

minicopter

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Congratulations for the purchase of your *Joker* - helicopter.

With this model you have a long-life product in your hands, which is maufactured to the highest quality standards. So flying and servicing will give you a great deal of fun for a long time.

The manual contains many detailed graphics so that you should have no problems when bulding the helicopter. Please take a little time to study the manual before beginning. Then you get an overview of the building process.

The kit contains some hexagon wrenches. Additionaly you need the following tools:

### <u>Tools:</u>

socket wreches with grip for nuts 5,5 and 7 mm with a thin outer diameter. open wrench 4,5/5,5 mm hexagon wrenches with axial grip 2/2,5/3 mm hexagon wrench with cross grip 4 mm (2 parts for feathering spindle) sharp tongs with 45° cranked head Phillips screwdriver small screwdriver flat screw lock (for example Loctite 243 blue)

### **Special Tools:**

ball joint tongs f.e.Robbe S 1360 pitch gauge f.e. Robbe S1366 paddle gauge f.e. Robbe S1368

### Lubricants:

axial bearings: normal machine lubricant (from toolmarket) autorotation coupling: synthetic motor oil The gear wheels don't use lubricant.

### **Recommended RC-equpiment:**

receiver: PCM-system with 10bit and double superhet RC-battery: 4 cells Sanyo KR 1400AE swash-plate servos:Futaba S9202 or better gyro: Futaba GY 401 with servo S9253 interference elimination filter between receiver and controller

If you have problems when building your model please e-mail us. We help you!

And now: Much fun by building your Joker !

### Safety rules:

Radio controlled helicopters are **not toys**. The wrong use of such models can cause accidents with serious injuries.

Therefore please bear the following rules in mind:

- For engine running tests on your workbench remove the complete mainrotor including all rods and the tailrotor blades. Make sure that nothing can come in contact with the tailrotor assembly.
- With an electric helicopter there is a danger of sudden engine starts. So remove the main- and tailrotor before connecting the battery packs.
- Don 't switch the controller off and on suddenly when running up. Wait some seconds if retrying.
- In hovering flight please keep a distance of at least 5 metres from the helicopter.
- When flighing DON'T aim at persons or other creatures and keep a safe distance of at least 20 metres.
- Don't fly in forward flight if your battery is nearly empty, if you can't autorotate in all situations. For landing calculate a safety reserve of at least 30 seconds or better one minute. Empty the battery while hovering.
- Don 't empty the battery absolutely completely in hovering, otherwise the battery can be damaged.
- For the first flight a partner should tell you the flight time in intervals of 30 seconds so that you get a feeling for electric flight. After some time you feel an empty battery by giving full pitch for a moment. When the rotorspeed shuts down then you should search the ground for landing.
- Practice autorotations with running engine as soon as possible.
- When you see that a crash is unavoidable try to stop the engine before ground contact.

Liability exclusion:

We can't check for correct building, adjustment, maintanence and usage. So **no guarantee is possible**.

Vellmar, in november 2001











4a



Tip: mount gyro in such position that you can use switches and potentiometers







for other rotation sense turn bush No.246 (open snap ring No.59 with pliers)

Lubricate the clutch only with synthetic motor oil, never with grease!







4 = washer M3 large 8 = nut with lock ring M3 16 = hexagon socket screw M3 x 12



manual



6













11 329(2x) 286 -**8** (13x) 327 Child Children and Child 261 198 and the second of the second o 294 254 -20(13x) (2x) **132** 8 = nut with lock ring M3 20 = hexagon socket screw M3 x 30 minicopter® **JOKER** manual









357 Ø -**8**(2x) O Co -23 (2x) 8 = nut with lock ring M3 23 = hexagon socket lense screw M3x6 minicopter®

















53 = shim 4x8x0.167 = ball bearing 4x12x4











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Mainrotor right (CW) 26 (4x)57 (2x)**4**3-517-(L) (2x) 526 525 -35(2x) (L) 35 = headless hexagon socket screw M4 x 5  $43 = shim 4 \times 8 \times 1$  $\bigcirc$  = use Loctite 57 = Teflon anti-friction bearing minicopter®















- 1. Place blocks with 17.5mm height between frame and swash plate.
- 2. Adjust pushrod 1 between servos and swash plate until all servo arms are horizontally.
- 3. Adjust pushrod 2 to the hiller bridge until ball bearing is in the middle of the brass control ledge.
- 4. Double ball link between flybar and mixer arm is 42 mm long.
- 5. Adjust lower ball link between swash plate and mixer arm until mixer arm is in horizontal position.
- 6. Check pitch angle of mounted rotorblades with with a pitch gauge. Adjust lower ball links of rod 4 until both blades are exactly in neutral position (zero degree pitch).





## pitch gauge

1. normal flight, 1200 1/min



hovering
forward flight



④ 3D-aerobatic⑤ autorotation

recommended main rotor speed: 1200 - 1600 1/min

## steering deflections:

elevator:	hovering	1200 1/min:	12°25% Exponential
	forward flight	1200 1/min:	20° 20% Exponential
	aerobatic	1600 1/min:	20° 15% Exponential
roll:	hovering	1200 1/min:	15° 20% Exponential
	forward flight	1200 1/min:	20° 10% Exponential
	aerobatic	1600 1/min:	20° 10% Exponential
tailrotor:	all phases:	+26°/-10°	30-50% Exponential

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### **Construction of controler platform:** (see pictures)

- 1. Remove the black foil from the fiberglass board and wipe the photosensitive plate off with acetone (nail enamel remover).
- 2. Cut parts with scissors or a fretsaw, straighten the borders with sand paper and solder them at two points on each side (copper inner side).
- 3. Mount platform with 4 screws M2 and locking nuts (drill-Ø2.2mm).
- 4. Fix controller with adhesive tape and cable fittings.

### Contruction of battery connector socket: (see pictures)

- 1. Cut the parts for the fiberglass frame (2 strips 0.5 mm and one cross strip 1,5 mm) from the rest of the board.
- 2. Solder on the first cell of every battery pack a 4mm gold connector (female). For best results you should build a small wooden frame. Keep a small distance of 0.5 mm from connector to the cell to avoid short circuits.
- 3. Screw side strips to the frame with 4x M3x8 screws and lock nuts.
- 4. Solder two brass screws into the gold connectors (male). Remove the heads of the screws with a saw. Screw these units into the 1.5mm cross strip after drilling two holes 24 mm apart in the middle of the strip. File 3 break lines across the copper on the inside of the end plate to avoid short Fix the connectors to the cross strip and fix battery pack in the chassis frame. Now plug in the connectors and solder the end cross plate at 2 points on each side.
- 5. Solder cables between connectors and controler.



















