robbe

Assembly and operating instructions
Notice de montage et de pilotage
Istruzioni di montaggio e d'uso
Instrucciones de montaje y manejo

Crown III

No. S 2610

Specification

Main rotor diameter:	approx. 630 mm
Tail rotor diameter:	approx. 142 mm
Length:	approx. 570 mm
Height:	approx. 210 mm
Weight:	min. 545 g

Introduction

The Crown III model helicopter you have purchased is a member of the robbe family of helicopter products.

The model is supplied factory-assembled; all you have to do to complete construction is to install the motor and the receiving system.

The drawings corresponding to the numbered stages of construction can be found in the German instructions.

The tools and accessories required to complete the model are listed on a separate accessory sheet.

Notes on the radio control system:

All the pushrod lengths and servo output arm lengths assume the use of robbe/Futaba servos. If you wish to use other makes of servo you may need to make allowance by adjusting the stated dimensions slightly.

The building instructions are grouped according to the helicopter's sub-assemblies, and are divided up in a logical sequence of stages.
An assembly drawing is included for each stage, showing how the parts fit together.

Each stage includes **supplementary notes and tips** which should be read carefully while you are assembling the model.

Replacement parts

It is vitally important that you use only genuine replacement parts when required. Pictures of the replacement parts and the associated numbers are to be found in the appendix to these instructions. The numbers and descriptions are listed in the Replacement Parts list on the final page.

Please store these building instructions in a safe place so that you can refer to them later when maintaining or repairing your model. The red Quality Control sheet and any other supplementary sheets in the kit should also be kept safely.

Please state the original Order No. when ordering replacement parts, as this avoids problems and delays in obtaining spares. **Replacement parts are only available in the stated sets.**

If you think you have cause for complaint, or wish to make a claim under guarantee, please note that you must state the Control Number and include proof of purchase.

The electric motor

Read and observe the instructions supplied with the motors and speed controllers.

Speed controllers must be operated in helicopter mode.

Controlling a model helicopter

The most important feature which differentiates a helicopter from a fixed-wing aircraft is that its power element - the main rotor - is also the essential control element.

The helicopter is controlled by varying the settings of both the main rotor and the tail rotor. The main rotor head includes what is known as an auxiliary rotor (flybar and paddles) which transfers the control movements to the main rotor itself.

The swashplate is a sub-assembly mounted on the main rotor shaft, or mast. It is capable of moving in all directions, and its purpose is to transfer mechanical control movements from the servos to the main rotor.

How the swashplate works:

Helicopters are capable of flying forward, backward and to both sides, and these movements are controlled by tilting the main rotor in the desired direction.

These movements are generated by varying the pitch angle of the rotor blades according to their momentary position in each cycle
= cyclic pitch control
To produce vertical movement in either direction the pitch angle of the rotor blades is varied simultaneously
= collective pitch control

Four primary functions have to be controlled:

- **Climb and descent: „collective pitch, throttle"**
  The pitch angle of both (all) blades is altered, and at the same time the throttle setting is changed to deliver the appropriate level of power to the rotor.

- **Roll: „roll-axis"**
  (movement around the longitudinal axis)
  The main rotor plane is tilted to right or left as required

- **Pitch: „pitch-axis or forward / back cyclic"**
  (movement around the lateral axis)
  The main rotor plane is tilted forward or back as required

- **Yaw: „tail rotor"**
  (movement around the vertical axis)
  The pitch of the tail rotor blades is altered as required

(L) = Use Loctite

Fig. 1

- When working on the motor and speed controller be sure to read the instructions supplied with the units.
- Solder the connector contacts to the motor wires.
- Fit the pinion on the motor shaft.
- Fit suitable connectors to the motor wires and battery wires attached to the speed controller.

Figs. 2 and 3

- Fix the motor to the chassis using the screws supplied. Adjust the gearbox meshing clearance so that the gears engage fully, but without any trace of binding.

- The pinion and main gear must engage over their full width; adjust the position of the pinion on the motor shaft if necessary.

Fig. 4

- Screw the bottom end of the brace to the skid bar, and the top end to the clip on the tail boom.

Fig. 5

- Attach the horizontal stabiliser to the tail boom using the clip and screws provided. Ensure that the stabiliser is exactly at right-angles to the main rotor shaft.

Fig. 6

- **Undo the front screws and remove the servo frame "S".**

Fig. "L", Measuring the pushrod lengths "X".

Fig. 7

- Prepare the pitch-axis servo (N) and the roll-axis servo (R) as follows: set the servos to neutral from the transmitter, cut down the output arms as shown, and fit them on the servo output shafts in the position shown.
- **Use rubber grommets and metal spacers when installing the servos.**
- **Connect the pushrods (Y-02, pitch-axis, length: 59 mm) and (Y-03, roll-axis, length: 49 mm).**
- Place the servos in the servo frame and secure them with the screws and nuts provided.

Fig. 8

- **Install the servo frame again.**
- **Press the pushrods onto the ball-end bolts on the rocker and the bellcrank. Fix the four cabin supports to the chassis; secure the screws with Loctite.**

Fig. 9

- Set the collective pitch servo (P) to neutral from the transmitter, cut down the output arm as shown and attach it to the servo output shaft.
- **Connect the collective pitch pushrod (Y-06, length: 15 mm).**

Fig. 10

- Install the servo and secure it with the screws and nuts supplied. Connect the collective pitch pushrod.
- The collective pitch actuator Y-01 is adjusted as part of the radio control system set-up procedure.

Fig. 11

- Undo the rear screws in the chassis (arrow) in order to install the gyro support.
- Fit the gyro support and re-tighten the screws.

Fig. 12

- Set the tail rotor servo (H) to neutral from the transmitter, cut down the servo output lever as shown, and mount it on the servo output shaft.
- Open up the hole in the servo output arm to 1.5 mm Ø, screw the linkage ball to the output arm and secure it with a nut, not forgetting the Loctite.
- Place the servo in the frame and fit the retaining screws.

Fig. 13

- Attach the tail rotor servo assembly to the tail boom using the clips provided. Tighten the screws just to the point where the assembly cannot shift.

Fig. 14

- Route the tail rotor pushrod Y-08 through the guide in the horizontal stabiliser clip.
- Connect the pushrod to the linkage ball on the servo output arm and the bellcrank.
- Adjust the position of the servo assembly so that the bellcrank is at right-angles to the tail boom.
- Tighten the screws in the clips in this position.

Fig. 15

- Attach the gyro to the gyro support using double-sided foam tape.

Fig. 16

- Attach the speed controller to the chassis using a cable tie.

Fig. 17

- Install the flight battery and secure it. **Don't connect it to the speed controller at this stage.**

Figs. 18 and 19

- Connect the servos, the gyro and the speed controller to the receiver.
- Fix the receiver in place.
- Locate the flexible wire aerial attached to the receiver, route it through the holes in the skid bars and finally to the vertical stabiliser.

Figs. 20 and 21

- Connect all the pushrods to the main rotor head after checking that they are set to the stated lengths.
  Pushrods: see also Replacement Parts list, "Stage 12".
- **Linkage points and pushrod lengths at the main rotor head:**
- Y-04, swashplate - flybar frame, length: 42 mm
- Y-05, collective pitch compensator - mixer lever, length: 25 mm
- Y-07, mixer lever - blade holder, length: 14.5 mm
- Y-09, Bellcrank (roll-axis) - swashplate, length: 22 mm

Fig. 22

- Sand the cut edges of the cabin smooth using abrasive paper.

Fig. 23

- Mask off the front screen, paint the cabin in the colour scheme of your choice and apply the decals.

Fig. 24

- Place the cabin on the model.

Fig. 25

- **The next step is to balance the rotor blades.**
- Fix the two rotor blades together by passing a screw through both root holes; secure it with washers and a nut.

- Set the temporarily joined rotor blades in a straight line, and support them in the centre.

- The lighter blade is the one that rises; apply adhesive tape to it until the blades balance exactly level.

Fig. 26

- Fix the rotor blades to the blade holders using M 2.5 x 15 screws and M 2.5 nuts.

- Tighten the screws just to the point where the rotor blades can still swivel smoothly in the blade holders.

Fig. 27

- **Please note when transporting the model:** swing both main rotor blades back towards the tail and set them parallel - don't rest one on top of the other.

- We recommend that you protect the blades in transit using a suitable blade support.

Fig. 28

Centre of Gravity

- The correct Centre of Gravity (C.G.) is at the front edge of the main rotor shaft. Adjust the position of the flight battery until the model balances at the stated point.

Setting up the radio control system

Basic requirement:
You need a radio control system designed for helicopter use. Check that the servos are connected to the receiver in the sequence described in the operating instructions.

Procedure:

- **For reasons of safety disconnect the motor from the speed controller.**

- Switch on the transmitter
- Select a vacant model memory
- Program the model memory to the „Heli" mixer type
- Set the swashplate mode to „H1"
- Activate the tail rotor mixer (Revo-Mix) if required by the gyro you are using
- Program the system for a right-hand rotation main rotor
- Set all transmitter sticks and trims to centre
- Do not set up any trim memories or freely programmable mixers
- Program throttle trim to idle trim (ATL - throttle trim active only at idle end of range)
- Switch on the receiving system (connect flight battery to speed controller).

Adjusting the collective pitch actuator Y-01
- Ensure that the collective pitch servo is exactly at neutral.

- Use a pitch gauge to set the pitch angle of both main rotor blades to + 3° to +4°.

- In this position tighten the socket-head screw in the collet.

- Set the collective pitch maximum to +7° to +8° , collective pitch minimum to 0° to +1°.

Setting up the servos for roll and pitch-axis movements

- **Note:** with an H1 swashplate linkage the swashplate tilt corresponds to the helicopter's direction of flight.
- Check the direction of travel of the servos.
- **Apply a roll command to the right: the swashplate should tilt to the right as seen from the tail of the model.**
- Use the servo reverse facility on your transmitter if any of the servos moves in the wrong direction.
- **Apply a forward pitch (forward cyclic) command: the swashplate should tilt forward.**
- Use the servo reverse facility on your transmitter if any of the servos moves in the wrong direction.

Setting up the tail rotor servo

Note:
Fold the tail rotor blades together as shown in the drawing. When you move the tail rotor stick to the right, the tip of the top blade should also move to the right (away from the tail boom).
- Reverse the tail rotor servo if necessary.

Checking the direction of gyro effect (fig.)

Kreiselwirkrichtungskontrolle = Checking the direction of gyro effect

Set the gyro to maximum gain.
Swing the tail boom briskly to the right (i.e. the helicopter's nose moves to the left).
With the tail rotor blades still folded together, the tip of the top blade should now move away the tail boom („Re" in the drawing).
Reverse the gyro direction if necessary. If your gyro is a simple type without a reversing switch (e.g. G 200), invert the gyro element.

Adjusting blade tracking (fig.)
Einstellen Blattspurlauf = Adjusting blade tracking

When you first operate the model you will need to check and adjust blade tracking.

Carefully open the throttle until the blades are spinning, and check the blade tracking from the side.

If the blades revolve at different heights when the rotor is at hover speed, you need either to increase the pitch angle of the lower blade B, or reduce the pitch angle of the higher blade A.

This is done by disconnecting the pushrod between the mixer lever and the blade holder, disconnecting Y-07 and rotating it by 1 - 2 turns in the appropriate direction.

General information on programming the radio control system

The settings stated in the following section refer to the FX 18 radio control system and the recommended components (see accessory sheet).

If your model helicopter is to operate efficiently the basic mechanical adjustments must be correct.

For safety reasons remove the main and tail rotor blades before making adjustments to the speed controller and throttle programming.

Before you continue with programming the system the following requirements must be fulfilled:

Adjust the speed controller as described in the operating instructions.

- **Caution: activate the soft-start facility of your speed controller, as this prevents the main rotor blades folding together.**

The first step is to set the hover point.
Your aim should be to set up the helicopter so that it hovers when the collective pitch stick is at centre, with a blade pitch angle of +3° - +4°.

Set up the mixer swashplate travel in % terms so that the collective pitch range is from 0° to + 8°.

If you are using a 6-channel receiver it is possible to set a fixed value for throttle in the throttle / collective pitch curve.

If you are using a receiver with 7 or more channels the speed controller can be assigned to a separate slider channel.

Tail rotor compensation (REVO)

Tail rotor compensation only needs to be set up if you are using a gyro which requires this.

The aim is to eliminate any tendency for the helicopter to yaw (swing to either side) when the model climbs or descends. This unwanted rotation is caused by variations in the torque generated by the rotor blades.

The basic requirement:

The model must first be trimmed neutrally for the hover, i.e. when hovering the model should have no tendency to yaw. Standard REVO value: 25%.

With the model at a steady hover, increase collective pitch briskly.

If the model yaws in the opposite direction to the direction of main rotor rotation, the value for tail rotor compensation (REVO) must be increased.

If the model yaws in the same direction as the direction of main rotor rotation, the value for tail rotor compensation (REVO) must be reduced.

Important

After flying the model helicopter for the first time please take the trouble to check that all screwed joints are still tight; this applies in particular to the power train components and the rotor system. All the following areas of the helicopter should be re-greased or oiled at intervals of two or three hours:

Main rotor shaft where the collective pitch compensator slides.
Tail rotor shaft in the area of the tail rotor slider,

And one final tip

On no account attempt to fly your new helicopter without enlisting the help of a good, experienced helicopter pilot. Many apparently difficult problems sort themselves out virtually by themselves if you can fall back on the experience of a competent helicopter pilot.

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We reserve the right to alter technical specifications

Description	Pack quantity	No.
Side frames	1	RF-01
Motor mount plate	1	RF-04
Dome bearing bracket	1	RF-05
Servo frame set, roll / pitch-axis	1	RF-07
Roll bellcrank	1	RF-11
Tail boom holder	2	RF-13
Front structure set	1	RF-15
Rotor head centre piece	1	RH-01
Blade holder set	1	RH-02
Blade pivot shaft	1	RH-04
O-ring	2	RH-11
Rotor blade set	1	RH-15
Flybar	1	RB-01
Flybar paddle set	1	RB-02
Control frame set	1	RB-04
Rocker set	1	RB-05
Mixer lever set	1	RB-06
Main rotor shaft	1	RS-01
Main gear / freewheel	1	RS-02
Toothed belt set	1	RS-07
Swashplate	1	RW-01
Washout unit set	1	RM-01
Pitch-axis rocker set	1	RE-01
Collective pitch linkage set	1	RP-01
Tail boom	1	RT-01
Toothed belt	1	RT-02
Tail boom holder	2	RT-05
Clamp	1	RT-04
Brace	1	RT-03
Tail rotor blade set	1	RG-01
Blade holder set	1	RG-02
Tail rotor gearbox set	1	RG-05
Tail rotor hub	1	RG-08
Tail rotor shaft	1	RG-09
Collective pitch bridge set	1	RG-11
Rear toothed belt pulley	1	RG-15
Vertical stabiliser	1	RG-19
Tail rotor bellcrank set	1	RG-24
Skid tubes	2	RL-01
Skid bar set	1	RL-02
Horizontal stabiliser set	1	RL-04
Pushrod set	1	RY-01
Tail rotor pushrod	1	RY-08
Canopy / decal sheet	1	RK-01
Canopy stand-off pillar set	1	RK-02
Motor pinion and grubscrew	1	RR-01
Belt tensioner set	1	RT-06
Tail rotor servo frame	1	RL-05
Small parts set	1	RF-03
Collets	2	RS-11

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