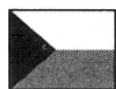


**MS**  
COMPOSIT

# HORNET

**RC Model Electro Powered Helicopter**



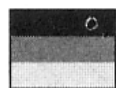
## **Stavební návod a seznam náhradních dílů.**

**UPOZORNĚNÍ** - RC vrtulník není hračka, je to létající model, pro jehož provoz je nutno dodržet pravidla obecně platná pro provoz všech RC modelů.



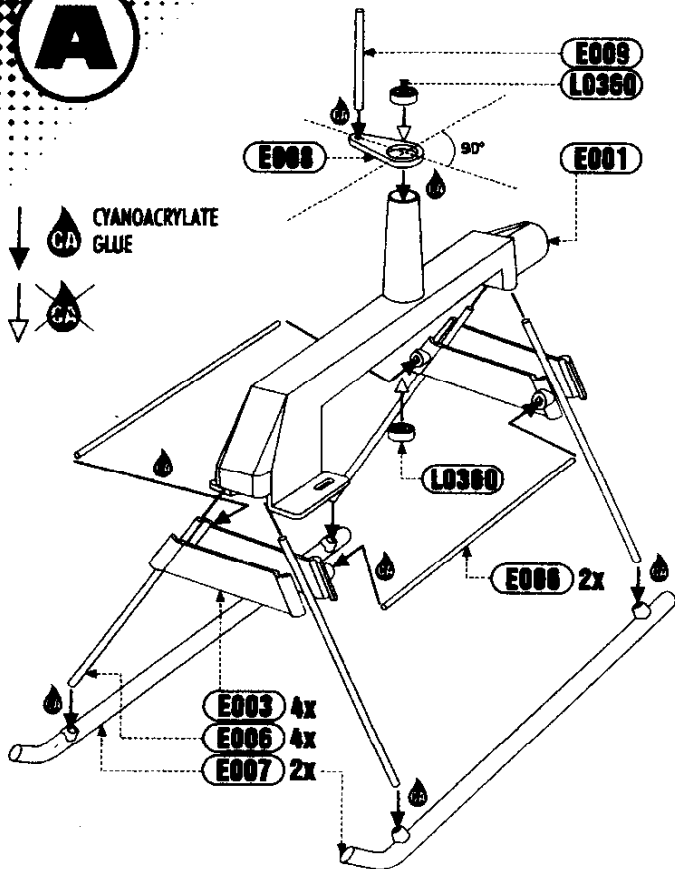
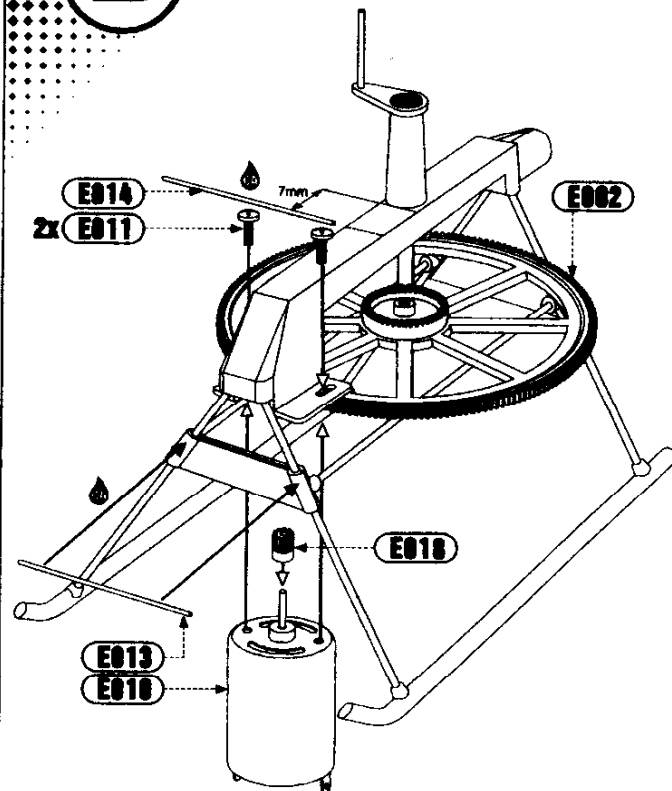
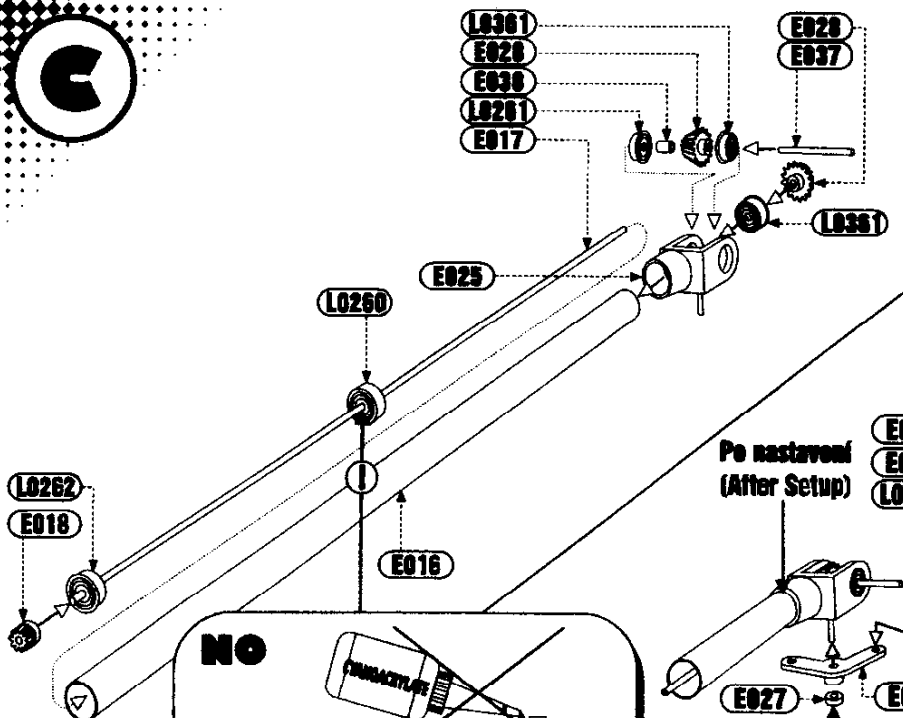
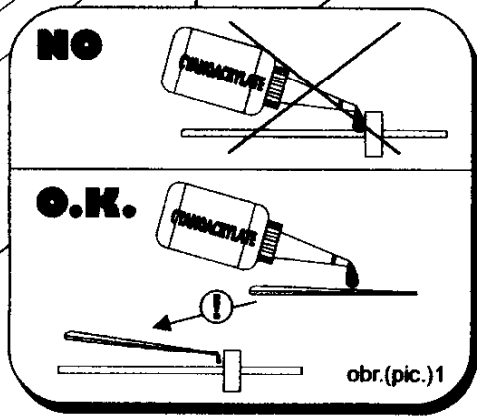
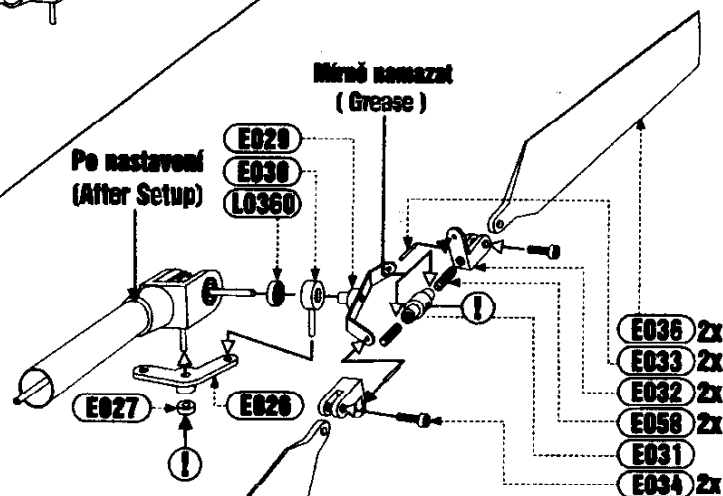
## **Assembly and operating manual and parts list.**

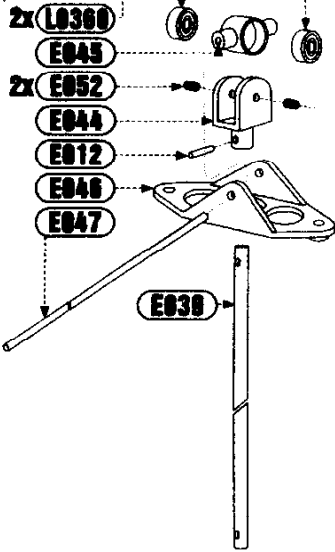
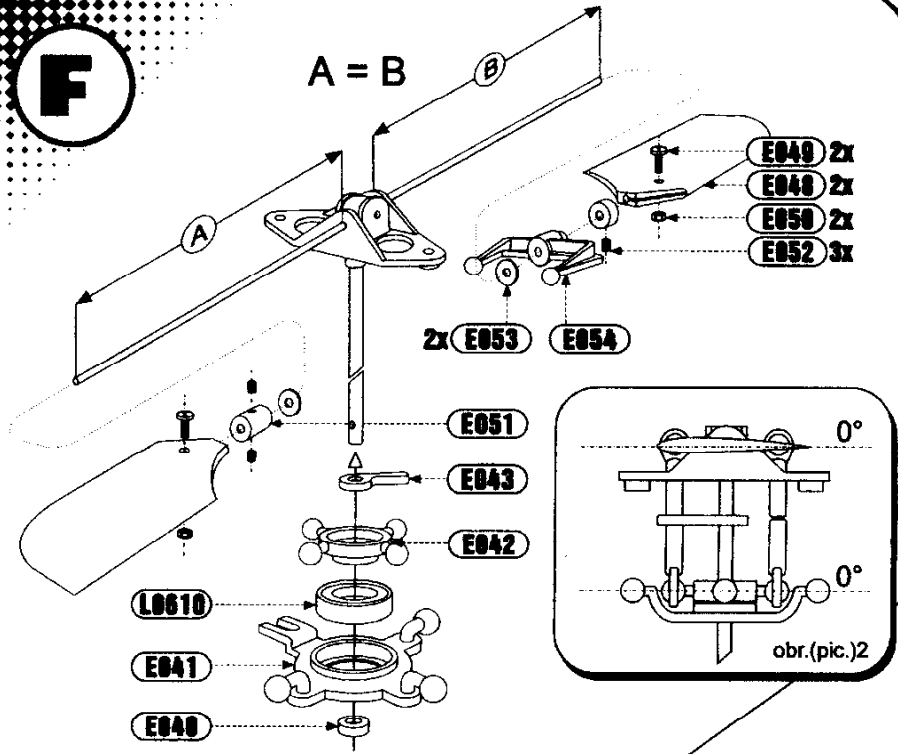
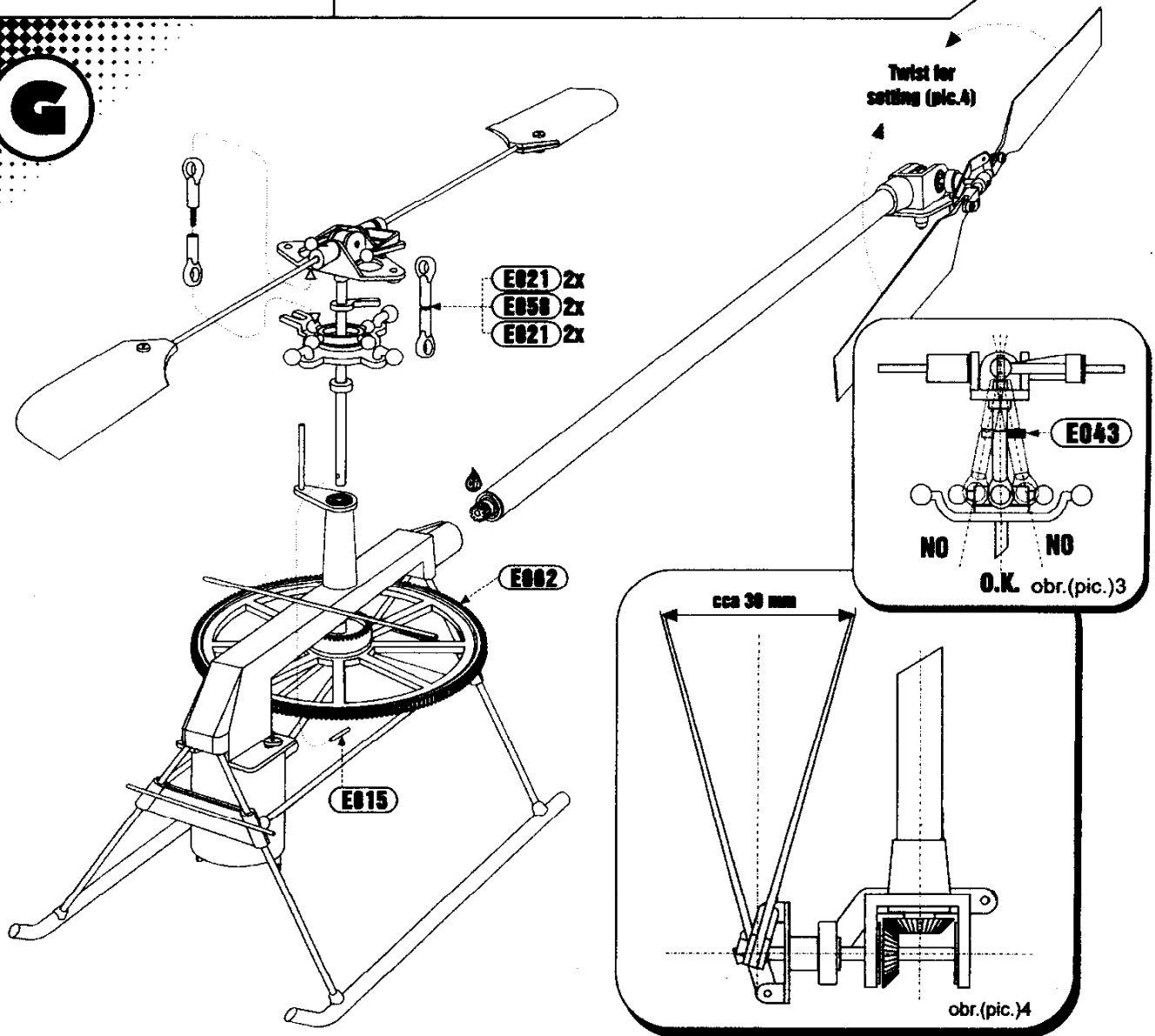
**ATTENTION** - RC helicopter is not a toy, it is a complex mechanical device. Errors in construction may result in an uncontrollable model. The rotating parts can cause injury to pilot and others, as well as damage to property.



## **Handbuch für Montage und Betrieb.**

**VORSICHT** - RC Hubschrauber ist kein Spielzeug. Die rotierenden Elemente können Gesundheits- und Materialschaden verursachen! HORNET ist geeignet für Einsteiger und erfahrene RC Helipiloten.

**A****B****C****D**

**E****F****G**



# MS HORNET ASSEMBLY INSTRUCTION

*Thank you for purchasing the Hornet Micro Helicopter.*

*To ensure you get the best from your Hornet, please follow these instructions precisely, we recommend that you take the time to read the assembly instructions thoroughly BEFORE starting to build the Hornet.*

## **Parts/items required for building the Hornet**

- 1) CyanoAcrylate Glue [CA] - We recommend a medium to thick version
- 2) CA De-Bonder for easy removal of parts requiring replacement
- 3) A Small flat face screwdriver
- 4) Metric Allen Keys
- 5) A Pin, Needle or instrument for application of CA glue in precise amounts and areas
- 6) Soldering Iron & Solder

## **Electronic components required for Hornet operation**

- 1) MS-002 4CH Micro Receiver 35 MHz or MS-003 4CH Micro Receiver 40 MHz or MS-015 4 CH Micro Receiver 72 MHz or Equivalent
- 2) MS-004 Micro Gyro or Equivalent
- 3) MS-005 5A + BEC Speed Controller or Equivalent
- 4) MS-006 3 Micro Servos
- 5) Standard receiver crystal for MS Micro RX 35/40/72 Mhz
- 6) MS-009 700Mah NiMH Battery Pack

## **Recommended Accessories**

- 1) MS-008 NiMH Fast Charger
- 2) MS-010 880Mah NiMH Battery Pack
- 3) MS-014 Charger Cable for Car Lighter
- 4) MS-016 AC/DC 110-240V/12V Power adapter for MS-008

**IMPORTANT** - *we recommend that you apply the CA glue using a pin or needle. This will ensure accurate application of the glue onto the parts to be glued and will avoid excess glue contamination.*

*CA glue will bond skin in seconds, please read the label on the CA glue for further information.*

*Many parts used in the Hornet are small; use a container to hold the component pieces until they are needed in the construction.*

## **A - Main Body Assembly**

### **Parts List:**

- |                                 |  |
|---------------------------------|--|
| E001 - Main Body-1x             | E003 - Undercarriage Frame-2x              |
| E006 - Undercarriage            | Legs-6x E007 - Undercarriage Skids-2x      |
| E008 - Anti-rotation Support-1x | E009 - Anti-rotation Pin [Length 20 mm]-1x |

- 1) Fit the ball race L0360 into the Main Body E001 1 in the top and 1 in the bottom.
- 2) Assemble and glue the Anti-Rotation pin E009 to the anti-rotation support E008 as shown, glue the assembled support to the Main Body E001. The support pin should be orientated 90 degrees to the main body as shown in the diagram.

- 3) Assembly and glue the two pieces of the Undercarriage Frames E003 together, repeat for second set.
- 4) Assemble and glue the undercarriage legs E006 to the undercarriage skids E007, ensure the legs are fully inserted into the plastic skids.
- 5) Dry Assemble [No GLUE!] - Slide the skid legs into the undercarriage frames and insert the cross supports E006.
- 6) Place the assembled undercarriage into the Main Body E001; check the symmetry of the frame and the position of the cross supports E009 in relation to the main body they should be parallel. Adjust the legs/supports until you are happy that the position and height of the undercarriage is correct and the Homet does not rock side-to-side or front to back in the skids.  
NOTE: Pay particular attention to the tail boom locating hole, it is possible to push the undercarriage legs into the tail boom locating hole, if this is the case simply retract the legs until the correct clearance is achieved.
- 7) CA the undercarriage legs to the frames E003 and CA the cross supports to the frame also. Invert the Main body and apply CA to the two-undercarriage leg locating holes.

## B - Motor / Canopy Support

### Parts List:

E018 - Gear [Motor]-1x	E010 - Electric Motor-1x
E014 - Canopy Support [50mm]-1x	E013 - Canopy Support [42 mm]-1x
E011 - Cap Head Bolt M3x5-2x	

### STEP B.

- 1) Press the gear E018 onto the motor shaft.
- 2) Assemble the motor on the main body using the 2 Cap Head Bolts M3x5 E011- do not tight the bolts!
- 3) Glue the Canopy Supports in place.  
The longer Canopy Support E014 is glued to the top of the main body approximately 7-8 mm in front of the main mast pillar.  
The shorter support E013 is glued to the front undercarriage frame support as shown in the diagram.

## C - Tail Drive & Gearbox

### Parts List:

E017 - Tail Drive Shaft-1x	E018 - Gear-1x
L0261 - Ball Race 2x6x2,5F-1x	L0260 - Ball Race 2x6x2-1x
E016 - Tail Boom-1x	E025 - Tail Gearbox-1x
L0361 - Ball Race 3x6x2,5F-2x	E028 - Tail Gear-2x
E037 - Tail Shaft-1x	E038 - Plastic Spacer-1x
L0262 - Ball Race 2x6x2,5FS-1x	

- 1) Slide the ball race L0260 onto the tail drive shaft until it is located approximately in the center of the shaft. Glue in place ensuring no glue penetrates the ball race. NOTICE: Ball Bearing no.L0260 can be already placed in Tail Boom E016. In this case, it is recommended to put a very small drop of Loctite or paint or glue to the center of the Tail Drive Shaft to prevent slipping the Tail Drive Shaft in the Ball Bearing no.L0260.
- 2) Slide the ball race L0262 [flanged] onto the drive shaft. NOTE: The flange should face towards the end of the shaft.
- 3) Press gear wheel E018 on to the tail drive shaft E017. Slide the bearing in step 2 up to the gear. Insert the tail drive assembly into the tail boom E016.
- 4) Insert the tail boom into the Tail Drive gearbox E025 - !DO NOT GLUE!
- 5) Install the ball race L0261 into the gearbox/tail drive shaft and the ball races L0361 into their position in the Tail Drive gearbox.
- 6) Press the Tail Gear E028 onto the end of the tail drive shaft.
- 7) Check for free rotation of the moving parts, the drive shaft must rotate freely. If needed, adjust the space between the Tail Gear and the bearing L0261.
- 8) Insert Gear E028 and spacer E038 into the tail gearbox as shown in the diagram.

- 8) Press the Tail Output Shaft E037 through the gearbox / bearings and gear until the end of the tail output shaft is in line with the outer shield of the bearing L0261.
- 9) Adjust the assembled tail gearbox / gears so the assembly rotates freely without excessive gear play or backlash.
- 10) Glue the Tail Gearbox to the Tail Boom

## D - Tail Hub

### Parts List:

E029 - Tail Pitch Slider [Front]-1x	E030 - Tail Pitch Slider [Rear]-1x
E026 - Bell Crank-1x	E027 - Silicone Retainer-1x
E031 - Tail Rotor Hub-1x	E058 - Blade Grip Shaft M2x8-2x
E032 - Blade Grip-2x	E034 - Cap Head Bolt M2x5-2x
E036 - Tail Blades-1x	

- 1) Assemble the Pitch Slider Front and Rear E029 and E030 using the ball race and slide onto the tail output shaft of the assembled gearbox from step C. It must rotate and move up and down the tail output shaft freely.
- 2) Fit the bell crank E026 to the gearbox and locate the pitch slider pin in the bell crank. Slide the silicon retainer E027 over the gearbox pin to retain the bell crank. Check for correct operation and apply a small amount of glue to the outside of the silicone retainer to prevent it sliding off of the gearbox. NOTE ensure the glue does not come in contact with the bell crank or it's operational area.
- 3) Glue the Tail Rotor Hub E031 to the Tail Output Shaft E037 - the end of the shaft must line with the Tail Rotor Hub's outer rim!
- 4) Screw the E058 shafts into the Tail blade Grip E032 as shown on the drawing.
- 5) Glue the pins E033 into the blade grips E032.
- 6) Grease the threads on the blade grip shafts and screw into the Tail Rotor Hub E031 until fully engaged, then back off [unscrew] turn or so.
- 7) Insert the pins on the tail blade grips into the front Pitch Slider E029 holes as shown on the diagram.
- 8) Mount the tail blades E036 into the blade grips E032 and fix using the cap head bolts E034 so that the tail blades can be moved if light pressure is applied, but do not rotate by themselves.

## E - Rotor Head

### Parts List:

E045 - Rotor Head Pivot-1x	E052 - Grub Screw M3x3-2x
E044 - Pivot Support-1x	E039 - Main Shaft-1x
E012 - Retaining Pin 1x5-1x	E047 - Flybar-1x
E046 - Main Blade Support-1x	

- 1) Insert the ball race L0360 into each side of the Rotor Head Pivot E045.
- 2) Insert the assembled Head Pivot into the Pivot Support E044, 2 grub screws E052 are used to retain this part. Screw the grub screws in until the grub screw lines up with the outer surface of the Pivot Support E044, so that the grub Screws line up with the outer surface of E044.  
**IMPORTANT:** The Rotor Head Pivot E045 **MUST** move absolutely freely. If this is not the case, disassemble, and reassemble, checking the position of the bearings is square against the face of the Rotor Head Pivot. If free movement is still not possible it may be necessary to submerge the rotor Head Pivot in hot water. This will remove any internal surface tension resulting from the molding process, re-assemble.
- 3) Locate the Main Rotor Shaft E039; you will notice that it has two holes drilled through it, one of which is slightly further away from the shaft end than the other. The end that has the hole furthest away from the end of the shaft should be inserted into the rotor head assemble from step 2.
- 4) Fix the rotor head assembly on the shaft by inserting retaining pin E012.
- 5) Position the Main Blades Support E046 and insert the flybar E047 through the holes in the Rotor Head Pivot.

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## F - Flybar / Swashplate

### Parts List:

E053 - Washer 1,7x4-2x	E051 - Weights-1x
E054 - Flybar Control Arm-1x	E052 - Grub Screw M3x3-3x
E048 - Paddles-1x	E049 - Bolt M1,6x5-2x
E043 - Anti Rotation Arm-1x	L0610 - Ball Race 6x10x3-1x
E042 - Swash Plate Upper-1x	E-041 - Swash Plate Lower-1x
E040 - Retainer-1x	E050 - Nut M1,6-2x

- 1) Slide the washers E053, weight rings E051 and the flybar control arm E054 onto the flybar.
- 2) Adjust the middle position of the flybar. The distance to the end (A) on both sides must be equal. Measure from the edge of the rotor head.
- 3) Tighten the Control Arm E054 to the flybar using grub screw E052 and the weight E051 by two grub screws E052.
- 4) Slide the paddles E048 onto the flybar E047 until the flybar is fully engaged into the paddle and loosely tighten using nuts and bolts E049 and E050. The paddle fixings are left loose to allow alignment later on.
- 5) Assemble the Swashplate from the component parts E042, L0610 and E041.
- 6) Place the assembled Swashplate, Anti Rotation Arm E043 and the Retainer E040 onto the Main Shaft in the order shown on the diagram.

For better stability of the model specially during first couple flights, it is recommended to put Weights no.E081 onto Flybar no.E047. Stability is growing with moving the Weights towards the Paddles. Be sure that the distance is the same on both sides.

## G - Tail Boom / Motor & Drive

### Parts List:

E002 - Main Gear-1x	E015 - Retaining Pin 1x10-1x
E021 - Ball Links-2x	E058 - Threaded Rod M2x8-2x

- 1) Insert the tail boom assembly from step C into the Main Body E001, so the end of the tail boom touches the end stop located in the main body. Ensure the tail output is set at 90 degrees to the main shaft [View from the rear of the Helicopter]
- 2) Insert the Main Gear E002 into the Main Body and insert the Main Rotor Assembly / Main Shaft assembled in step F.
- 3) Check the Main Gear mesh between itself and the tail drive gear, the gears should move freely without excessive play. If needed, place a washer between the Main Gear Wheel and the lower ball race in the Main Body.
- 4) Glue the Tail Boom into the Main Body, ensure the tail output shaft remains at 90 degrees to the main shaft.
- 5) Secure the Main Gear to the Main Mast using the Retaining Pin E015.
- 6) Move the retainer ring E 040 to the upper main mast ball race, so the shaft does not have any vertical play. Apply a small amount of glue to the upper side of the retainer to hold in place. Attention - the glue must not get into the ballrace!! The whole assembly (without motor mesh set) must rotate freely!!
- 7) Adjust the play on the motor gear and tighten, apply a small amount of loctite to the bolts prior to final assembly.
- 8) Assemble the ball links E021 (with Threaded Rod E 058) to make two pieces. Attach these assemblies to the Flybar Control arm E054 and upper part of the swashplate E042. Ensure that the ball links do not interfere or touch the lower part of the swashplate. The ball links must move freely.  
Useful Tip: If needed, the ball links can be adjusted to eliminate stiffness by lightly pressing the outside of the ball link, thus compressing it on to the plastic ball. Only small amounts of LIGHT pressure are required.
- 9) Adjust the anti-rotation arm E043 on the main shaft as shown on Pic.3 and glue to the main shaft. The ball links must be parallel with the main shaft, the anti-rotation arm should rest against the ball link to prevent it moving out of alignment.

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## H - Push Rods / Tail Control & Fin

### Parts List:

E021 - Ball Links-2x  
E020 - Servo Link-4x  
E064 - Tail Fin-1x

E024 - Tail Servo Mounting Plate-1x  
E022 - Tail Rotor Push Rod-1x

### STEP H.

- 1) Assembly the push rods from E021, E058, and E020, and attach to Lower Swashplate E042.
- 2) Glue the tail servo mounting plate E024 onto the tail boom E016 so as the plate is parallel [vertical] to the main shaft. The end of the mounting plate should be approx 2mm from the end of the main body.
- 3) Glue the tail fin E064 to the tail boom as close as possible to the tail rotor gearbox. Ensure the fin is vertical/parallel to the main shaft
- 4) Assembly the tail rotor pushrod E022 and servo links E020. Glue only at one end, the other end will be used later for tail rotor adjustment.

## I - Servo, Gyro, Speed Controller Installation / Set-up

### Parts List:

E023 - Tail Push Rod Support-1x  
Micro Gyro e.g. MS/CSM 180  
Micro Receiver 4 Channel

Qty 3 Micro Servos  
Micro Speed Controller  
Double Sided Tape

- 1) Mount the tail rotor servo to the holder E024 with double sided self adhesive foam tape so the servo arm axis (shaft) ends approx. 8mm below the tail boom.
- 2) Install the tail rotor pushrod - Place the glued end at the tail gearbox end and the unglued end at the servo using the first available hole in the servo output arm [i.e. closest to the servo shaft].
- 3) Attach the Pushrod Support E023 to the Tail Rotor Push Rod E022. Glue the Pushrod Support E023 in the middle of the tail boom ensuring that the tail push rod remains straight. The Pushrod must not be bent in any direction!
- 4) Fix the cyclic control servos to the Main Body by double-sided, self-adhesive foam tape so that the pushrod assemblies when fitted are parallel with the Main Shaft as much as possible.
- 5) Put the servo links on the servo horns, into the first hole (the closest to the servo shaft). Cut off the unused section of the servo horns, so they will not interfere with surrounding items.
- 6) Install the receiver on the Main Body (fix with double-sided foam tape) as shown in the diagram.
- 7) Install the gyro. If you are using the MS/CSM Gyro, it should be mounted so that the RX cable is located in the top right of the gyro and the servo plug is bottom right of the gyro.
- 8) The Speed controller can be fixed to the undercarriage frame E003 as shown in the diagram, or can be left free hanging on its wires. It is useful to fix the charging cable to the undercarriage leg.
- 9) DO NOT connect the speed controller output to the motor at present, as it is safer to perform initial RC tests/setup without power to the motor. Cover the speed controller cables to avoid a short circuit.
- 10) Assign the servos to the proper receiver/gyro outputs/inputs, switch on your transmitter and select the model memory if required. The transmitter should not have any mixing enabled and with the exception of the throttle, all stick positions and trims should be set at neutral. Adjust the servo horns for straight neutral position. Check elevator/aileron and rudder for correct operation reverse if necessary.
- 11) With your RC equipment on, adjust the neutral position of the swashplate (the swashplate must be perpendicular to the main rotor shaft in both directions) by adjusting the pushrods length where necessary.
- 12) With your RC equipment on, adjust the neutral position of the paddles E048 as shown on Pic. 2. Tighten the paddles, re-check alignment again.
- 13) With your RC equipment on, adjust the tail pushrod length corresponding to Pic.4 and fix the servo link with glue.
- 14) Secure all of the servo horns with the screws supplied with the servos.

- 15) Route and secure the servo cables in such manner that they cannot interfere or contact moving/rotating parts.
- 16) The receiver antenna must be located as far from the motor and servo cables as possible. Position and fix the antenna in such a way that it cannot get entangled in any rotating parts.
- 17) Check all controls for correct operation again, including the tail rotor and gyro function.
- 18) Attach the speed controller output to the motor along with the capacitors E062 as shown on Pic. 5.
- 19) Secure the helicopter on your working bench and gently increase the throttle until the rotor head rotates slowly, note the direction of the rotation viewing the helicopter from above: - If the rotor head turns counter-clockwise, REVERSE the motor speed controller cable connections, and check again. If the rotor head turns clockwise, this is CORRECT.
- 20) Install the main rotor blades E059 using bolts E055, washers E057 and nuts E056. Tighten the bolts to secure the blades, but insure the rotor blades are able to move freely.

## **Asembling the canopy**

Cut out by the outside lines and assemble the two halves correctly to the lock and glue by CA. Measure the position of the upper canopy holder E014 and press the holes into the canopy by needle from the inside out. Paint the canopy with paint for lexan from the outside or before assembling from the inside. Tail Fin cut of from enclosed material and paint the same as the canopy. For the finish look use stickers No. MS 221.

## **Replacing Broken Parts**

Parts should always be replaced when repair by CA glue is not possible or will not provide the required strength.

To remove parts for replacement that have been glued, use the CA de-bonder recommended by the manufacturer or the CA glue used to assemble the parts in the first place. We do not recommend using brute force!

Order spare parts by enclosed PARTS LIST.

We offer two types of crash sets.

Basic crash set No. MS 200 includes: E002, E003, 2x E006, 2x E018, E039, E040, E064.

Extended crash set No. MS 210 includes: E002, 2x E003, 4x E006, 2x E018, 2x E028, 2x E032, 2x E035, E036, E037, E039, E040, E043, E046, E060, E064.

Complete connecting material is supplied in set No. MS 220.

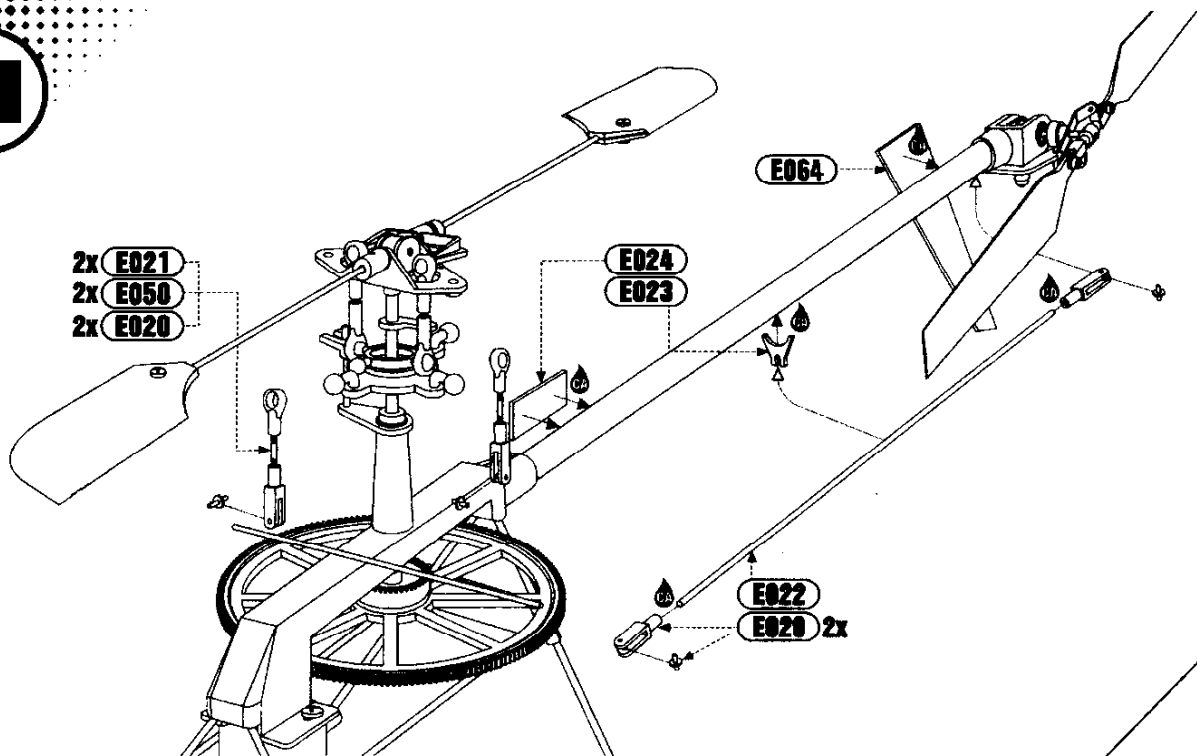
Optional PRO main rotor blades are CFC composit No. E080.

***Further information regarding the assembly of the Hornet, including photographs can be found on our web site <http://www.mscomposit.com>***

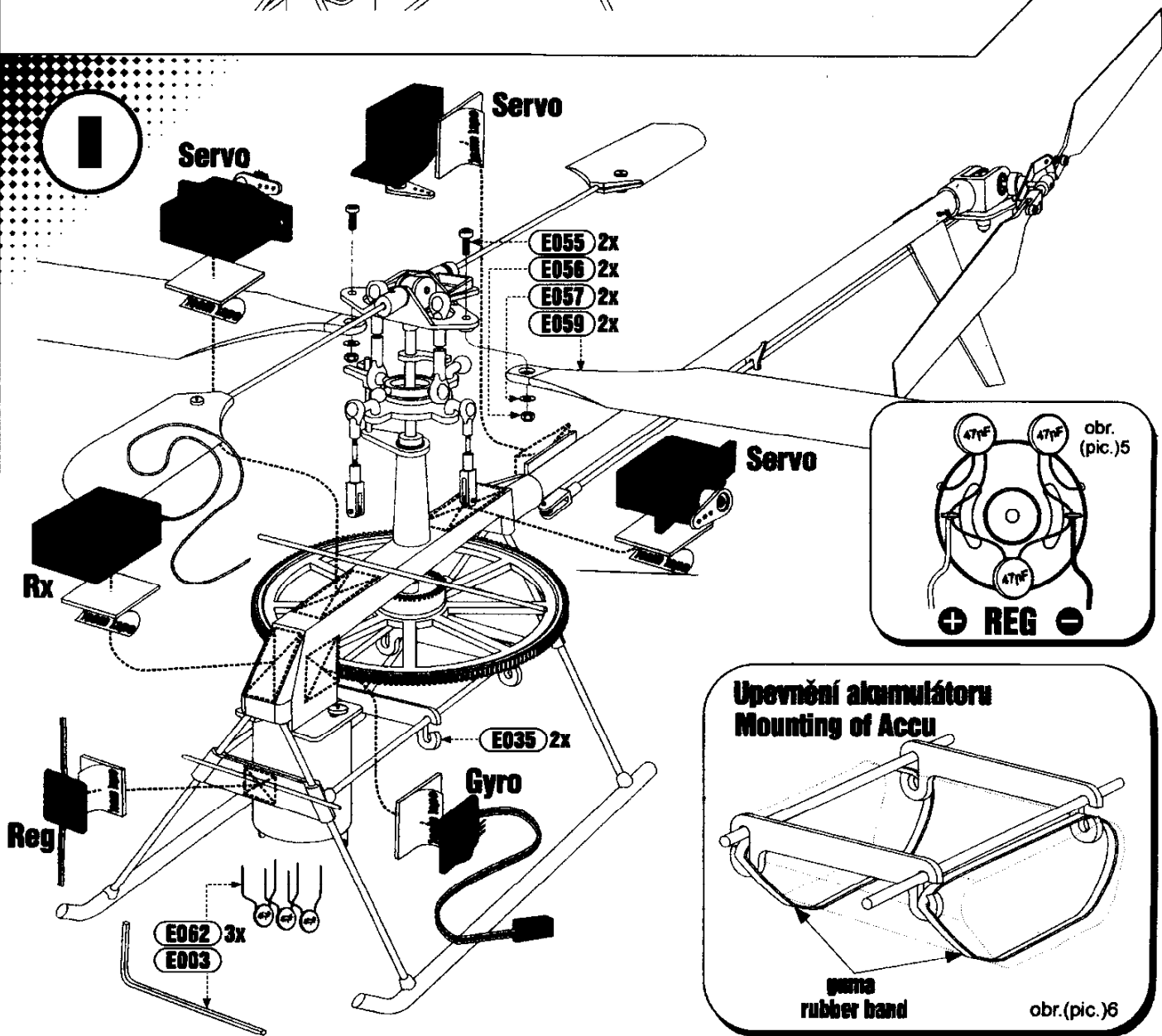
### **WARNING!**

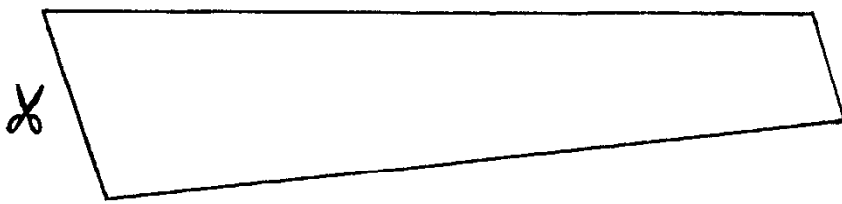
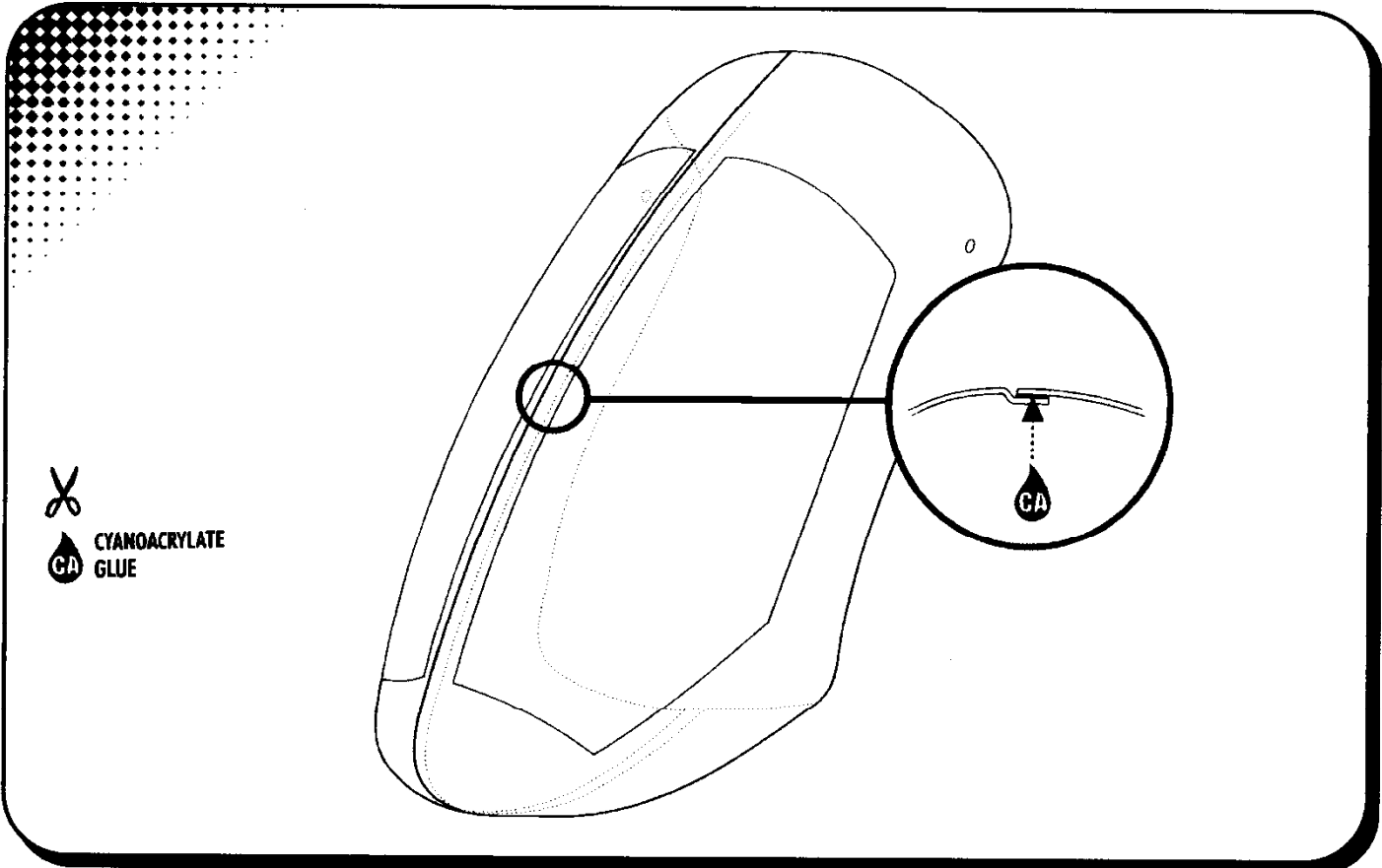
***Radio-controlled model helicopter is not a toy! The rotating parts are an instant source of danger, and can cause severe injury as well as damage to the property of the pilot and the others. As the manufacturer and dealer have no control over assembly and operation of the product, we only can point out the danger expressly. We deny any liability.***

**H**



**I**





**Trer 30P E064**  
**Shape of Tail Fin E064**

