MiG-29 Retract Kit

(for the HET-RC Mini Air Retract System)

The MiG-29 Retract Kit was designed to allow the easy installation of the HET-RC mini Air Retract system into the twin EDF MiG-29.

We recommend to install the retract kit before starting to build any other part of the plane as this will greatly ease the installation.

Before you start building the MiG-29 please go through the instructions on the following pages and study the pictures and building guidelines carefully. Please also study the main MiG-29 construction manual as it will give you further hints which will ease the building process.
You will find that the plane is very easy and quick to build.

Items required to complete the retract kit installation:

- 30 min epoxy
- Milled fiberglass
- Drill (e.g. Dremel tool) with 1, 1.5 and 2mm drill
- X-acto Knife
- Sandpaper (220-180)
- 1x HET-RC 9gram Servo (switched retract valve)
- 1x Feather servo with at least 1.8kg torque (example: Hitec HS-65HB) (nose gear steering)

A rotary tool such as a Dremel will greatly help in the building process.
A drum sander and cutting disk is highly recommended to cut the necessary retract openings into the fiberglass fuselage.

Please note:
Due to the higher take-off weight of the MiG-29 with installed retracts we highly recommend a setup with at least 2x Typhoon 2W-20 Motors, suitable ESC and LiPo battery. We further recommend the use of a concrete runway to reduce stress on the landing gear.

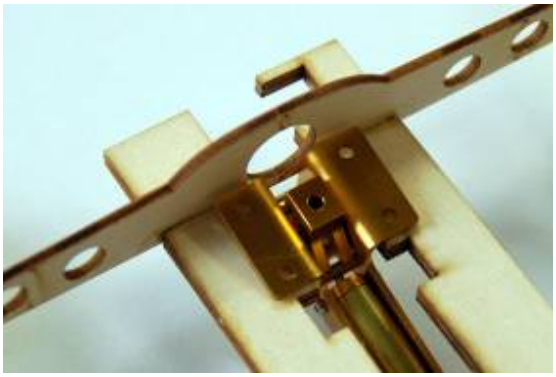
The retract kit includes the following items:

1x Nose wheel
1x Nose wheel strut
2x Main wheels
2x Main wheel strut
1x Nose former set including:
    1x Forward former (3mm)
    2x Retract plates (4mm)
    1x Rear former (3mm)
2x Main former set with each including:
    1x Forward former (3mm)
    1x Rear former (3mm)
    2x Support brace (3mm)
    2x Retract plates (4mm)
1x Retract valve pushrod with clevis
1x Nose gear steering pull-pull cable
4x Crimp rings
2x Threaded couplers
2x Clevis
4x Wheel collar (3mm)
12x Retract mounting screws

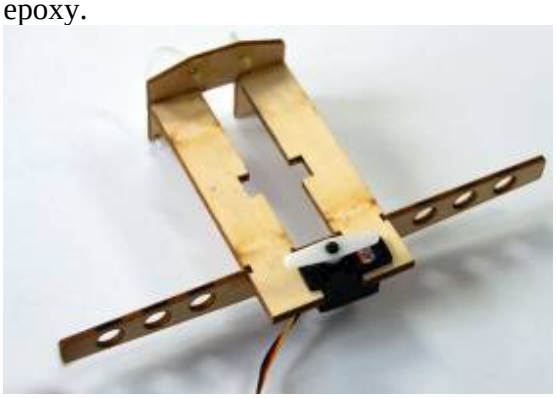
Step 1: Nose retract preparation

The nose retract mount consists out of the parts shown above.
In addition to the ply formers included in the kit please cut two 7cm long pieces from the airtube included in the HET-RC Mini Air Retract System set.

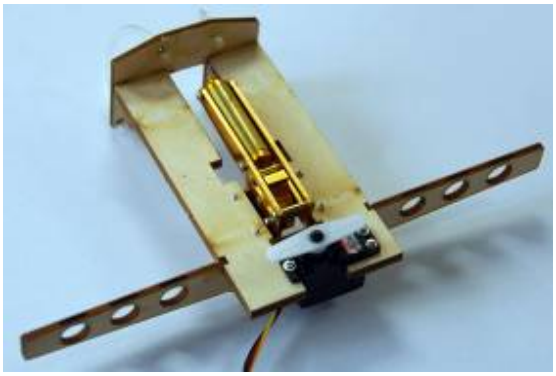
Dry fit the ply parts together as shown in the picture above. Take care that the retract mounting plates are installed in the correct direction. The 2 airtubes are inserted into the 2 holes at the back of the main retract former and will form an arc from above the retract mounting plate to the bottom on each side. Roughen the airtube with sandpaper and glue all parts with 30min epoxy.



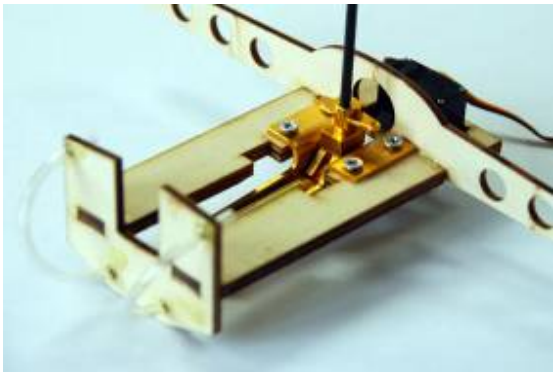
Once the glue has dried, test fit the nose retract unit and mark the mounting hole positions. Remove the retract unit and drill 4x 2mm holes at the marked positions.



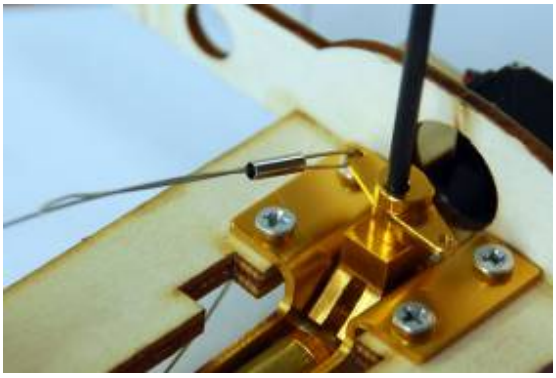
Turn the mount around and test fit the nose gear steering servo as shown above. The servo arm is shown in its center position. Mark the servo mounting hole locations, remove the servo and drill the holes to the size required for your servo (e.g. HS-65HB 1mm hole).



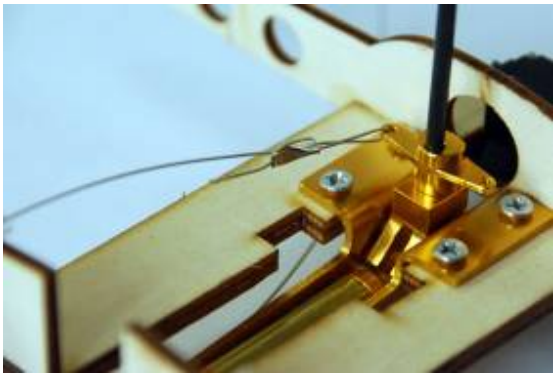
Once all holes are drilled install both retract unit and steering servo.



Install the included nose gear wire and steering arm. Both items need to be removed again later so do not tighten them to much.

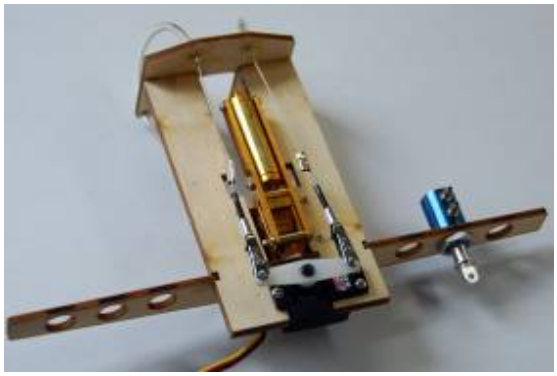


Cut 2x 40cm from the supplied pull-pull cable and pull one through each of the airtubes installed in the retract mount. Next slide one of the supplied crimp rings over the wire and loop the wire through the steering arm. After that pull the end of the pull-pull cable through the crimp ring a second time.

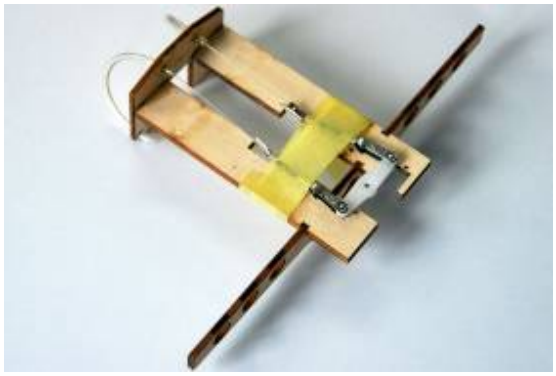


For a stronger hold loop the end of the pull-pull wire one more time from the front through the crimp ring. Squeeze the crimp ring together with pliers. Test that the wire is firmly crimped in place by pulling on the pull-pull wire behind the crimp ring. Repeat this step with the second pull-pull wire.

Turn the retract unit around and install the pull-pull wire through the threaded couplers as described in the previous steps. Ensure that the couplers are fixed far enough back to allow slop free but not to tight fit between the pull-pull wire and the servo.
Test the retract operation and adjust the pull-pull wire tension to allow the retract to fully lock in retract down position.
A drop of silicon oil (e.g. from RC-Heli ball bearings) can be used to lubricate the cable running through the airtube. This will reduce steering cable friction.



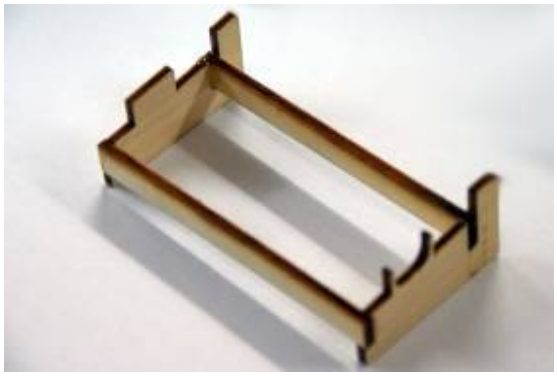
Depending on the final model setup and required weight distribution for the correct center of gravity (CG) the retract valve can be installed into the model at a later stage as shown above or with the separate valve holder supplied with the Mini Air Retract set.



Remove servo, retract unit and valve from the mount and secure the steering cable, Servo and retract steering arm with some masking tape in place.
The nose retract mount is now ready to be installed in the plane.

Step 2: Main retract preparation

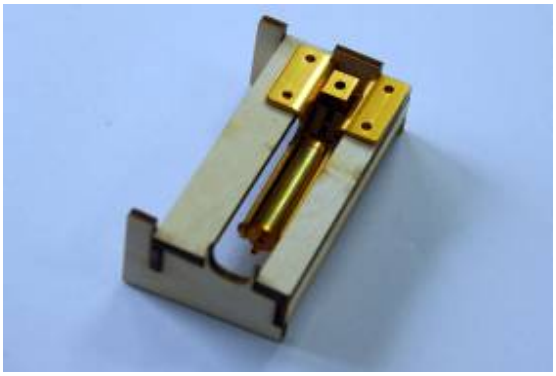
Each main retract former consists out of the parts shown above. Before you begin please read through this section and dry fit all components.
NOTE: ensure that you build one right and one left side retract mount.



Slot the 4x 3mm ply wood parts together as shown above and glue with 30min epoxy. Notice the difference between the 2 main formers

Install the 4mm retract mounting plates as shown above and glue with 30min epoxy (apply the 30min epoxy to all areas that have contact with the mounting plates).

Repeat the steps above for the 2nd retract mount.
IMPORANT: Ensure to build one left and one right hand side retract mount.



Once all parts are dry, fit the retract unit and mark the position of the mounting holes. Ensure that the retract cylinder points towards the former with the wire cut out as shown above.

Drill the retract mounting holes (2mm drill) and secure the retract unit in place. Remove the retract unit. The main retract mounting plates are now ready for installation in the fuselage.

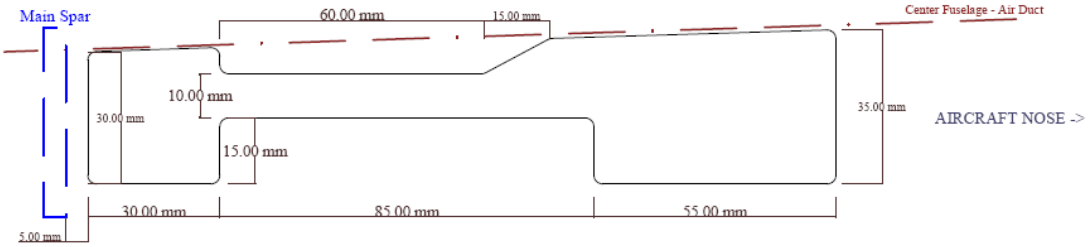
Step 3: Retract cut outs

Before the retract mounts can be installed in the fuselage the necessary retract cut outs have to be made in the fuselage.
We recommend to use a Dremel cutting disk and drum sander to make the necessary cuts.

NOTE:

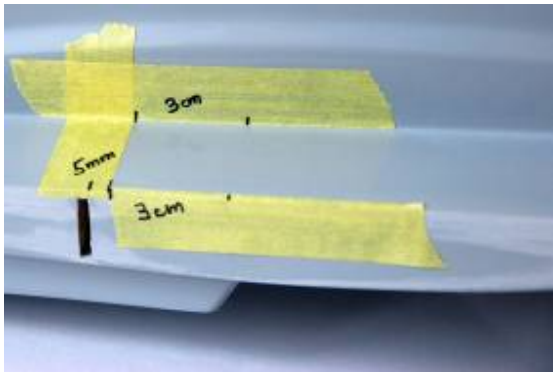
As this process creates very fine epoxy/glass dust, the cutting has to be done in a well ventilated area. The use of safety gear including gloves, safety glasses and surgical mask is highly recommended.

Main Retract Units

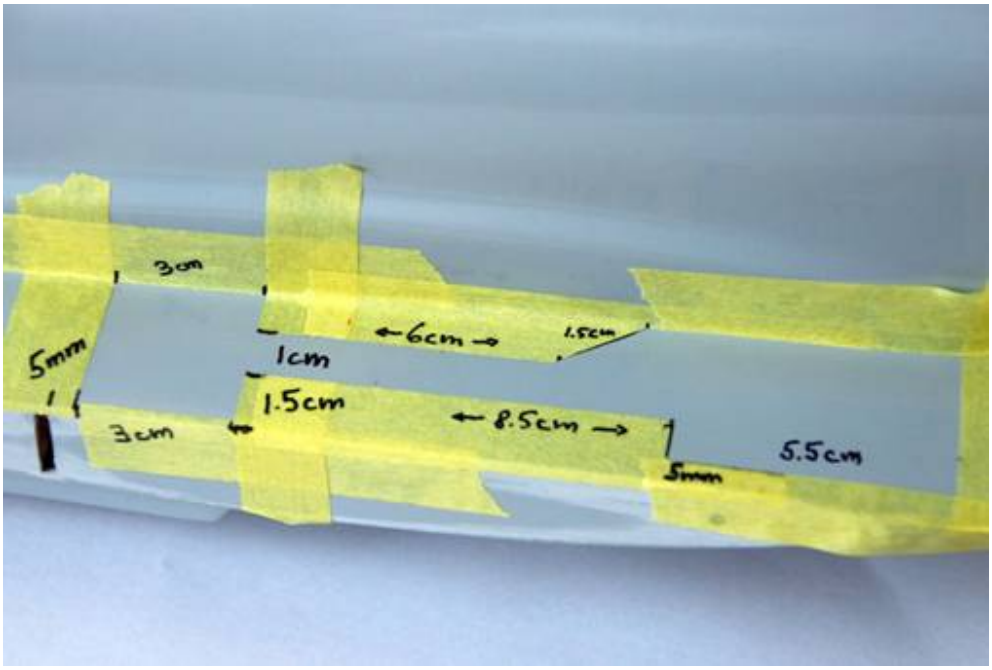


The above cut out hast to be made for the main retract unit. Mirror the template for the opposite side.

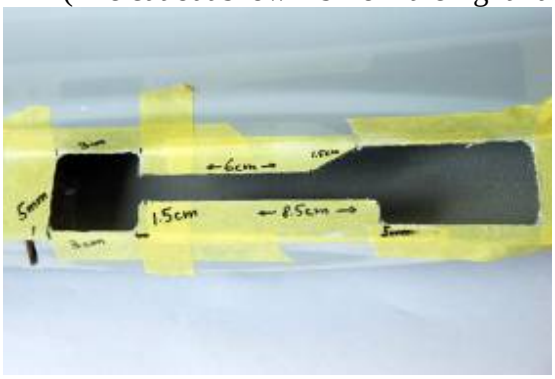
Before the retract slot can be cut, the cutting area needs to be marked. Masking tape does this job very well.
First measure 5mm forward (towards the planes nose) from the main wing spar.



The retract slot will be cut between the outer wing mounting wall and the air duct towards the center of the fuselage. Leave around 5mm between wing mounting wall and retract cut out. The inner cut can be made at the point where the air duct meets the main fuselage body. Measure 3cm (30mm) from the position marked in the previous step towards the nose of the plane.



Mask the remaining area as shown above and in the template.
(The cut out shown is from the right hand side of the model viewed from below)

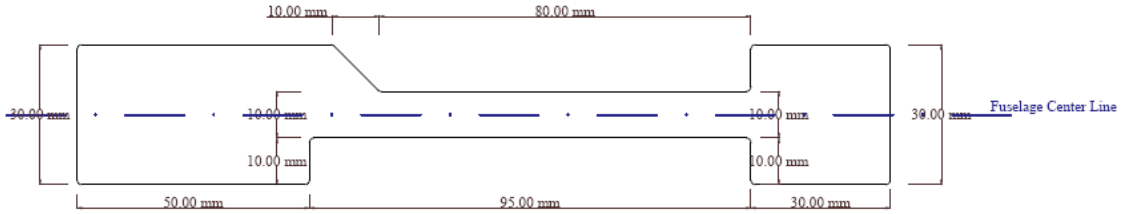


Cut the marked area with a Dremel cutting disk and drum sander. Sand round edges where possible and avoid cutting into the main spar.

Before the retract mount can be installed it might be necessary to remove some of the excess glue around the wing spar and fuselage sides. In order to see if this is necessary, slot the main retract unit through the cockpit into the fuselage and position it in place (use the correct side).

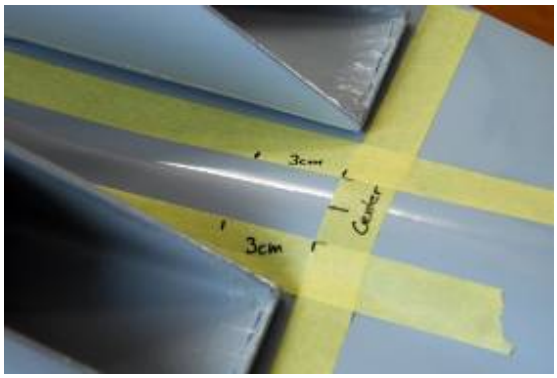
Remove excess glue where required until you get a proper fit of the retract mount against main spar and fuselage wall (where the wing meets the fuselage).
Ensure not to damage the main spar.
Roughen the inside of the fuselage at the glue areas with sandpaper.
Glue to main retract mount in place with 30min Epoxy and milled fiberglass. Use a spanner to hold the mount in place until the epoxy has cured.

Nose Retract Unit

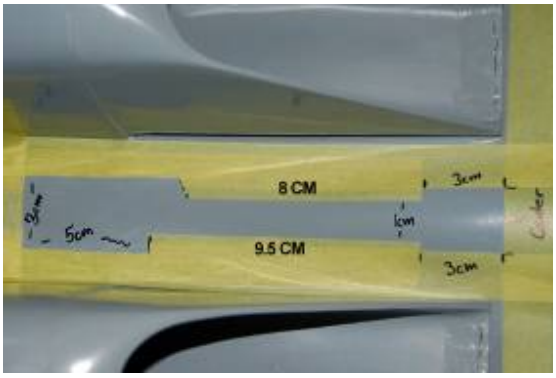


The above cut out hast to be made for the nose retract unit.

Measure the center of the fuselage at the height of the air intake.

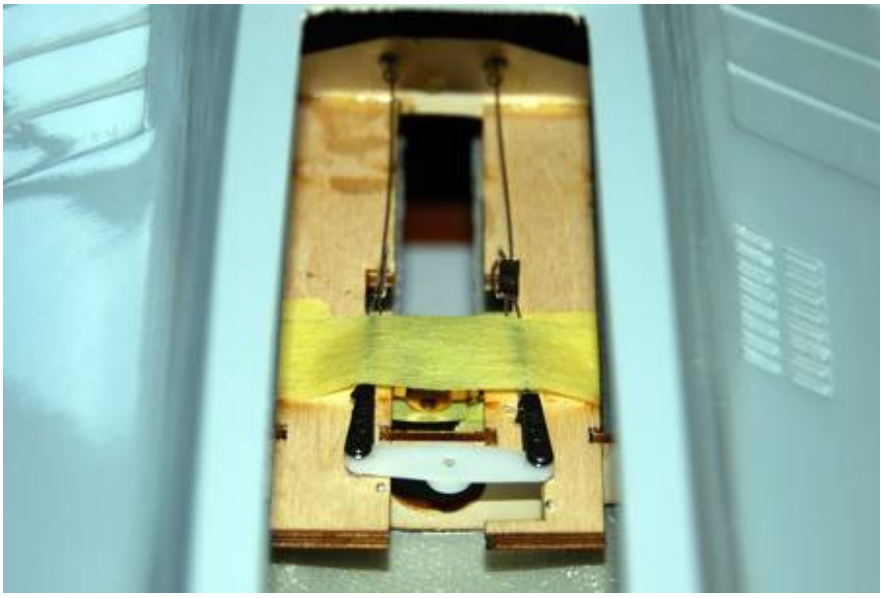


Measure 1.5 cm (15mm) from the center and 3cm (30mm) towards the tail of the plane. Use 2 parallel masking tapes as guide.



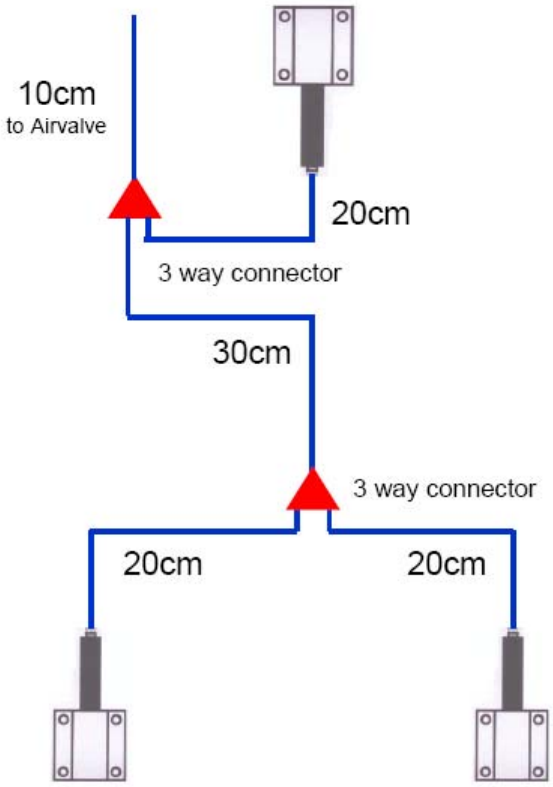
Measure and mark the cutout as shown above and on the dimension drawing. For a closer fit between retract wire and fuselage it is possible to make the cutout smaller and later enlarge it once the retract mount has been installed.

Cut the marked area with a Dremel cutting disk and drum sander. Sand round edges where possible.



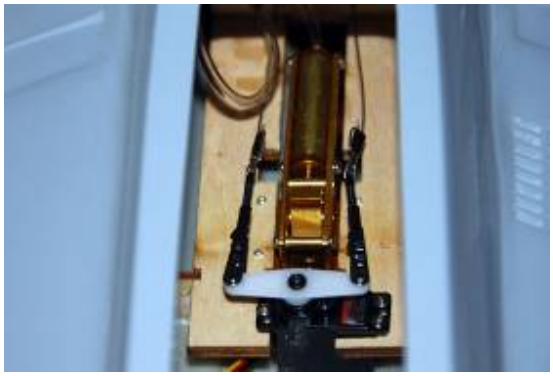
Before the nose retract mount can be glued it is required to roughen the surface of the fuselage on to which the formers are glued. Trial fit the nose retract mount and sand the areas with 180-220 sand paper.
Once done glue the former in place with 30min epoxy and milled fiberglass.
NOTE: Ensure that no glue touches the pull-pull cable or runs into the airtube.
Use a spanner to hold the mount in place until the epoxy has cured.

Step 4: Final Installation
Before the air retracts can be installed the airtube needs to be measured and cut to length. The following instructions are one example of how the airline can be installed. Depending on your final setup and positioning of the battery and RC equipment you might want to use a different method.



Cut the following length from the supplied airline:
3x 20cm
1x 30cm
1x 10cm

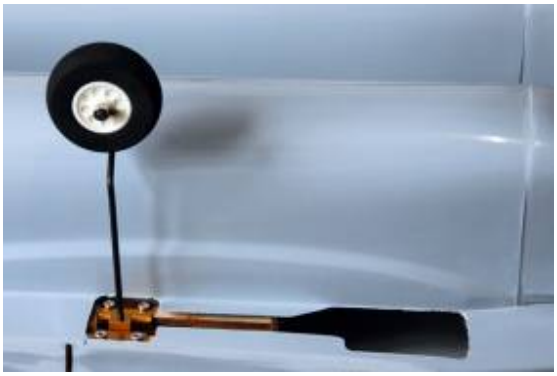
Assemble the airline as shown.
Pull the airline inside the fuselage and connect it to the retract units. Fix the retract units in place with the screws supplied.



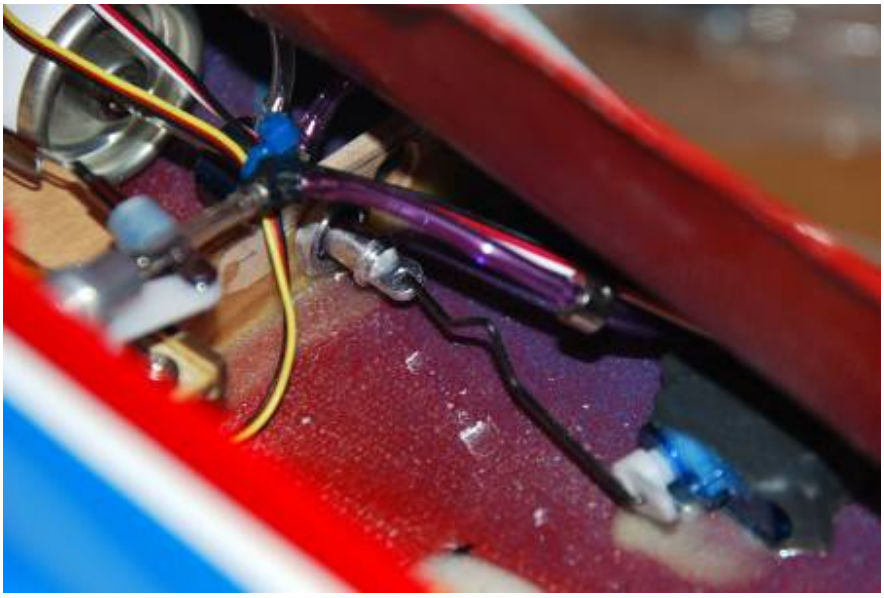
Install the nose steering servo and nose gear wire.
Ensure that the gear wire or wheel does not touch the fuselage during retract operation as this might prevent the gear from deploying later.

Test steering and retract operation.
If the retract does not lock in down position reduce the pull-pull cable tension.

Install the nose gear wheel. Ensure it can turn without binding. Mark the position of the wheel collar and file a flat spot on the gear wire where the wheel collar screw will sit.



Install main gear wires and wheels. Ensure the wheels can turn without binding. Align the wheels and mark the position where the retract grub screw touches the retract wire. File a flat spot in the retract wire. This will prevent the retract wire from turning.
Mark the position of the wheel collar and file a flat spot on the gear wire where the wheel collar screw will sit.



As last step the retract valve and servo, air tank and filler valve have to be installed. Above picture shows the installation in our prototype model. It is recommended to only install these items once the rest of the model has been completed as this will make correct CG positioning easier.

The retract valve is installed in the nose retract former as shown on page 6.
The 9gram retract servo is wrapped in heat shrink and glued directly to the fuselage bottom.
A “V” bend in the pushrod, between servo and retract valve, prevents the servo from binding.
The air tank is glued with 2 drops of silicone to the fuselage side and bottom.

Step 5: Final check
Ensure that all retract units operate smoothly without binding. If necessary bend the gear wire to ensure smooth operation.
To reduce the speed with which the retract unit operates (only for gear up movement), install the additional supplied 3mm wheel collar over the airtube **directly** between air tank and retract valve (do not install the collar on the side of the air retract or between air tank and filler valve) . The retract "up" movement can now be adjusted by tightening the wheel collar screw. Take care not to puncture the airtube.

It is recommended to program your radio so that the steering servo is disabled in the "retract up" position.

Finish the model by following the instructions in the main construction manual

WARNING!

Although the MiG-29 is a stable airplane it might cause serious personal injury and property damage if out of control. We strongly urge you to seek the help of an (AMA) approved instructor if this is your first aircraft. Only fly this model at dedicated flying fields with sufficient safety measures in place.

Please use common sense