Mounting instructions for the retractable undercarriage

FEMA

FEMA retractable undercarriages are delivered completely assembled, you just have to mount on your own the wheel brake, the additional kit for spring-loaded mounting as well as the gas pressure spring. Please read the mounting instructions carefully and stick to them to avoid problems.

Mounting of the wheel brake

The mounted wheel brake is clearly visible in figure (I). Please regard the following steps. When disassemble the bolt make sure that the recuperation spring does not burst open. Attach the end of the recuperating spring to the oscillating cranks with the help of a string. The screws (1) are secured with adhesive and have to be heated up with a soldering bit to approximately 80°C. All retractable undercarriages with a pierced locking lever that have been delivered up to now can additionally be equipped with wheel brakes.

Mounting of the reversing lever

If the retractable undercarriage is mounted spring-loaded the servo for operating the wheel brake has to be attached to the frame of the undercarriage. The wheel brake is applied via the reversing lever (stock number 9810/22). The mounted reversing lever is clearly visible on figure (II). Use the enclosed string (twofold) to connect reversing lever and brake lever. Secure the tied spot with adhesive.

Mounting of the additional kit for spring-loaded mounting

The additional kit for spring-loaded mounting as well as the gas-pressure spring with the assembling gear contain all necessary parts. The mounted articulation piece (1) and the gas pressure spring (2) are clearly visible on figure (II). For the undercarriages with the stock numbers 9800A and 9810A the articulation piece is centred with the enclosed distance rings.

figure I

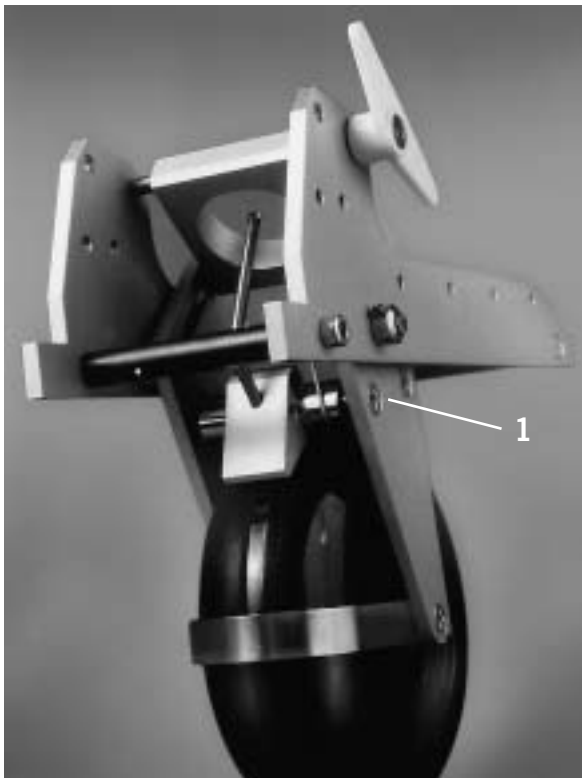
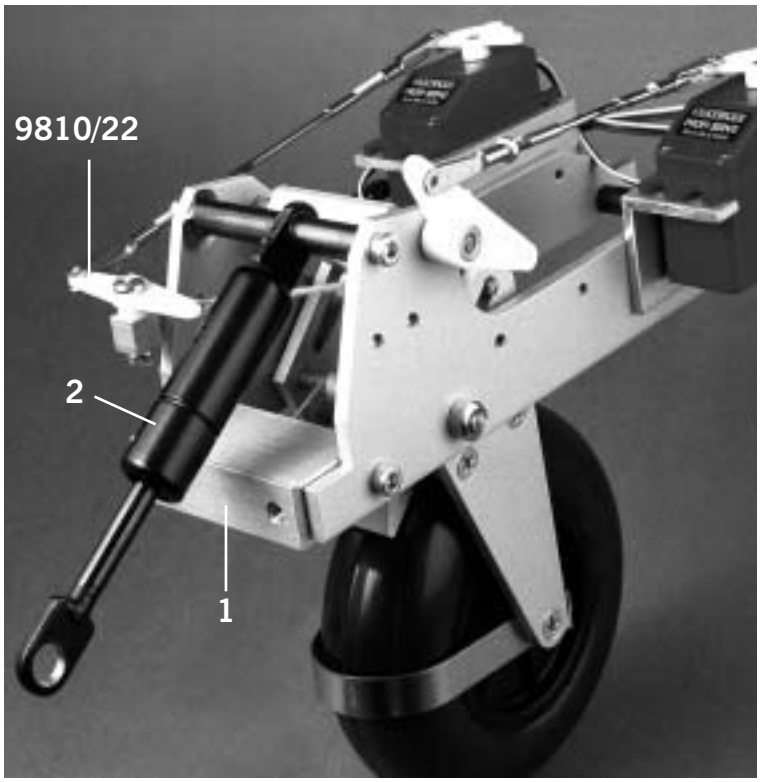


figure II



Firm attachment between two fuselage bulkheads

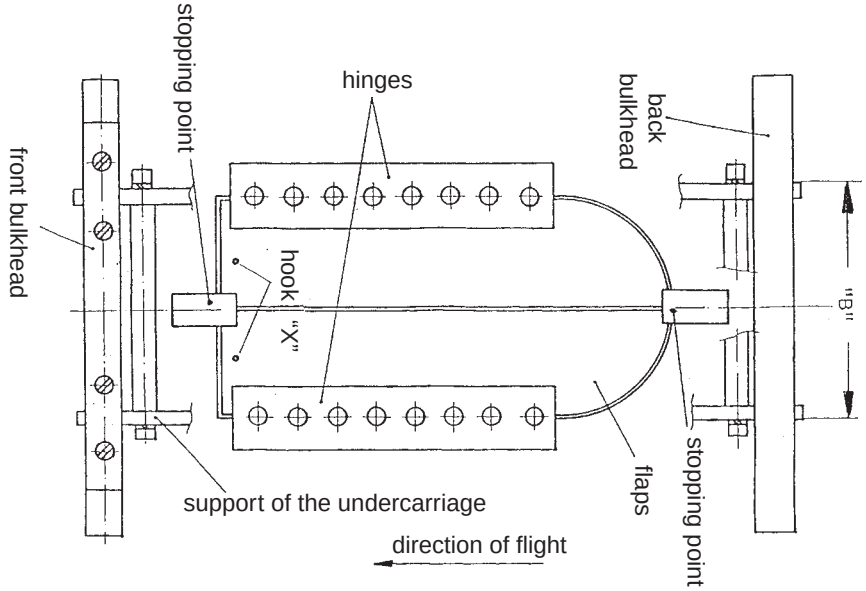
Attach the retractable undercarriage carefully to avoid problems in flight practice. Please regard the following notes thoroughly.
Up to four servos can be attached to the undercarriages with the stock numbers 9800A, 9810A and 9820A. To the undercarriage with the stock number 9830 up to two servos can be attached. The supports have all necessary fastening bores. The wheel bow of stainless spring steel makes the retraction easier and guarantees a safe functioning of the fuselage flaps.

Position of the retractable undercarriage in the fuselage

At most modern sail planes, the axle of the extended wheel is located just vertically below the leading edge stringer strip. The aeromodelling practice, however, has shown that the model too easily bends its nose down when starting a towed flight and landing. It is advisable to mount the axle nearer to the front of the model. We recommend to shift it 5-15° to the front in relation to the vertical below the stringer strip.

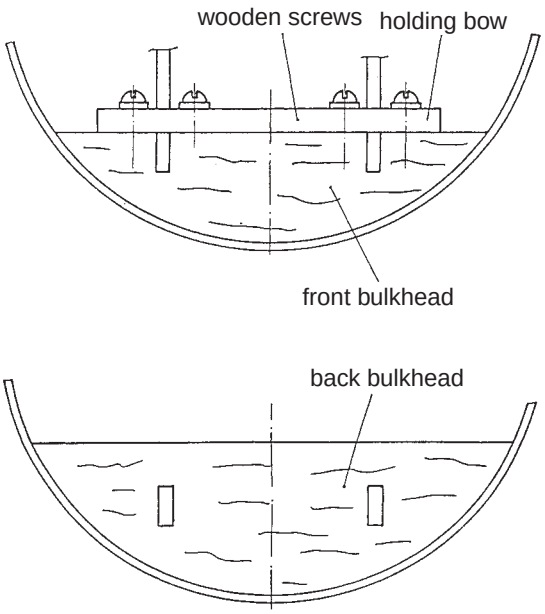
Fuselage opening and position of the flaps

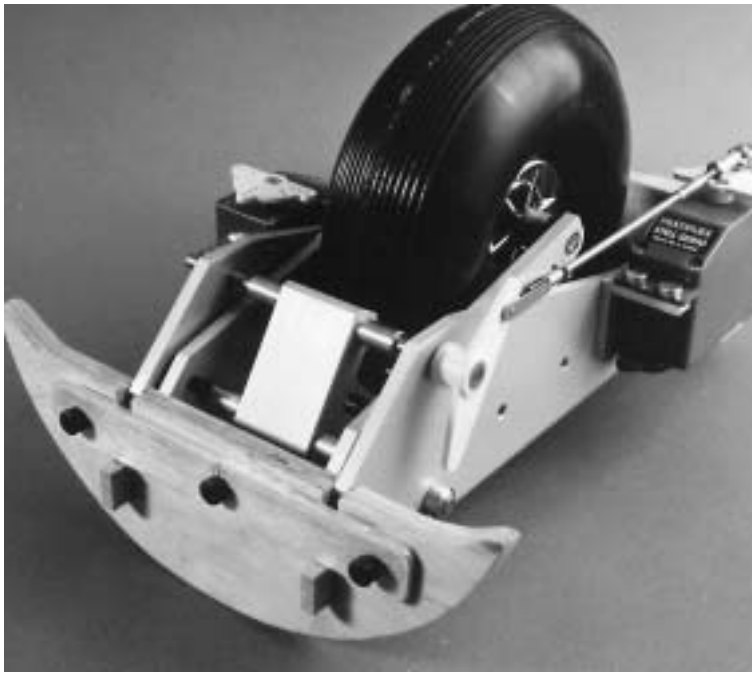
The width of the opening should be 2 mm smaller than the dimension "B" of the undercarriage. The length of the opening depends on the wheel diameter. Determine the dimension of the front edge of the oscillating cranks (extended) and measure the round shape of the flaps according to the graphic. The preparation of a firm cardboard template is advisable for the superficial fissure of the saw line. The stronger the superficial fissure, the easier to use the saw. A small electronic compass saw is ideal, but if not available it is also possible to use the saw blade of a small coping saw. Separate the cut out piece right in the middle. A piece of a racing cycle's thin tube is suitable as hinge for the flaps. Cut off strips that are 2 cm wide and of the appropriate length. Punch holes into the middle of the rubber strip with the help of a splayed brass pipe (see graphic). These hinges are really robust and adapt to the bulging of the fuselage. They are stuck together from the inside with instant adhesive first to the fuselage and then to the flap. The gap between fuselage and flap should amount 1 mm. Prepare the two stopping points "Y" out of a sheet or an epoxy plate and stick them together. The flaps can be shut with the help of small springs of rubber band.



Preparation and mounting of the bulkheads

Use plywood 8-12 mm thick. Prepare a cardboard template according to the cross-section of the fuselage. Ascertain the mounting height of the retractable undercarriage in the fuselage (between 1-5 cm) from the lower edge of the support. Then cut the openings for the support into the template and try if it fits into the fuselage. Prepare the plywood bulkheads according to this template and test their shape in the fuselage. Make sure that the undercarriage is mounted exactly in longitudinal direction and does not incline on the sides. The bulkheads are stuck into the fuselage with concentrated epoxy resin. When the resin has cured, the undercarriage is taken out and the bulkheads are stuck with glass fabric ribbon solidly to the fuselage. Prepare a holding bow of very solid beech wood and screw it with 4 wooden screws to the bulkhead at the very front. You can also use a holding bow made out of aluminium sheet (2-3 mm thick) and screw it on the face of the bulkhead.





Mounting of the servos and rods

Cut out the servo holding (stock number 9810/10) according to the size of the servo. A slowly running 180° servo is perfect for the operation of the undercarriage, but it is also possible to built in a 3-6 kg normal servo. Use an M3 fork head and an M3 ball head to prepare the rods of the undercarriage. When adjusting make sure that both final positions are safely reached even though the servo must not be under load. It is advisable for bigger models to attach the servo of the elevator onto the vertical rudder unit. The servos for retractable undercarriage, vertical rudder and tow release should be attached at the side of the retractable undercarriage. The coupling of the vertical rudder can be prepared neatly with two cable controls made out of cord. After adjusting the driving lever for the locking of the undercarriage it is advisable to grind off the area of the steel shaft onto which the fastening screw is pressing and thus making a positive fit.

Wheel brake

The wheel brake is applied by a servo and thus can be used very sensitively even despite the high brake force. If the retractable undercarriage is attached firmly, the brake servo can be mounted either directly to the frame of the undercarriage or to the front fastening bulkhead. The wheel brake can also be applied in combination with the landing flaps or the tow release. If the retractable undercarriage is attached spring-loaded the brake servo has to be mounted to the frame of the undercarriage to secure the safe functioning of the wheel brake during spring-deflection.

When adjusting the brake functioning make sure that the arrester wire is not too tight while the undercarriage is extended. The arrester wire should be tight but the brake should not be applied yet.

Additional instructions for spring-loaded attachment

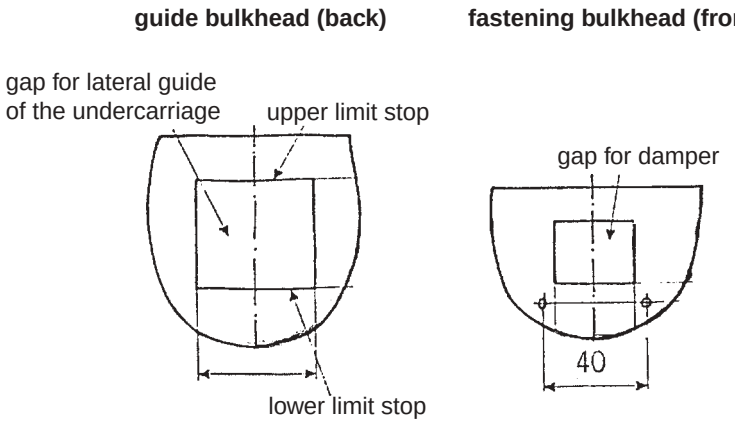
When mounting spring-loaded undercarriages it is very important to attach the back bulkhead which is needed as limit stop and lateral guide. Otherwise tough touch-downs or crosswind landings may damage the fuselage. When mounting the wheel brake, additionally attach a plywood adapter 10 mm thick between the aluminium pillow block of the retractable undercarriage and the front fastening bulkhead so that the front fuselage bulkhead does not hinder the reversing lever (stock number 9810-22) after the spring deflection.

Preparing the bulkheads

It is advisable to prepare cardboard templates before preparing bulkheads out of plywood (8-10 mm). Stick to the following steps to get exactly symmetrical components:

1. Fold a square cardboard right in the middle.
2. Cut out the rough contour of the fuselage.
3. Unfold the cardboard and hold it up to the corresponding position in the fuselage.

Repeat steps 1 to 3 until the template has the same contour as the fuselage. After preparing templates for both bulkheads, transfer the contours onto the plywood. Include also the fold which is needed as a symmetrical line to draw the necessary borings and gaps for the undercarriage. Now saw out the bulkheads.



Fix the lower limit stop in such a way that the retractable undercarriage rests with an initial stress of 1-2 mm. The lateral guide should not have more than 0.5 mm of positive allowance. We recommend to screw plastic ledges onto the bulkhead for the lateral guide that can then be adjusted very precisely. Grease the guide a bit to obtain a safe functioning.
Fix the upper limit stop in such a way that the spring deflected wheel rises at least 30 mm above the flaps of the fuselage.

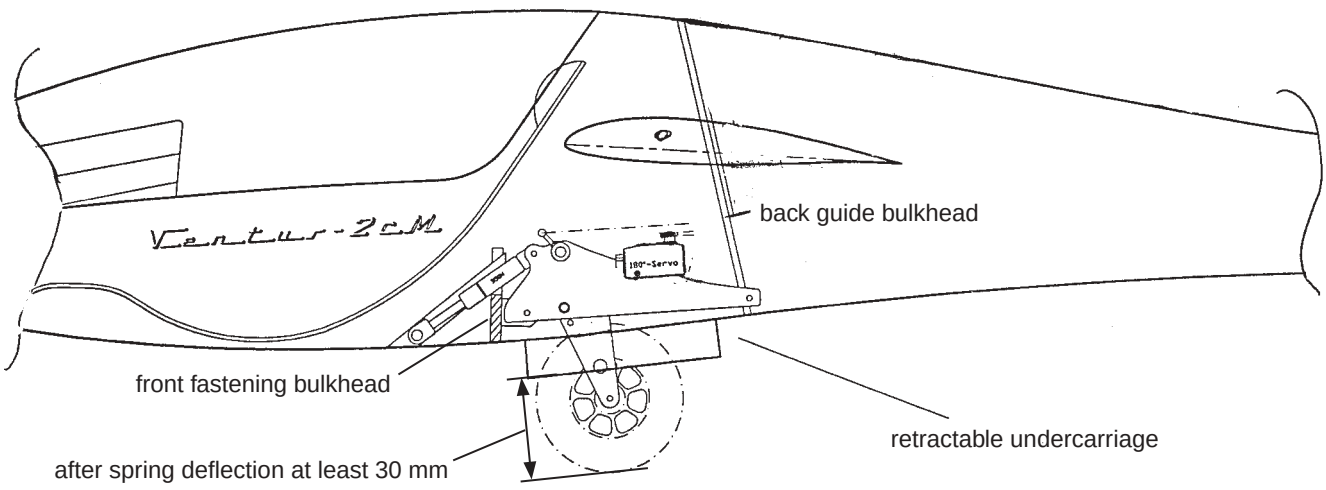
Mounting of undercarriage and of gas pressure spring

Calculate the required springiness of the gas pressure spring according to the following thumbrule:

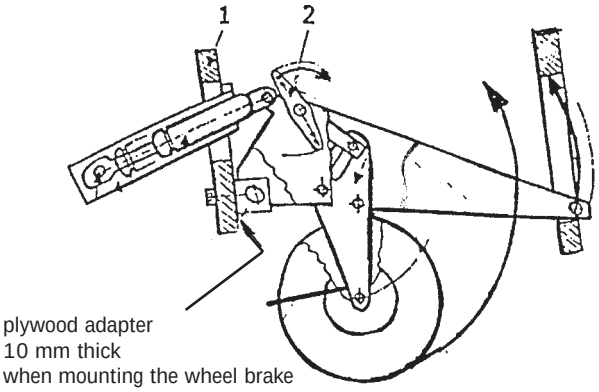
springiness (N) = model weight in kg x 40 (1kp ca. 10N)

Gas pressure springs are available with a springiness of 200N, 300N and 400N. Models of more than 10 kg require the attachment of two gas pressure springs. If additionally a wheel brake is attached, the second gas pressure spring has to be mounted eccentric to leave space for the reversing lever (stock number 9810/22).
The lateral force has no negative influence on the functioning of the spring. If the gas pressure springs have a different springiness the weaker one is attached eccentric.

Screw the undercarriage with the mounted dampers to the fastening bulkhead (don't forget the plain washer). Lead the fastening strips of the damper that are not yet tangent-bent through the gap of the fastening bulkhead past the sides of the dampers (according to the general view). Then connect damper and fastening strips of the damper with the spring steel bolt. Then keep the damper in the desired position and make sure the guide bulkhead of the undercarriage is surface-mounted on the lower limit stop. Align both fastening strips exactly parallel to the dampers. A short piece of the fastening strips protrudes the end of the fastening bulkhead. Draw a line at these edges. According to the line the two fastening strips can be tangent-bend with the help of a vise (once to the left and once to the right) . Then just drill a fastening bore through bulkhead and fastening strip to screw everything up. The spring steel bolt is secured against lateral shifting by the included slide index (according to the general view).

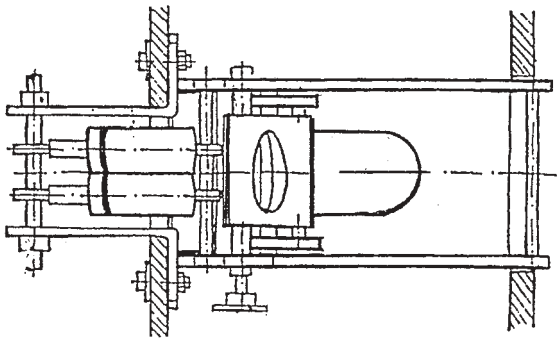


general view



plywood adapter
10 mm thick
when mounting the wheel brake

top view



For very rough flight practice we recommend mounting the thrust bearing according to figure III. This fastening method relieves the fastening bulkhead as the forces are lead directly to the fuselage. The additional longitudinal bulkheads and the transverse bulkhead give the undercarriage an optimal support.

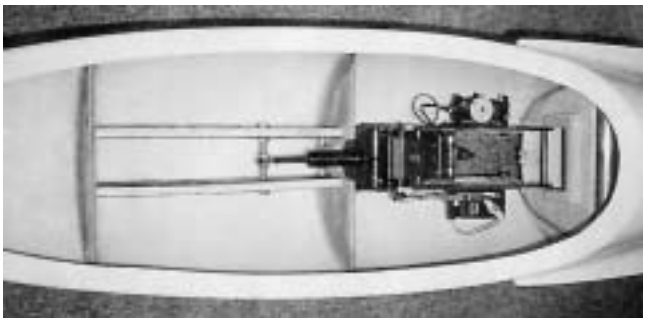
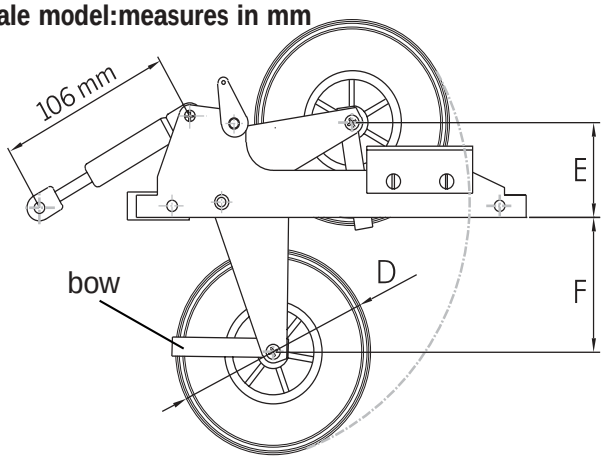
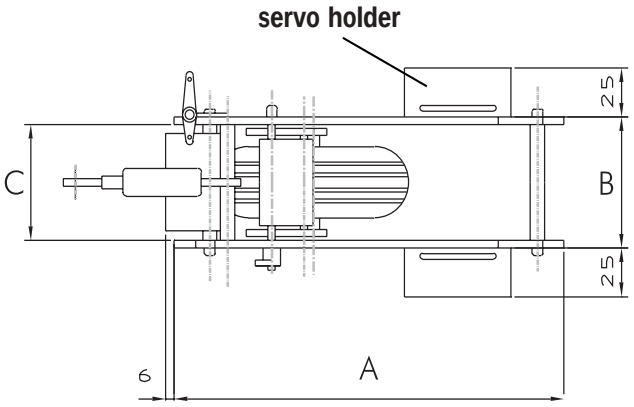


figure III

scale model:measures in mm





*without wheel, servo holder and bow

stock number	A	B	C	D	E	F	weight	model weight
9800A	272	80	68	140 - 165	66	92	680 g	12 - 25 kg
9810A	220	72	60	110 - 127	56	68	420 g	8 - 16 kg
9820A	196	62	50	90 - 100	46	60	350 g	5 - 10 kg
9830	172	54	44	70 -80	36	54	200 g	3 - 7 kg