areas of construction to supplement your own modelling experience.

Flying Legends P-51 Mustang Specification

Wingspan:	**99" (2515mm)**
Length:	**85" (2159mm)**
Radio:	**6-8 Ch. (8/9 Servos)**
Weight:	**37 - 39lbs (17 - 18Kgs)**
Engine:	**75-85cc Petrol Required**

ARTF
ALMOST READY TO FLY

Ripmax

FLYING LEGENDS
241 Green Street,
Enfield,
Middlesex,
EN3 7SJ,
United Kingdom.

Part Number:
Q-FL100

Introduction

The Flying Legends P-51D Mustang comprises a fully moulded airframe, which has been completely finished at the factory. Due to this it is vitally important that the components parts are protected during the assembly process to avoid cosmetic damage to the surface finish. Ensure that your assembly area is of adequate size for a model of this size and cover your work bench with protective foam to avoid marking of the paint finish.

Ensure that only the highest quality components are fitted to your Mustang, as a high performance scale model such as this requires matching capability from the engine and radio equipment to ensure safe, enjoyable and reliable flying. If you have not previously flown a large warbird such as the Mustang we strongly recommend that an experienced warbird pilot carry out a comprehensive check of the model and then make the initial test flights – although the Mustang is easy to fly and particularly easy to land, it is a large model with a great deal of inertia, and this can take a little getting used to for a pilot inexperienced with such large warbirds.

Optional Parts

(Note that some of these parts may already be included depending on the Mustang version selected :

Q-FL100/RE	-	Retracts with Struts and Air System
Q-FL100/SC	-	Scale Cockpit
Q-FL100/SP	-	Alloy Machined Spinner
Q-FL100/MW	-	Main Wheels/Tyres (Pr)
Q-FL100/RW	-	Rear Wheel/Tyre
L-IRVSIL/85IL	-	Silencer In-Line 85cc (DA/BH)

Items Recommended

Engine: 85cc Petrol engine recommended, either DA85 or BH85 are ideal, the prototypes were flown using a DA85 with a Menz 26 x 10" propeller.

Servos:

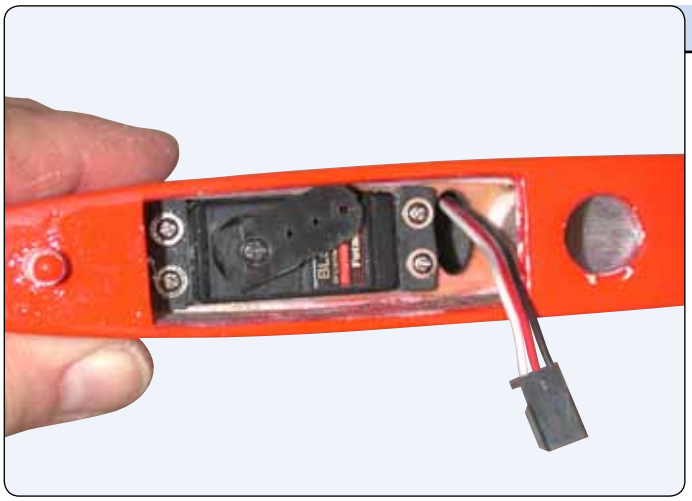
Ailerons:	2 x 10 Kg.cm min torque req (Futaba BLS351 used in prototypes)
Elevator:	2 x 10 Kg.cm min torque req (Futaba BLS351 used in prototypes)
Rudder:	1 x 12 Kg.cm min torque req (Futaba S9155 used in prototypes)
Flaps:	2 x 15 Kg.cm min torque req (Futaba S9156 used in prototypes)

Radio Battery: Due to the weight of the Mustang and the flight loads on the servos the current consumption is much higher than on smaller models - due to this we strongly recommend the use of a battery pack of at least 3000mAh, ideally of 6.0v to enable the optimum servo response.

Fuel tank: A tank of 950cc was used in the prototypes, this gave plenty of flight time with the DA85 engine installed.

As the linkage for each control surface is completed in a similar manner, the elevator linkage is detailed in full here.

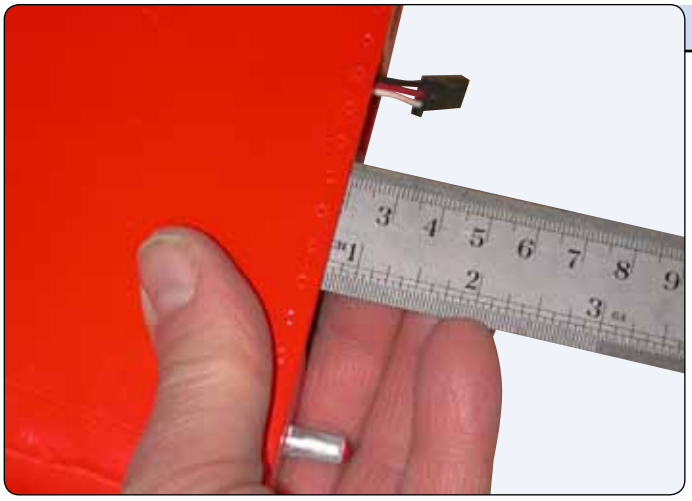
Section: Elevator Linkage



Step 1

Assembly begins with the fitting of your choice of elevator servo in its pre-fitted mount in the first tailplane half. Note the orientation of the servo. Use the mounting screws, grommets and brass ferrules supplied with your servo and ensure that the lead is drawn out of the tailplane through the opening in the mount. Temporarily fit a servo control horn as shown.

A Futaba BLS351 Servo was used on our prototype model.



Step 2

Measure the distance from the root face of the tailplane to the control horn fitted in the previous step.

Step 3

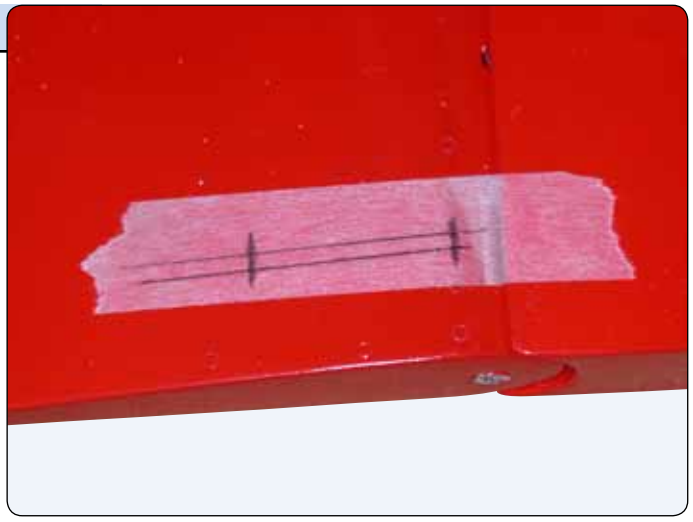
Transfer this measurement onto a piece of masking tape on the underside of the tailplane. Develop the measurement for the thickness of the control horn, then viewing from the opening in the tailplane, mark the length of the slot required for free movement of the control horn over the full range of servo travel.

Step 4

Using a rotary cutting disc or hand tools, cut a slot wide enough for clearance on the servo control horn.

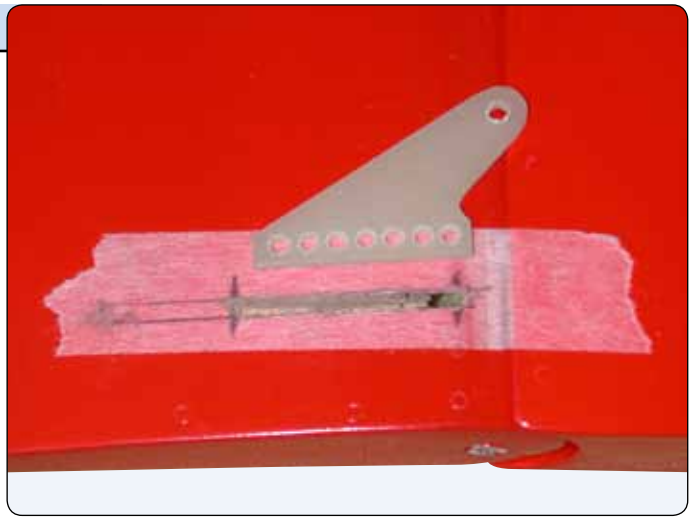
Step 5

The elevator horn's position can now be marked out on the elevator. Use a strip of masking tape to make marking the elevator easier. Ensure that the slot you mark is offset slightly outboard when compared to the servo output horn to allow for the balljoint width and is positioned to ensure the control horn aligns with the hinge centreline.



Step 6

Using a small file or rotary cutting disc prepare a suitable close-fitting slot for the control horn. The slot should be the full depth of the elevator to the underside of the top elevator skin, but not through the skin. Take great care not to cut too deeply and mark the top surface of the elevator.



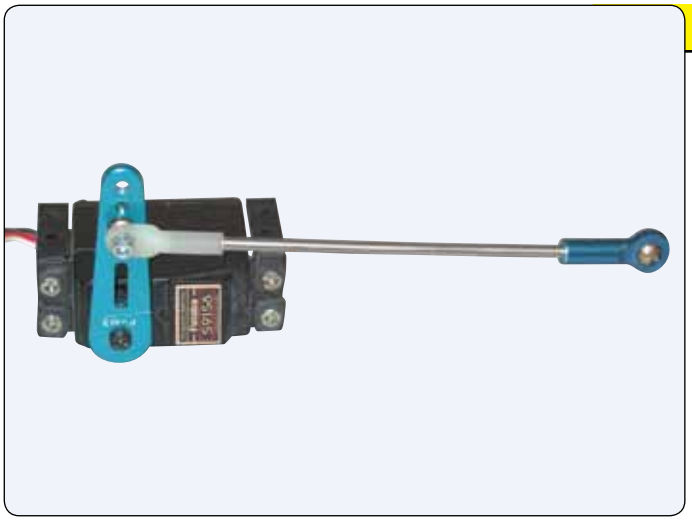
Step 7

Roughen the base of the elevator horn with coarse sandpaper. Glue the horn in place using Hysol or 30 minute epoxy ensuring it is firmly seated in its slot and at 90° to the elevator. Ensure that the horn is vertical - not leaning to one side - and that the balljoint hole is directly above the pivot rod of the elevator. Allow glue to fully cure.

Step 8

Centre the elevator and the elevator servo and make up the supplied linkage using the 3mm steel elevator pushrod with an aluminium ball link at the elevator and steel clevis with a locknut at the servo control horn. Don't omit the fitting of a fuel tubing retainer to the clevis.

Repeat all the above steps for the second elevator taking care to ensure that you work on the underside of the tailplane.



Step 9 Section: Aileron/Flap Linkage

Prepare your flap servos by fitting their rubber grommets and ferrules, then screw them to the moulded right-angled mounting brackets as shown. Note that M3 screws are used to screw the servos to these brackets. Some servo ferrules may be too small to accept these screws, so will have to be changed to a suitable type. Due to the size of the flaps, we recommend using heavy duty aluminium servo horns. Make up the flap linkage as shown and screw to the servo horn.

A Futaba S9156 Servo was used on our prototype model.

Step 10

Remove the flap servo cover and screw the flap servo in position with the output horn towards the flap. Note the orientation of the servo's control horn when the flap is extended / lowered. When the flap is up / retracted, the servo should be as far forward as possible without touching the wing joiner tube.

Step 11

Using the balljointed end of the flap pushrod as a guide, mark the flap control horn's position on the flap. Now remove the flap from the wing and slot the flap for the control horn as shown. Note that the slot is towards the top of the flap.

Step 12

Temporarily fit the control horn into the slot in the flap and check for clearance as the flap is lowered and raised. Roughen the control horn and glue it into the flap using Hysol or 30 minute epoxy. Refit the flap and adjust the linkage accordingly. Repeat this procedure for the second flap. Ensure the horn positions are identical on both flaps.

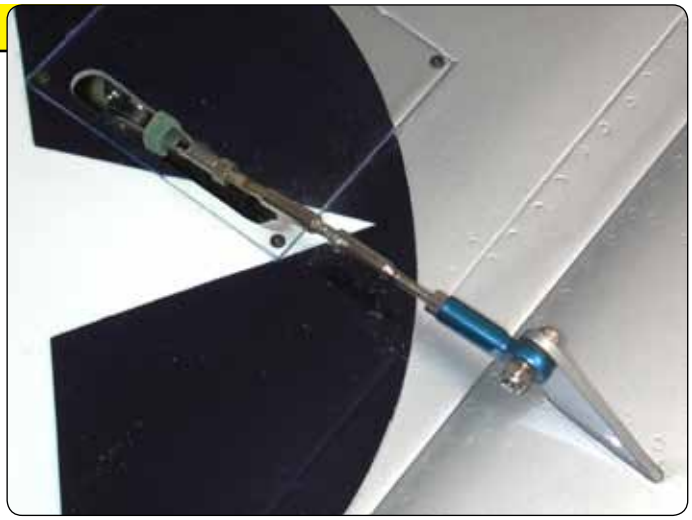
Step 13

Prepare your aileron servos by fitting their rubber grommets and ferrules, then screw them to the moulded right-angled mounting brackets as you did with the flaps. Fit a heavy duty nylon control horn. Remove the aileron servo cover and screw the aileron servo in position with the output horn towards the leading edge of the wing.

A Futaba BLS351 Servo was used on our prototype model.

Step 14

As was done with the elevators, prepare a slot and glue the aileron control horn into the aileron in line with the servo output arm using Hysol or 30 minute epoxy. Once cured, make up your aileron linkage, re-fit the servo cover and link up the aileron. Test that it moves freely throughout the entire range of movement. Note that the pre-cut slot in the servo cover will require enlarging to suit the ouput arm being used. Repeat for the second aileron.



Step 15

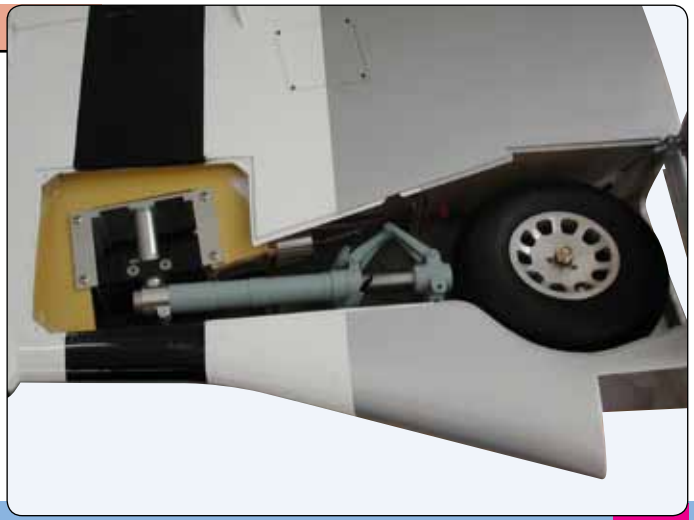
Section: Retracts

Note that depending on which version of the P-51D Mustang you have purchased, some of the following steps concerning the installation of the retracts and gear doors will not be applicable as they are factory installed.

Installing the retracts is a simple task. Simply mount each unit to the factory fitted plate in the wing using the four screws supplied for each.

Step 16

Fit each oleo leg and wheel assembly and tighten the retaining socket head screw in the retract unit. Ensure that both legs retract and extend without fouling the wing and that both wheels track straight ahead.

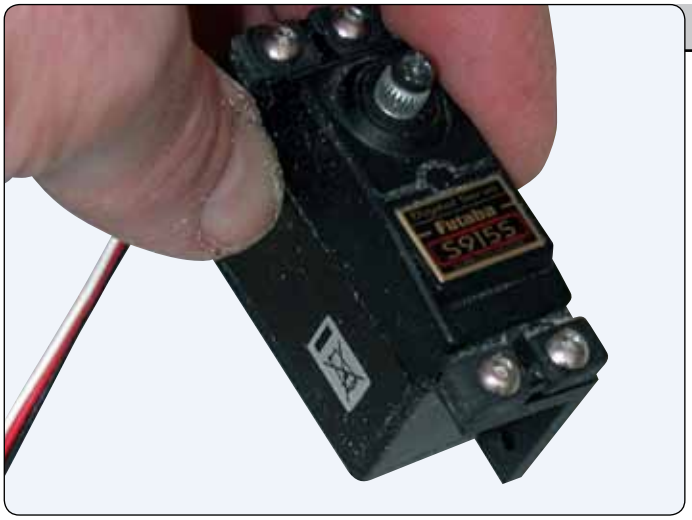


Step 17

Once you have installed the inner gear doors, fit your air rams as shown. Ensure that all air lines are fixed to the airframe to reduce the risk of them being caught by a retracting undercarriage unit.

Step 18

Unless they are factory fitted, the outer doors must be hinged then attached to the undercarriage leg as shown.

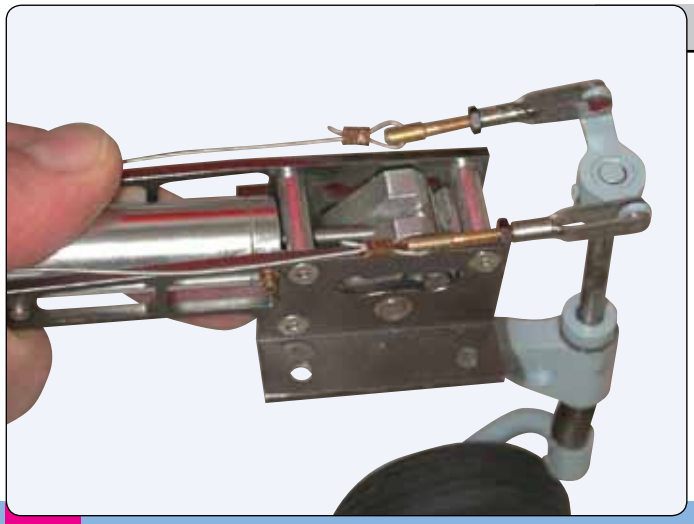


Step 19

Section: Rudder

Prepare your rudder servo by fitting its rubber grommets and ferrules, then screw it to the moulded right-angled mounting brackets as shown.

A Futaba S9155 Servo was used on our prototype model.

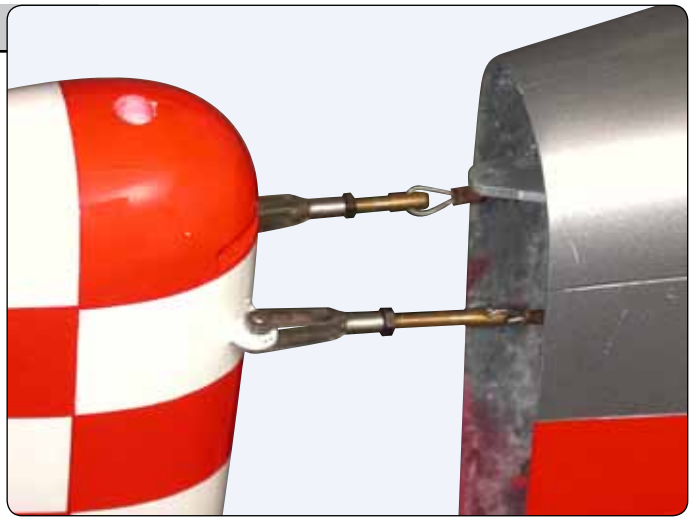


Step 20

The retractable tailwheel is steered from the rudder via an internal closed loop linkage. Begin by removing the rudder from the fin by withdrawing the hinge pin. Attach the factory made closed loop cables to the retractable tailwheel unit as shown. The tailwheel unit can then be installed in the fuselage. Push it back towards the rudder to allow the closed loop cables to exit through the rear of the fuselage.

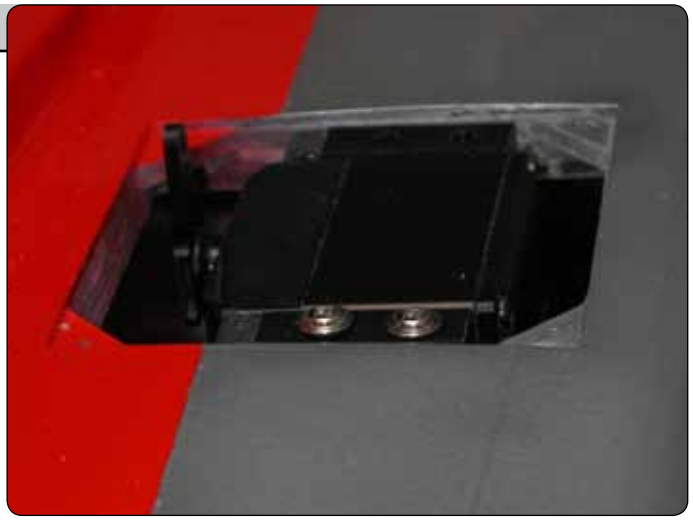
Step 21

Connect the closed loop cables to the rudder as shown. Now the rudder can be re-fitted by installing the hinge pin and the tailwheel unit can be installed in its mount. Adjusting the tension of the closed loop is done before the tailwheel unit is permanently installed, so secure the tailwheel unit with only a couple of screws to check, then undo these screws and slide the rudder back to allow the clevis adaptors to be screwed in or out as required.



Step 22

Remove the rudder servo cover from the rear of the fuselage and screw the rudder servo in position and re-fit the servo cover. Install the prepared pushrod.



Step 23

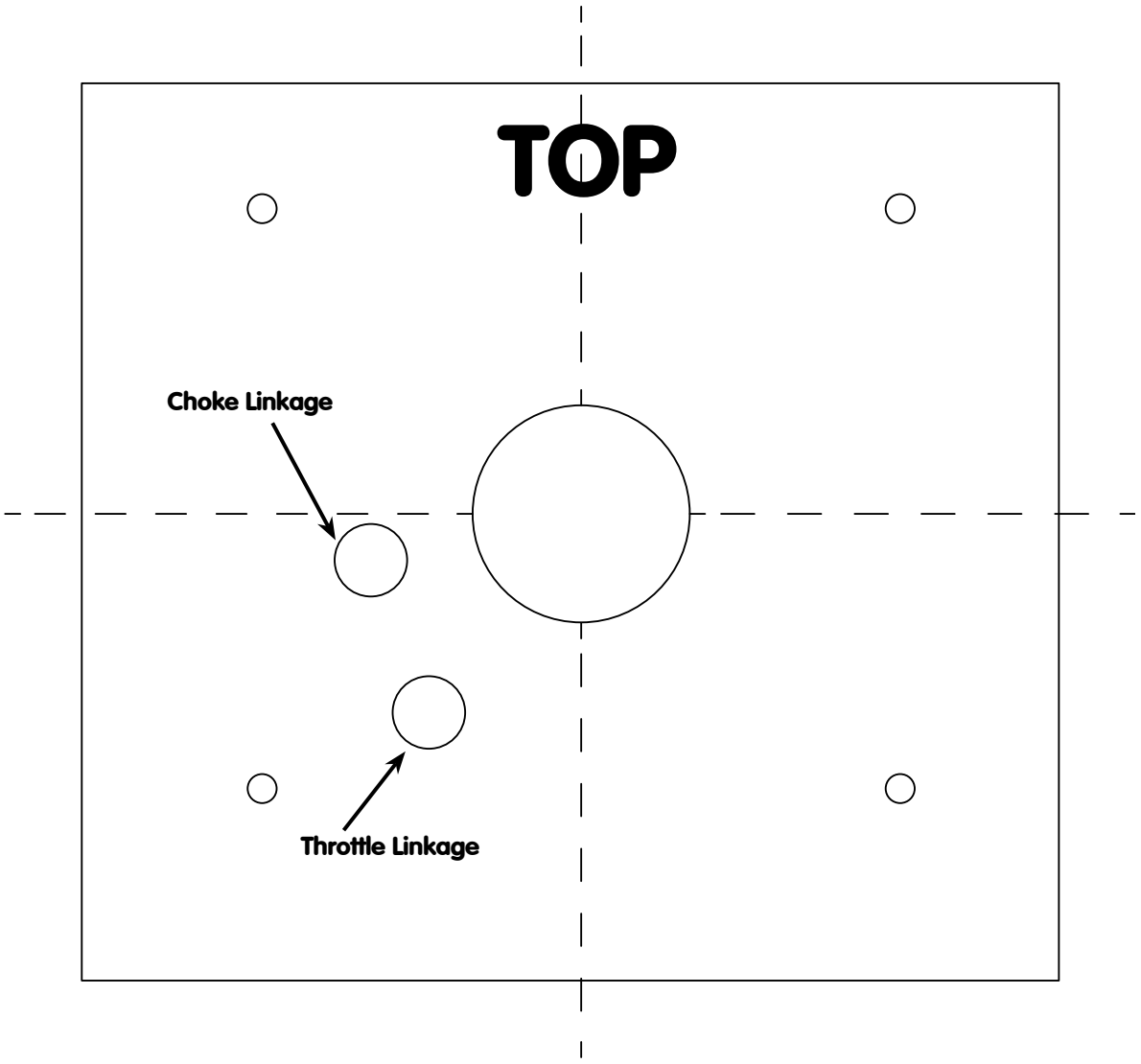
Section: Engine

The DA-85 is one of the most commonly available and suitable petrol engines for the P-51D Mustang. Use the following template to mark the positions of the holes required in the factory built engine-mounting box. Other engines are suitable for this model - simply adjust the positions of the mounting holes accordingly.

Remove the cowl from the model and test fit the engine mounting box. Mark the top of the box and remove. Cut out the engine mounting drill template below and temporarily paste it to the mounting box as shown.

Proceed to the next page for the Full Size Mount Diagram

DA85 Engine Mounting Template



Step 24

Once the mounting holes have been drilled, remove the template and fit the supplied captive nuts for your aluminium engine mounting stand-offs.

Step 25

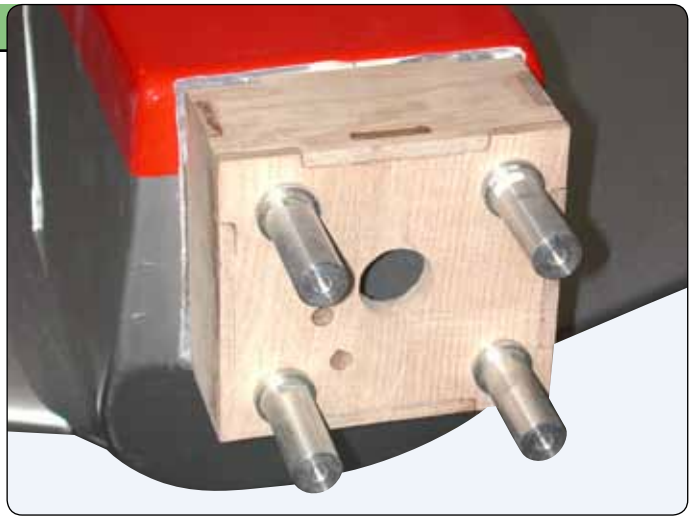
Now screw your engine mounting stand-offs in place.

Step 26

Offer up the engine mounting box to the fuselage and mark its position on the firewall. Remove the paint from the firewall where the mounting box will be glued. Thoroughly roughen the firewall.

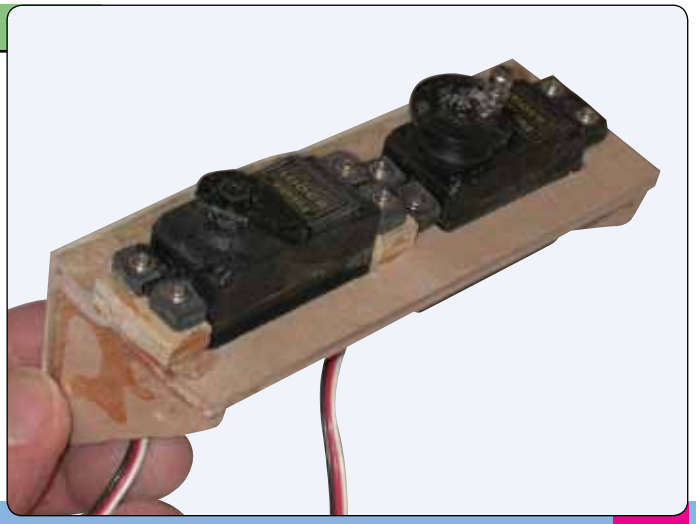
Step 27

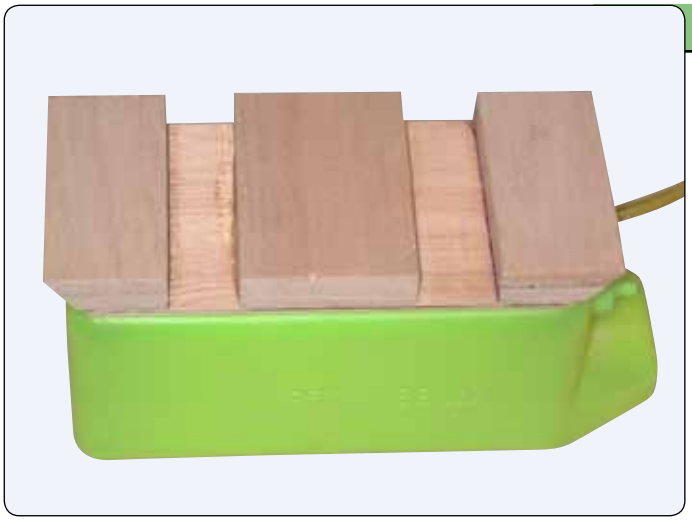
Now glue the mounting box in place using plenty of 1 hour epoxy or Hysol and leave to cure.



Step 28

Mounting your throttle and choke servo (if used) will depend on the engine you are fitting. On our prototypes, we screwed the throttle and choke servos to a plywood mount as shown.



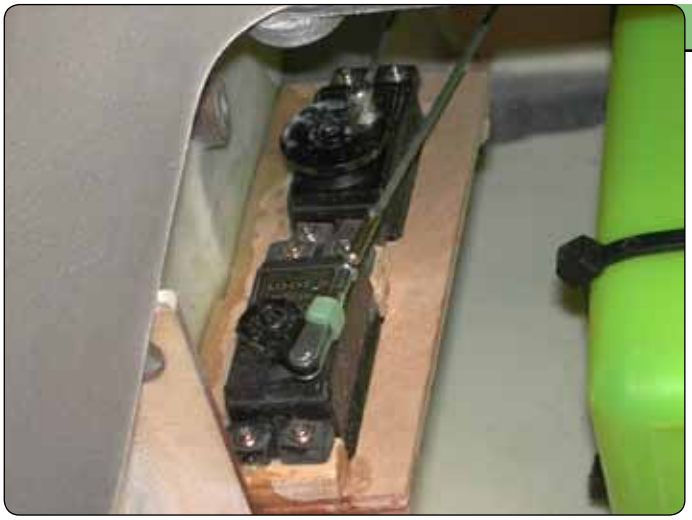


Step 29

Once you have decided on your choice of fuel tank, you need to make a simple plywood mount as shown.

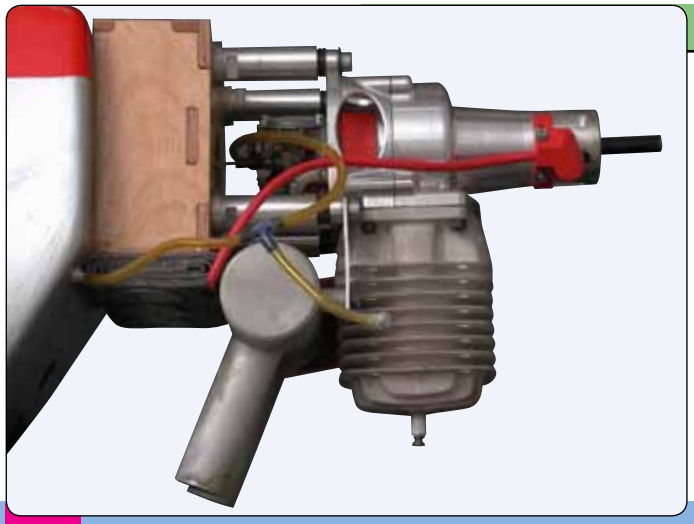
Step 30

The tank is then retained to its mount using two large tie wraps and double sided tape. Once the fuel tubes have been connected to the tank and drawn through the bulkhead, the tank mount can be glued in place in the model's nose.



Step 31

Make up suitable linkages for the throttle and choke and then glue your servo mounting tray in place alongside the tank in the nose of the model.

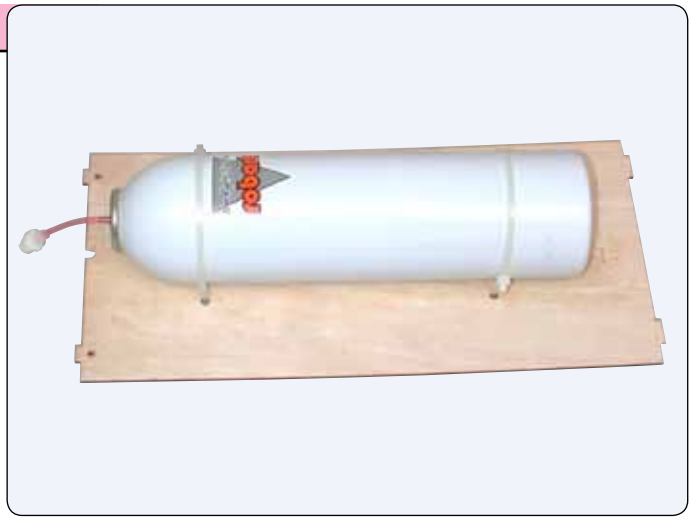


Step 32

The engine can now be installed, the plumbing completed and the ignition system wired in. Note that the silencer in these shots is a pre-production prototype.

Step 33 Section: Air Supply

To complete the air system, remove the rear mounting plate from the fuselage. Drill the plate for a pair of tie wraps, then a large volume air cylinder can be fitted to the top of the plate as shown.

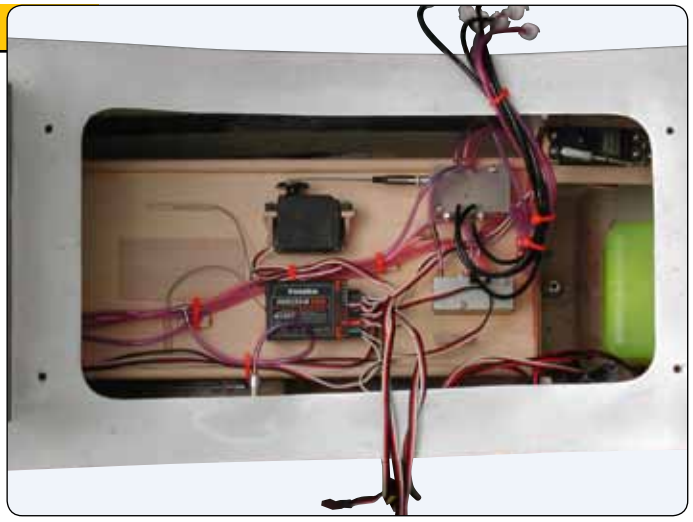


Step 34

The plate can now be re-installed in the fuselage as shown. Ensure that the tongues at the rear locate before tightening the two retaining screws.

Step 35 Section: Final Installation

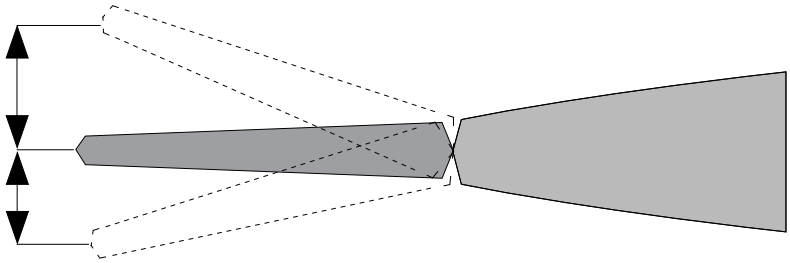
To complete the installation, remove the radio plate for easy access. Mount your receiver, air control valve, retract servo and any other equipment you require. Re-fit the plate by locating the tongues then tightening the retaining screws.



Step 36 Section: Control Movements

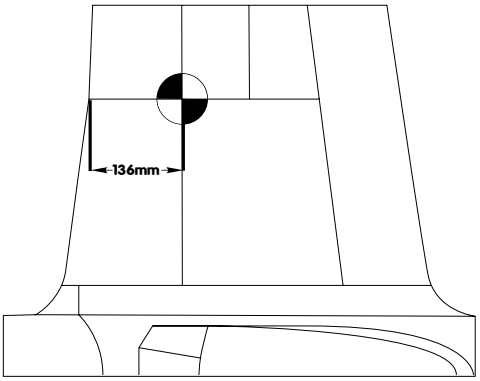
Check that the controls move in the correct direction and that their throws correspond to the following when measured at their widest points.

Ailerons	- 25mm up/20mm down
Elevator	- 35mm up/30mm down
Rudder	- 60mm each way
Flap	- 20 Degrees (Take Off)
	- 45 Degrees (Landing)



Step 37 Section: Center of Gravity

Check the center of gravity to ensure the model balances correctly 136mm back from the Leading edge at the crank in the wing. We needed 1.7kg of nose weight to achieve this on our prototype. Secure any weight well to avoid it coming loose due to vibration.



Step 38 Section: Final Assembly

The wing panels are joined with the large diameter aluminium tube supplied, and the wing is then mounted to the fuselage using four M4 bolts. The tailplane halves mount to the fuselage using the smaller diameter aluminium tube supplied and two countersunk M3 screws.

Step 39 Section: Flying the P-51D Mustang

For first flights we recommend the use of a large and open flying site with a good length of runway, not because the model is hard to fly, but in the event of a minor problem or an engine cut, having plenty of runway available can make the difference between a safe landing and a wrecked model. If there is going to be a problem it is most likely to occur during the first few flights, so any extra time required to travel to a good open site can prove to be well worth the effort.

Do carry out thorough range checks before flying, both with the engine off and running, and check for any radio interference caused by the engine, throughout the rpm range. Also check all the controls, ensuring that they operate in the correct direction and with the correct movements, and that there is no slop or lost motion in any of the linkages and that all clevises and balljoints are secure. Any clevises being used must have keepers fitted for added security. Finally check the retracts and doors to make sure they are operating correctly and that no air leaks have developed.

Once happy, refill the fuel and air tanks, and once the engine is running and warmed up check that it will

hold full throttle without sagging. Taxi the model out to the runway being used – although flap can be used for take off we suggest that this is not done for first flights. Right rudder will be required during the early stages of the take off run, and some up elevator should be held at first to avoid the model nosing over, although this must be reduced to nothing as the model accelerates. Once at flying speed a small amount of up elevator is all that is required to allow the model to lift off, and at full power with an 85cc engine a comfortable height will quickly be gained, at which point the throttle can be brought back to obtain a suitable cruise speed.

Fine trimming can now be carried out, and once the model is correctly trimmed we suggest that a few handling manoeuvres are performed at a safe height, for example turns in both directions, slow flight, a clean stall, etc, etc. When happy with the handling of the model it is recommended that the model be slowed down, the undercarriage lowered and flaps applied into landing configuration and a simulated landing approach is flown at a safe height, so that descent rates and flight attitudes at various throttle setting can be observed. With this completed the model can be flown through basic and advanced aerobatics until it is time to land.

The Mustang is a fairly simple model to land, a normal approach should be flown to stabilise the model and slow it enough to lower the undercarriage, once aligned with the runway the flaps can be lowered in stages until full flap is applied – note that more throttle will be required due to the increased drag of the flaps. You will find that the Mustang is very stable in the landing configuration and it should be relatively simple to position the model for an accurate touchdown, the stability once on the ground being excellent due to the wide track of the main wheels.

Happy and safe flying!

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