The Goblin Speed is the best compromise between a 3D helicopter and a full body, aerodynamically efficient, speed helicopter. The Goblin Speed incorporates all the best parts and components SAB Heli Division has to offer in order to support the most extreme power systems available in the market today. The kit combines incredible design features with good aerodynamic properties.

Please read this user manual carefully, it contains instructions for the correct assembly of the model. Please refer to the web site www.goblin-helicopter.com for updates and other important information.

VERY IMPORTANT

Inside Box 5, you will find Bag 21. This bag contains your serial number tag. Please take a moment to register your kit online via our web site at:

http://www.goblin-helicopter.com

It is extremely important that you take a moment to register your helicopter with us. This is the only way to ensure that you are properly informed about changes to your kit, such as upgrades, retrofits and other important developments. SAB Heli Division cannot be held responsible for issues arising with your model and will not provide support unless you register your serial number.

To mount the serial number tag on your helicopter, please refer to page 31.

Thank you for your purchase, we hope you enjoy your new Goblin helicopter!

SAB Heli Division

INDEX
1 – Serial Number
2 – Important Notes
3 – Components and Box
4 – Carbon frame Assembly
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7 – Assembling The Modules
8 – Installation of Swashplate Servos
9 – Installation of The Motor
10 – Installation of The ESC
11 – Installation of Flybarless Unit and RX
12 – Tail Assembly
13 – Installation of the Boom, Canopy
14 – Battery
15 – In flight
16 – Maintenance
17 – Exploded Views
18 – Spare Parts

SPECIFICATIONS

Main rotor diameter: 1626mm (with 720mm blades)
Main blade length: up to 720mm
Tail rotor diameter: 283mm
Tail blade length: 104mm rounded tip (up to 105mm)
Main shaft diameter: 12mm
Tail shaft diameter: 6mm
Spindle diameter: 10mm

Weight including standard electronics: 4010g (excluding batteries).
Motor size: Maximum 64mm diameter, maximum height 80mm.
Battery compartment: 75x58x350mm.
IMPORTANT NOTES

*This radio controlled helicopter is not a toy.
*This radio controlled helicopter can be very dangerous.
*This radio controlled helicopter is a technically complex device which has to be built and handled very carefully.
*This radio controlled helicopter must be built following these instructions. This manual provides the necessary information to correctly assemble the model. It is necessary to carefully follow all the instructions.
*Inexperienced pilots must be monitored by expert pilots.
*All operators must wear safety glasses and take appropriate safety precautions.
*A radio controlled helicopter must only be used in open spaces without obstacles, and far enough from people to minimize the possibility of accidents or of injury to property or persons.
*A radio controlled helicopter can behave in an unexpected manner, causing loss of control of the model, making it very dangerous.
*Lack of care with assembly or maintenance can result in an unreliable and dangerous model.

*Neither SAB Heli Division nor its agents have any control over the assembly, maintenance and use of this product. Therefore, no responsibility can be traced back to the manufacturer. You hereby agree to release SAB Heli Division from any responsibility or liability arising from the use of this product.

SAFETY GUIDELINES

*Fly only in areas dedicated to the use of model helicopters.
*Follow all control procedures for the radio frequency system.
*It is necessary that you know your radio system well. Check all functions of the transmitter before every flight.
*The blades of the model rotate at a very high speed; be aware of the danger they pose and the damage they may cause.
*Never fly in the vicinity of other people.

NOTES FOR ASSEMBLY

Please refer to this manual for assembly instructions for this model. Follow the order of assembly indicated. The instructions are divided into chapters, which are structured in a way that each step is based on the work done in the previous step. Changing the order of assembly may result in additional or unnecessary steps.

Use thread lockers and retaining compounds as indicated. In general, each bolt or screw that engages with a metal part requires thread lock.

It is necessary to pay attention to the symbols listed below:

- Use retaining compound (eg Loctite 648)
- Use retaining compound (eg Loctite 243)
- Use CA Glue
- Use grease (eg Vaseline Grease)
- Use grease (eg Tri-Flow Synthetic Grease)
- Box xx
- Bag xx
- Tray xx

Indicates that for this assembly phase you need materials that are in box xx, bag xx, tray xx.
ADDITIONAL COMPONENTS REQUIRED

* Electric Motor: 12S-520/650Kv, 14S-450/580Kv
  Maximum diameter 64mm,
  Maximum height 80mm,
  Pinion shaft diameter 6/8mm

* Speed controller: minimum 160A to be safe

* Batteries: 12S-5000mAh or 14S-4500mAh

* 1 flybarless 3 axis control unit

* Radio power system, if not integrated with the ESC

* 3 cyclic servos

* 1 tail rotor servo

* 6 channel radio control system on 2.4 GHz

TOOLS, LUBRICANTS, ADHESIVES

* Generic pliers

* Hexagonal driver, size 1.5,2,2.5,3,4mm

* 4mm T-Wrench

* 5.5mm Socket wrench (for M3 nuts)

* 8mm Hex fork wrench (for M5 nuts)

* Medium threadlocker (eg. Loctite 243)

* Strong retaining compound (eg. Loctite 648)

* Spray lubricant (eg. Try-Flow Oil)

* Synthetic grease (eg. Tri-Flow Synthetic Grease)

* Grease (eg. Vaseline grease)

* Cyanoacrylate adhesive

* Pitch Gauge (for set-up)

* Soldering equipment (for motor wiring)

Inside the main box there are:

Box 2: Canopy, Blade Holder.

Box 3: Boom, Blades, Tail blades, Carbon rod.

Box 4: Mechanical parts in 4 trays:
  Tray 1: Main rotor
  Tray 2: Carbon frame and tail rotor
  Tray 3: Transmission
  Tray 4: Main structure

Box 5: Bags

Box 6: Carbon parts

Box 7: Carbon parts

The assembly process is described in the following chapters. Each chapter provides you with the box, bag and/or foam tray numbers you will need for that chapter. The information is printed in a green box in the upper right hand corner of the page at the beginning of every chapter.
The manufacturing process of the carbon parts often leaves micro-burr and sharp edges. We recommend de-burring the edges to minimize the risks of electrical wire cuts, etc. Very important in red line zone.
Chapter 5, Transmission Assembly

Bearing Ø10x Ø19x5mm

...x1

Socket Head Cap Screw M3x10mm

...x4

Flat Head Cap Screw M2.5x5mm

...x3

Bearing Ø10x Ø19x5mm

...x1

Bearing Ø12x Ø24x6mm

Note:

You must be put strong main gear (H0320-S) before you put 3 column on main structure

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**Note 1:** When you tighten the collar (H0121-S) on the main shaft, ensure there is no axial play. Push down the main shaft while pulling up the locking collar. Tighten the screw M4x22 at this time.

**Note 2:**
The pinion and gear are designed to have zero backlash. This leads to initial “rough” rotation. After some run in flights (3-5 flights) it will begin to rotate freely, ensuring perfect contact and the ability to transmit maximum power.

It is very important to lubricate these two elements with a lubricant (Tri-Flow Synthetic grease).
Note:
Position without preload. Insert the screw in the hole through the aluminum support as in the picture.
Note for 6mm motor shaft

To maximize space for the batteries, it is advisable to shorten the motor shaft. Follow the dimensions given in this drawing. For the cut, you can use an electric tool like a “Dremel” with a cutoff disc.

Additionally, ensure the motor shaft has an appropriate 'flat' for one of the set screws.
Uniball Radius Arm... x2 Assembly

- Flanged Bearing Ø2.5xØ6x2.5mm (HC400-S)
- Spacer Arm Ø2.5xØ4x6.3mm H0253 (H0132-S)
- Uniball Radius Arm H0205 (H0132-S)

Radius Arm ... x2 Assembly

- Flanged Bearing Ø3xØ7x3mm (HC402-S)
- Radius Arm (H0132-S)
- Spacer Arm 3x5x2.7mm (H0134 (H0132-S)

Center Hub Assembly

- Flanged Bearing Ø3xØ7x3mm (HC402-S)
- Radius Arm (H0132-S)
- Center Hub (H0135-S)
- Oring (HA024)

Swashplate Assembly

- Uniball M3x4 Ø1.8mm (H0065-S)
- Uniball M3x4 Ø1.8mm (H0065-S)
- Swashplate Assembly (H0023-S)

Main Blade Grip Assembly...x2

- Bearing Ø10xØ19x5mm (HC422-S)
- Main Blade Grip (H0182-S)
- Washer Ø10xØ16x1mm (HC230-S)
- Socket Head Cap Screw M4x10mm (HC101-S)

Linkage Rod Assembly ...x2

- Plastic Ball Link (H0066-S)
- Linkage Rod Assembly
- Washer Ø10xØ16x1mm (HC230-S)
- Washer Ø10xØ16x0.2mm (HC230-S)
- Washer 3x4x0.5mm (HC176-S)
- Socket Head Cap Screw M3x16mm (HC068-S)
- Socket Head Cap Screw M2.5x18mm (HC032-S)

Note:
The main rotor is assembled provisionally without loctile. Need to add Loctile 243 in the screws M4x10 and M6x10.

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Page 14
Chapter 7, Assembling The Modules

Socket Head Cap Screw M3x8mm
- x6

Socket Head Cap Screw M3x12mm
- x2

Socket Head Cap Screw M4x24mm
- x1

Finishing Washer M3
- x6

Metric Hex Nylon Nut M4
- x1

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INSTALLATION OF SWASHPLATE SERVOS

The linkage ball must be positioned between 17-19 mm out on the servo arm (figure 1). The 120° placement of the servos inside Goblin means the arms are difficult to access. For this reason it is advisable to ensure alignment of the servo arms (and sub trim set) before installation of the servos in the model (figure 2). Proceed with installation following the instructions below. Figure 3 shows a completed installation.

ASSEMBLY OF THE BALL ON THE HORN.

The rods going from the servos to the swash plate must be as vertical as possible. Not all servos are equal, so to better align them you can choose to use the supplied spacer H0031. Figure 4 illustrates this.

SERVO ASSEMBLY 1, 2, 3

Uniball M2 φ5H6 (H0064-S)
Socket Head Cap Screw M2x8mm (HC008-S)
or
Socket Head Cap Screw M2x6mm (HC004-S) without Uniball Spacer

Uniball Spacer (H0064-S)
Socket Head Cap Screw M3x8mm (HC044-S)

Socket Head Cap Screw M2.5x12mm (HC026-S)
Socket Head Cap Screw M2.5x8mm (HC020-S)

Socket Head Cap Screw M2.5x12mm (HC026-S)
Socket Head Cap Screw M2.5x8mm (HC020-S)

Servo 1
Servo 2
Servo 3

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Head HPS Version Preliminary Setup

Adjust the linkage as shown. The linkage Rod A has thread right/left. Turning, you can change the tracking without disconnecting the plastic ball link.

Linkage Rod A Assembly  ... x2

- Approx 75mm
- Right Thread
- Plastic ball link (H0346-S)
- Left Thread
- Plastic ball link (H0346-S)

Initial length for the rods from the swashplate to the blade grips.

Linkage Rod B Assembly  ... x3

- Set Screw M2.5x18mm
- Plastic ball link (H0066-S)
- Plastic ball link (H0066-S)

Initial length for the rods from the servos to the swash plate.
Chapter 9, Installation Of The Motor

TRANSMISSION SETUP

In order to select the correct motor pulley, please read page 32
The Goblin has many possible reduction ratios at your disposal. It is possible to optimize any motor and battery combination. It is recommended to use wiring and connectors appropriate for the currents generated in a helicopter of this class.

If you are using a head speed calculator which requires a main gear and pinion tooth count, use 214 teeth for the main gear (this takes into account the two stage reduction) and the tooth count of your pulley as the pinion count.

Below is a list of available reduction ratios:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Pinion Teeth</th>
<th>Reduction Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO175-18-S -18T</td>
<td>18</td>
<td>11.9:1</td>
</tr>
<tr>
<td>HO175-19-S -19T</td>
<td>19</td>
<td>11.3:1</td>
</tr>
<tr>
<td>HO175-20-S -20T</td>
<td>20</td>
<td>10.7:1</td>
</tr>
<tr>
<td>HO175-21-S -21T</td>
<td>21</td>
<td>10.2:1</td>
</tr>
</tbody>
</table>

MOTOR BELT TENSION

*Assemble the motor and pinion to its mounting plate.
*Fit the motor assembly into position.
*Compress the springs by pushing the motor toward the main shaft.
*At maximum compression, temporarily tighten one of the slide screws.
*With the minimum centre distance it is easy to install the belt. First put the belt on the motor pinion.
*Then put the belt around the big pulley.
*Rotate the motor several times by hand.
*Release the screw that locks the slide.
*The springs keep the belt in tension.
*Help the springs by pulling the motor slightly.
*The belt must be very tight.
*Lock all screws.

Note:
Check for vertical alignment of the motor pulley. To do this, simply turn the motor several time and check to you see if the belt is aligned with the big pulley (one way bearing pulley). If the belt is riding too high, simply loosen up the motor pulley and drop it just a little bit, if it is riding too low, loosen up the motor pulley and raise it a bit.
DE-BURR THE SIDE FRAMES

We recommend de-burring the edges of the carbon parts in areas where electrical wires run.

ESC INSTALLATION

The speed controller (ESC) is installed in the front of the helicopter.
We recommend to use 6-8 mm connector and correct wires to support high current (>200A)

In order to install the ESC support module you’ll have to slightly bend the frame doublers (H0368) in order for the spacers (H0003) to reach. This is normal.

**Figure 1:** Shows the installation of the Kosmik ESC from Kontronik.
**Figure 2:** Shows the motor correctly wired. This drawing shows the connection between the motor and ESC using very short cables.
It is possible to install any commercially available Flybarless control unit in the goblin. For Flybarless systems with a separate sensor, the sensor must be installed under the plate (Figure 3).

Figure 4 shows an example of installation of the receiver and flybarless control unit. In Figure 5, you can see the extension lead for the tail servo. It is very important to include a connector for fast disassembly of the boom module. The connector will prevent servo damage in case of boom separation during a crash.

Slot for sensor cable
It is important to lock the plugs of the flybarless unit with an adhesive—for example hot glue.

Tail servo extension cable
To install a one piece Flybarless system it is necessary to add the support shown in these figures. Figure 3 shows the installed support. Figure 4 shows the control unit and the receiver installed on the support.

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FLYBARLESS CONTROL UNIT AND RX INSTALLATION

It is possible to install any commercially available Flybarless control unit in the goblin. For Flybarless systems with a separate sensor, the sensor must be installed under the plate (Figure 1). Figure 2 shows an example of installation of the receiver and flybarless control unit. In Figure 3 you can see the extension lead for the tail servo. It is very important to include a connector for fast disassembly of the boom module. The connector will prevent servo damage in case of boom separation during a crash.

To install a one piece Flybarless system it is necessary to add the support shown in these figures. Figure 4 shows the installed support. Figure 5 shows the control unit and the receiver installed on the support.

It is important to lock the plugs of the flybarless unit with an adhesive - for example hot glue.
7-Boom and Tail
Chapter 12, Tail

Bag 10, Tray 2

Tail Rotor Hub Assembly

- Already Assembled
- Vaseline
- Oring (HC335-S)
- Tail Shaft (H0325-S)

Tail Pitch Slider Assembly

- Already Assembled
- Flanged Bearing Ø 8x Ø 12x3.5mm (HC418-S)
- Spacer Ø 8.1x Ø 9.2x3.2mm
- Uniball M3x3.5 Ø 5H3 (H0065-S)
- Tail Pitch Slider 01 (H0053-S)
- Tail Pitch Slider 02 (H0053-S)
- Tail Pitch Slider 03 (H0053-S)

- Tail Blade Grip Assembly...
- Tail Rotor Hub Assembly

Buttom Head Cap Screw M4x6mm (HC096-S)

- Thrust Bearing Ø 5x Ø 10x4mm (HC411-S)
- Bearing Ø 5x Ø 10x4mm (HC411-S)
- Spacer Ø 5x Ø 9x0.75mm (H0330-S)
- Tail Rotor Hub Assembly

Note: It is a normal for the tail to feel a bit tight after initial assembly as the tail spindle preload is usually high when the helicopter is brand new. The preload will loosen up after 2-5 flights allowing the system to become smooth.

Note:
- Smaller ID
- Larger ID

Spacer Ø 7.5x Ø 10x0.5mm (H0349-S)

Tail Pitch Slider Link Assembly

- Already Assembled
- Vaseline
- Tail Pitch Slider Link (H0261-S)
- Socket Head Cap Screw M2x6mm (HC004-S)
- Spacer Ø 2x Ø 3x3mm (H0076-S)

Note: S >> Left Side

Buttom Head Cap Screw M4x6mm...

...x2

Socket Head Cap Screw M2x6mm...

...x4

Note: S >> Right Side

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**Bell Crank Lever Assembly**

- Bell Crank Base (H0058-S)
- Washer \( \phi 3 \times \phi 4 \times 0.5 \text{mm} \)
- Spacer \( \phi 3 \times \phi 4 \times 9.6 \text{mm} \) (H0080 (H0059-S))
- Socket Head Cap Screw M2x8mm (H008-S)
- Bell Crank Lever (H0059-S)
- Uniball Spacer H0031 (H0064-S)
- Uniball M2x5H6 (H0064-S)
- Socket Head Cap Screw M3x22mm (HC086-S)

**Tail Side Plate Assembly**

- Socket Head Cap Screw M2.5x8mm (HC020-S)
- Tail Side Plate (H0373-S)
- Bell Crank Lever Assembly
- Flanged Bearing \( \phi 6 \times \phi 13 \times 5 \text{mm} \) (HC414-S)

**Tail System Assembly**

- Bell Crank Lever Assembly
- Flanged Bearing \( \phi 6 \times \phi 13 \times 5 \text{mm} \) (HC414-S)
- Flanged Bearing \( \phi 6 \times \phi 20 \times 5 \text{mm} \) (HC042-S)
- Belt Gates 2061-3GT-06 (HC304-S)
- Tail Side Plate Assembly
- Bell Crank Lever Assembly
- Tail Rotor Shaft Assembly

**Note:** The set screw should align with the hole in the tail shaft.
DETAIL A
Attaching H0082-S to the boom:
Pre-assemble the two boom spacers H0082-S with the M3x20 socket set screw.
Insert into the boom tube completely done up.
Center the holes, then unscrew until there is contact with the walls.
Lock everything with the adhesive.

Assemble H0040-S in the boom:
Before assembling the two parts in the boom we suggest tightening the M2.5 screws into the two plastic parts to pre-thread them. In this way when you will assemble the tail servo it will be easier to tighten the screws into the plastic parts. Check the tail servo can fit, if necessary carefully sand the hole.

DETAIL B
Assemble H0045-S in the boom:
Before mounting H0045 on the boom we suggest to first tighten the M2.5 screws into the holes to thread them. In this way when you assemble the part it will be easier to tighten the screws.

DETAIL C
Locking Element Tail Assembly .... X 2
Already Assembled:
Locking Element Tail (H0041-S)

Double Sided Tape

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**Note:**

- Plastic Ball Link (H0066-S)
- Carbon Rod $\phi 4 \times 2.5 \times 702$mm (HC239-S)
- Threaded Rod M2.5x40mm (HC242-S)
- Plastic Ball Link (H0066-S)

- Finishing Washer M3 (H0007-S)
- Socket Head Cap Screw M3x12mm (HC062-S)
- Threaded Rod M2.5x40mm (HC242-S)

Approx 752mm

---

**Chapter 12, Tail**

**Bag 13**

**Box 3, Bag 16**

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The tail servo wire lead must not be allowed to move above this line (Figure 1). To ensure this, it is necessary to position it and then secure with hot glue in the area indicated by the arrow. Figure 2 shows the installed servo.

**Note:** Please note that the boom edges might be rough and can eventually chafe or cut your tail servo lead - we recommend protecting the leads with heat shrink or even electrical tape.
Chapter 13, Installation Of The Boom

BOOM ASSEMBLY

*Insert the tail boom assembly.
*Lock the M8 nuts with the HA016 special tool supplied (Tray 2).
*Firmly lock the lateral screws M3x12. Use Loctite for this screw and make sure you remain tight.
*Assemble the H0038 carbon security plate.
*Connect the tail servo wire to the previously fitted extension lead.

Socket Head Cap Screw M3x6mm

....x1

Finishing Washer M3

....x1

Socket Head Cap Screw M3x12mm

....x2

Nylon Screws M8x20mm

....x2

Note: Between the boom and the aluminum plate, there is a space of around 0.75mm. Look the picture.
**TAIL BELT TENSION**

*Check the proper assembly of the tail boom.*

*Check that the aluminum part of the tube is against the M3 stop screw.*

*Loosen the tail group by loosening the 4 M3 screws.*

*Install the belt onto the pulley, taking care to respect the direction of rotation (figure 1).*

*Rotate the tail drive several times by hand.*

*Load the spring by a rotation of 270° the tensioning arm (clockwise)*

*Tension the boom until the tensioning arm is aligned with the frame.*

*Tighten the 4 screws.*

*Check that the tail output shaft is perpendicular to the tube. (figure 2)*

*In figure 3,4,5 you can see the three conditions, ok, too loose and too tight.*

**NOTE.** To disassemble the tail boom it is possible to remove the pulley H0101-S without loosening the tail unit. Remove the locking screw and pull down.

---

**CANOPY**

The Goblin Speed canopy has a very effective locking system in order to eliminate vibrations and optimize aerodynamics.

You must install the following to complete the canopy assembly:
Adhesive foam tape (Fig 6), Canopy edge protection (Fig 8), and Canopy grommets (Fig 6)

To install the canopy:
- Insert the canopy from the front up to the area of the block shown in Fig. 7
- Join the edges and tighten the M3 bolts(Fig.8)
- Insert the H0378 knobs (Fig.9)

The canopy hole must be 12 to 12.5 mm in diameter. Initially is 9 mm. You can enlarge the hole slightly to optimize the vertical position of the canopy itself.
BATTERIES

The battery tray system in the Goblin 700 is simple, but very effective. The battery should be attached to the tray (Part H0149) with heat shrink, tape or velcro. You can optionally use the battery protection tray (Part H0151) see Fig. 1, 2. Before permanently mounting the batteries onto the battery tray, check the ideal position for the best center of gravity. Cut the heat shrink around the carbon fiber tray locking pins. Fig. 3.

Battery Pack:

Slide the tray until it locks into the CNC stopper. Fig. 4, 5. Using the velcro straps, making sure that the two locking pins are stopped against the frame spacer (Part1#H0003 and #H0151) Fig.6, 7.
**SERIAL NUMBER**

In Bag 21, I will find the serial number tag for your Helicopter. Sticking the tag as show. Please remember to register your product. (See page 1)

**OPERATIONS BEFORE FLIGHT**

* Set up the remote control and the flybarless system with utmost care.
* It is advisable to test the correct settings of the remote and flybarless system without main blades or tail blades fitted.
* Check that all wiring is isolated from the carbon/aluminum parts. It is good practice to protect them at the points where they are at most risk.
* Be sure of the gear ratio, verifying carefully the motor pulley in use. The forces acting on the mechanics increase enormously with increasing of rpm. Although the Goblin can fly at high rpm, for safety reasons we suggest to not exceed 2200 rpm. You can get 2600 rpm with the model at a safe distance (at least 30 meters from any people).

* Check the correct tension of the tail belt through the belt tensioner.
* Fit the main blades and tail blades. (Fig.1 and Fig.2)
* Please make sure the main blades are tight on the blade grips, you should be able to violently jerk the head in both directions and the blades should not fold. Failure to tighten the blades properly can result in a boom strike. To fold the blades for storage, it is advisable to loosen them.
* Check the collective and cyclic pitch.
* It is important to check the correct tracking of the main blades.
* On the Goblin, in order to correct the tracking, adjust the main link rod as shown in figure 3. This is provided with a right/left thread system that allows continuous fine adjustments of the length of the control rod; for this adjustment it is not necessary to detach the ball link.

* Perform the first flight at a low headspeed, 1700/1800 RPM. After this first flight, do a general check of the helicopter. Verify that all screws are correctly tightened.

**HPS HEAD**

- The dampening system of this head allows for a wide range of head speeds to be used without sacrificing safety.
- The dampers are composed of an o-ring and a technopolymer damper that defines the maximum possible movement of the spindle.
- The model response with change based on the preload, less preload (less shims) will allow for a softer feel and lower head speed, a high preload is used for hard 3D flight.
- To increase the preload, you can add an additional 0.2mm shim on each side, to decrease the preload, you can remove a 0.2mm shim on each side. It is important that the blade grips do not have the axial play so you must always keep the 1mm shim on each side regardless. The initial setup of the kit is correct for Goblin Speed.
In Flight

During its first flights the Goblin has to be “run in”. The Damper, the main gear, the uniball and other parts must undergo some slight wear to operate smoothly. It is likely that during the very first flights the model may exhibit a swaying phenomena, particularly at low head speed. This phenomena disappears after a few flights.

General Information

A high-speed helicopter requires a good balance between power, aerodynamic efficiency, blade efficiency for speed and stabilization system (flybarless unit).

The stability of the helicopter at high speeds is usually dependent on the types of blades being used. The Goblin Speed blades are designed specifically for this purpose, they combine ease of flight while maintaining stability at high speeds.

"SPEED" Flying

It is recommended to have at least 2 flight conditions (idle up modes), one for take off and landing and another flight condition at much higher RPM for speed flight.

- The high RPM flight condition should only be used while away from the pilot (at least 30 meters).
- Speed passes should always be made longitudinally to the pilot and spectators (left to right or right to left) and always at a safe distance.

- The main and tail blades included with the Goblin Speed are not suitable for 3D flight, they’re optimized for sport and speed flying ONLY.

If you would like to perform 3D maneuvers with your Goblin Speed, we recommend using standard 3D blades. SAB Part # BW4690 and BW5115.

General Setup Tips:

- We recommend 15° of collective pitch for speed flying. Exceeding 15°-16° will simply cause loss of efficiency, which will in turn “rob” power without increasing forward speed.
- We recommend a rotor speed of approximately 2400 to 2600 RPM max. The same applies for rotor speed, using higher rotor speeds can potentially exceed 0.7 to 0.8 match speed for the blade tips, which will decrease efficiency.
- We recommend cyclic servos with at least 20 kg of torque.
- ESC Tested: Kosmik 160-200 and YGE 160-320
- Motors Tested: Pyro 750-800-850 Competition, Scorpion HK 4535 / 4540

<table>
<thead>
<tr>
<th>Battery</th>
<th>Motor</th>
<th>Pinion</th>
<th>RPM</th>
<th>Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>12S - 5000 mAh</td>
<td>Kontronik Pyro 750 -56</td>
<td>22T</td>
<td>2400</td>
<td>+15°</td>
</tr>
<tr>
<td></td>
<td>Scorpion HK 4530 -540</td>
<td>23T</td>
<td>2400</td>
<td>+15°</td>
</tr>
<tr>
<td>14S 4000-5000 mAh</td>
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Tips

There are a few extra parts in the kit:
- H0372: Speed tail fin, this fin minimizes the drag induced by the standard tail fin
- H0379: Safety landing gear, increases safety during take offs and landings. The correct angle connection reduces the drag
- H0377: This allows you to lock the batteries. Please use under the front strap.

To improve cooling, it is possible to cut a small opening in the position shown in Figure.
On the Goblin, areas to look for wear include:

- Motor belt
- Tail belt
- Damper
- Main gear and pinion

The lifespan of these components varies according to the type of flying. On average it is recommended to replace these special parts every 100 flights.

- The head tends to lose rigidity after a while. Check this condition every 20 flights. Preloading with precision shim washers, it is possible to vary the rigidity of the head.

- Check all uniballs often.

- The most stressed bearings are definitely those of the tail shaft. Check them frequently. All other parts are not particularly subject to wear.

- Periodically lubricate the tail slide movement and its linkages as well as the swashplate movement and its linkages.

- Lubricate the main gear with Tri-Flow Synthetic grease, every 20 flights.

- Check the screws that are highlighted in the following images frequently, make sure you remain tight (Fig. 3 and Fig. 4).

- To ensure safety you should do a general inspection of the helicopter after each flight. You should check:

  * The maintenance of proper belt tension.
  * The proper isolation of wires from the carbon and aluminum parts.
  * That all screws remain tight.

**TIPS:** We recommend using something to prevent damage to the canopy due to vibration. In the picture, we used a piece of self adhesive velcro on one side (Fig. 1) and a piece of foam (from a blade holder) on the other side. (Fig. 2)
## Main Frame

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<td>44</td>
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<td>Flanged Bearings</td>
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<th>Quantity/Description</th>
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<tr>
<td>Battery Tray</td>
<td>[H0002-S]</td>
<td>- 1 x CF Battery Tray.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 6 x Flat Head Cap Screws M2.6x5mm.</td>
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<tr>
<td>Frame Spacer</td>
<td>[H0003-S]</td>
<td>- 3 x Frame Spacers.</td>
</tr>
<tr>
<td>Main Structure</td>
<td>[H0009-S]</td>
<td>- 1 x Main Structure.</td>
</tr>
<tr>
<td>Swashplate Anti-Rotation Guide</td>
<td>[H0017-S]</td>
<td>- 1 x CF Swashplate Anti-Rotation Guide.</td>
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<td></td>
<td></td>
<td>- 1 x Finishing Washer M3.</td>
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<td>- 1 x Socket Head Cap Screw M3x8mm.</td>
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<tr>
<td>Column</td>
<td>[H0018-S]</td>
<td>4 x Columns.</td>
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<tr>
<td>Swashplate</td>
<td>[H0023-S]</td>
<td>- 1 x Swashplate Assembly.</td>
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<tr>
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<td>- 2 x Bearings 30xØ37x44mm.</td>
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<td>- 4 x Uniballs M3x4 Ø5 H3.</td>
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<td>- 1 x Uniball M3x4 Ø5 H18.</td>
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<td>- 3 x Socket Head Cap Screws M2x5mm.</td>
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<td>- 4 x Socket Head Cap Screws M2x8mm.</td>
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<tr>
<td>Bearing Support</td>
<td>[H0024-S]</td>
<td>- 1 x Bearing Support.</td>
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<tr>
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<td>- 1 x Bearing Ø12xØ24x6mm.</td>
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<td>- 3 x Flat Head Cap Screws M2.5x5mm.</td>
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<tr>
<td>Safety Lock Tail Boom</td>
<td>[H0038-S]</td>
<td>- 1 x Safety Lock Tail Boom.</td>
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<td>- 1 x Finishing Washer M3.</td>
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<td>- 1 x Socket Head Cap Screw M3x8mm.</td>
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<tr>
<td>Tail Servo Lock</td>
<td>[H0040-S]</td>
<td>- 2 x Tail Servo Locks.</td>
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<td>- 2 x Servo Spacers.</td>
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<td>- 4 x Socket Head Cap Screws M2x12mm.</td>
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<tr>
<td>Locking Element Tail</td>
<td>[H0041-S]</td>
<td>- 2 x Locking Element Tails.</td>
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<td>- 4 x Metric Hex Nylon Nuts M3.</td>
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<td>- 2 x Double Sided Tapes.</td>
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<tr>
<td>Spacer Flybarless</td>
<td>[H0043-S]</td>
<td>- 3 x Spacer Flybarless.</td>
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<td>- 1 x Supporto Flybarless.</td>
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<td>- 1 x Flat Head Cap Screw M3x8mm.</td>
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<td>- 5 x Socket Head Cap Screws M3x8mm.</td>
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<tr>
<td>Linkage Tail Support</td>
<td>[H0048-S]</td>
<td>- 1 x Linkage Tail Support.</td>
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<tr>
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<td>- 2 x Socket Head Cap Screws M2.5x8mm.</td>
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<tr>
<td>Antenna Guide</td>
<td>[H0050-S]</td>
<td>- 2 x Antenna Guide.</td>
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<td>- 2 x Button Head Cap Screws M3x4mm.</td>
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<tr>
<td>Tail Pitch Slider</td>
<td>[H0053-S]</td>
<td>- 1 x Tail Pitch Slider 01.</td>
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<td>- 1 x Tail Pitch Slider 02.</td>
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<td>- 1 x Tail Pitch Slider 03.</td>
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<td>- 1 x Spacer Ø6xØ9x3.2mm.</td>
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<td>- 1 x Uniball M3x4 Ø9 H3.</td>
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<td>- 2 x Flanged Bearings Ø6xØ12x3.5mm.</td>
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<tr>
<td>Bell Crank Base</td>
<td>[H0058-S]</td>
<td>- 1 x Bell Crank Base.</td>
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<tr>
<td>Bell Crank Lever</td>
<td>[H0059-S]</td>
<td>- 1 x Bell Crank Lever.</td>
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<td>- 1 x Bush Bell Crank.</td>
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<tr>
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<td>- 1 x Washer Ø3xØ4x0.5mm.</td>
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<td>- 1 x Spacer Ø3xØ4x9.6mm.</td>
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<td>- 1 x Socket Head Cap Screw M3x22mm.</td>
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<td>- 2 x Flanged Bearings Ø3xØ7x3mm.</td>
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<tr>
<td>Uniball M3x4 Ø5H18</td>
<td>[H0063-S]</td>
<td>- 1 x Uniball M3x4 Ø5H18.</td>
</tr>
<tr>
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<td>[H0064-S]</td>
<td>- 5 x Uniballs M2 Ø5H6.</td>
</tr>
<tr>
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<td>- 5 x Uniball Spacers.</td>
</tr>
<tr>
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<td></td>
<td>- 5 x Socket Head Cap Screws M2x8mm.</td>
</tr>
<tr>
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<td></td>
<td>- 5 x Socket Head Cap Screws M2x8mm.</td>
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### Chapter 18, Spare Parts

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<tr>
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<td>[H0066-S]</td>
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</tr>
<tr>
<td>Servo Spacer M3x12mm</td>
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<td>[H0078-S]</td>
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</tr>
<tr>
<td>Spindle</td>
<td>[H0079-S]</td>
<td>1 x Spindle. 2 x Button Head Cap Screw M6x10mm. 2 x Washer Ø6xØ14x1.5mm.</td>
</tr>
<tr>
<td>Boom Spacer</td>
<td>[H0082-S]</td>
<td>1 x Boom Spacer. 1 x Set Screw M3x20mm.</td>
</tr>
<tr>
<td>27T Tail Pulley</td>
<td>[H0102-S]</td>
<td>1 x 27T Tail Pulley. 6 x Socket Head Cap Screws M2x5mm.</td>
</tr>
<tr>
<td>Bush One Way</td>
<td>[H0110-S]</td>
<td>4 x Bush One Ways.</td>
</tr>
<tr>
<td>M4 Locking Collar</td>
<td>[H0121-S]</td>
<td>1 x M4 Locking Collar. 1 x Socket Head Cap Screw M4x22mm.</td>
</tr>
<tr>
<td>Main Shaft</td>
<td>[H0122-S]</td>
<td>1 x Main Shaft. 1 x M4 Locking Collar Shoulder M4x24mm. 2 x Socket Head Cap Screws M4x22mm. 3 x Metric Hex Nylon Nuts M4 H5.</td>
</tr>
<tr>
<td>Radius Arm</td>
<td>[H0132-S]</td>
<td>2 x Radius Arms. 2 x Spacer Arm Ø3xØ5x2.7mm. 2 x Spacer Arm Ø2.5xØ4x6.3mm. 2 x Uniball Radius Arms. 2 x Socket Head Cap Screws M3x16mm. 2 x Socket Head Cap Screws M2.5x18mm. 2 x Washers Ø3xØ4x0.5mm. 2 x Flanged Bearings Ø2.5xØ6x2.5mm. 2 x Flanged Bearings Ø3xØ7x3mm.</td>
</tr>
<tr>
<td>Center Hub</td>
<td>[H0135-S]</td>
<td>1 x Center Hub. 1 x Socket Head Cap Screw Shoulder M4x24mm. 1 x Metric Hex Nylon Nut M4 H5. 2 x Socket Head Cap Screws M3x12mm.</td>
</tr>
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<td>Bearing Support</td>
<td>[H0142-S]</td>
<td>1 x Bearing 3° Support. 1 x Flanged Bearing Ø6xØ13x6mm. 2 x Socket Head Cap Screws M3x8mm.</td>
</tr>
<tr>
<td>Damper</td>
<td>[H0144-S]</td>
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</tr>
<tr>
<td>Battery Tray</td>
<td>[H0148-S]</td>
<td>1 x Battery Plate. 1 x Battery Protection. 2 x Cylinder M2.5. 2 x Flat Head Cap Screw M2.5x5mm. 1 x Heat Shrink.</td>
</tr>
<tr>
<td>Stop Battery Tray</td>
<td>[H0150-S]</td>
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<td>(H0153-S)</td>
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</tr>
<tr>
<td>Secondary Shaft</td>
<td>[H0157-S]</td>
<td>1 x Secondary Shaft M3. 1 x Socket Head Cap Screw Shoulder M2.5x19mm. 1 x Metric Hex Nylon Nut M2.5xH3.5. 1 x Socket Head Cap Shoulder M3x22mm. 1 x Metric Hex locknut Nuts M3H4.</td>
</tr>
<tr>
<td>Aluminum Blade Spacer</td>
<td>[H0158-S]</td>
<td>4 x Aluminum Blade Spacer.</td>
</tr>
<tr>
<td>Double Bearing One Way Pulley</td>
<td>[H0171-S]</td>
<td>1 x Aluminum Double Bearing One Way Pulley. 3 x Shims Ø10xØ16x0.2mm. 1 x One Way Brass Bushing.</td>
</tr>
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</table>
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Aluminum Front Tail Pulley
[H0172-S]
- 1 x Aluminum Front Tail Pulley.
- 1 x Socket Head Cap M2.5x19mm.
- 1 x Metric Hex Nylon Nuts M2.5H3.5.

Belt Tensioner Support
[H0174-S]
- 1 x Column Belt Tensioner.
- 1 x Tail Belt Idler.
- 1 x Belt Tensioner Arm.
- 2 x Flanged Bearings Ø3xØ7x3mm.
- 2 x Flanged Bearings Ø5xØ9x3mm.
- 1 x Socket Head Cap Screw M3x50mm.
- 1 x Washer Ø3x Ø4x0.5mm.
- 1 x Socket Head Cap Screw M3x12mm.
- 2 x Washers Ø3.2x Ø6x0.5mm.
- 1 x Button Head Cap Screw M3x4mm.
- 1 x Spring De8/df0.5/LL8.

18T Pulley
[H0175-18-S]
- 1 x 18T Pulley.
- 1 x Set Screws M4x4mm.

19T Pulley
[H0175-19-S]
- 1 x 19T Pulley.
- 1 x Set Screws M4x4mm.

20T Pulley
[H0175-20-S]
- 1 x 20T Pulley.
- 1 x Set Screws M4x4mm.

21T Pulley
[H0175-21-S]
- 1 x 21T Pulley.
- 1 x Set Screws M4x4mm.

22T Pulley
[H0175-22-S]
- 1 x 22T Pulley.
- 1 x Set Screws M4x4mm.

23T Pulley
[H0175-23-S]
- 1 x 23T Pulley.
- 1 x Set Screws M4x4mm.

24T Pulley
[H0175-24-S]
- 1 x 24T Pulley.
- 1 x Set Screws M4x4mm.

Blade Grip
[H0182-S]
- 2 x Blade Grip.
- 2 x Thrust Bearing Ø10x Ø18x5.5mm.
- 4 x Bearing Ø10x Ø19x5mm.
- 2 x Washer Ø10x Ø16x1mm.
- 2 x Button Head Socket Cap M4x10mm.

Blade Grip Arm
[H0183-S]
- 2 x Blade Grip Arm.
- 2 x Socket Head Cap Screw M4x10mm.
- 2 x Uniball M3x4 Ø5 H3.5.

Plastic Tail Linkage
[H0261-S]
- 1 x Plastic Tail Linkage.
- 1 x Grip Link Bushing.
- 1 x Socket Head Cap Screws M2x6mm.

Motor Mount Cooling
[H0316-S]
- 1 x Bearing 3* Support.
- 1 x Motor Support.
- 1 x Flanged Bearing Ø6x Ø13x5mm.
- 2 x Socket Head Cap Screws M3x8mm.
- 2 x Set Screws M5x20mm.
- 2 x Washers Ø5.3x Ø10x1mm.
- 2 x Metric Hex Nylon Nuts M5H1.8.
- 2 x Finishing Washers M3.
- 2 x Socket Head Cap Screws M3x10mm.
- 2 x Metric Hex Nylon Nut M3 H4.
- 2 x Springs de 5.8/ df0.5 / LL9.
- 2 x Springs de 3/ df0.5 / LL12.

68T Main Gear
[H0320-S]
- 1 x 68T Main Gear.
- 1 x Socket Head Cap ScrewM4x25mm.
- 1 x Metric Hex Nylon Nut M4 H5.
- 1 x 19T Drive Pinion.
- 1 x Socket Head Cap Screw Shouldered M3x22mm.
- 1 x Metric Hex Nylon Nut M3H4.

Steel Tail Shaft
[H0325-S]
- 1 x Steel Tail Shaft Assembly.
- 1 x Tail Oring Damperem.

Aluminum Tail Blade Grip
[H0327-S]
- 2 x Aluminum Tail Blade Grip.
- 4 x Bearing Ø5xØ10x4mm.
- 2 x Thrust bearing Ø5xØ10x4mm.
- 2 x Button Head Cap M4x8mm.
- 2 x Socket Head Cap M2x6mm.
- 2 x Washer Ø5xØ6.9x0.75mm.
- 2 x Washer Ø7.5xØ10x0.5mm.

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Tail Spindle Shaft [H0329-S]
- 1 x Tail Spindle Shaft.
- 2 x Button Head Socket Cap Screw M4x6mm.

Spacar Set For Tail Rotor [H0330-S]
- 2 x Washer Ø6xØ8.9x0.75mm.
- 2 x Washer Ø7.5xØ10x0.5mm.
- 2 x Tail Oring Damperner.

Linkage HPS V2 [H0346-S]
- 2 x Linkage HPS.
- 4 x Plastic Ball Link.
- 2 x Linkage Rod.

Main Frame [H0354-S]

Tail Boom Support [H0358-S]
- 1 x Tail Boom Support.
- 1 x Nylon screw M8x20mm.
- 1 x Flat Head Socket Cap M3x8mm.

19T Drive Pinion [H0361-S]
- 1 x 19T Drive Pinion.
- 1 x Socket Head Cap Screw Shouldered M3x22mm.
- 1 x Metric Hex Nylon Nut M3H4.

YELLOW Tail Boom [H0366-S]
- 1 x Yellow Tail Boom.
- 2 x Locking Element Tails.
- 2 x Double-Sided Tapes.
- 1 x Set Screws M3 x 20mm.
- 2 x Washers 3.1 x 12 x 1.8mm.
- 4 x Metric Hex Nylon Nuts M3.
- 2 x Boom spacers.
- 2 x Socket Head Cap Screws M3 x 12mm.
- 2 x Nylon Screw M8x20mm.
- 1 x Flat Head Cap Screws M3x8mm.

Vertical ESC Support [H0368-S]
- 2 x Vertical ESC Support.
- 1 x ESC Support.
- 2 x Frame Spacer.
- 4 x Flat Head Socket Cap M3x5mm.
- 6 x Finishing Washer M3.
- 6 x Socket Head Cap Screws M3 x 10mm.
- 2 x Flat Head Cap Screws M3x8mm.

Vertical Fin [H0371-S]
- 1 x Vertical Fin.
- 1 x Small Vertical Fin.
- 6 x Socket Head Cap M3x8mm.
- 2 x Finishing Washer M3.
- 2 x Socket Head Cap M3x12mm.
- 1 x Yellow and Orange Stickers.

Landing Gear Support [H0374-S]
- 1 x Landing Gear Support.

Yellow Landing Gear [H0375-S]
- 1 x Landing Gear.
- 2 x Bottom Head Cap Screw M4x8mm.
- 2 x Bottom Head Cap Screw M4x10mm.
- 1 x Yellow and Orange Stickers.

Canopy Locking [H0378-S]
- 2 x Canopy Locking.
- 2 x Button Head Socket Cap M4x8mm.

Safety Landing Gear [H0379-S]
- 1 x Landing Gear.
- 2 x Bottom Head Cap Screw M4x8mm.
- 2 x Bottom Head Cap Screw M4x10mm.
- 1 x Yellow and Orange Stickers.

Canopy Yellow Speed [H0367-S]
- 1 x Canopy Yellow.
- 2 x Canopy Grommet.
- 1 x Canopy Mousse.
- 1 x Canopy Edge Protection.

Canopy Orange Speed [H0382-S]
- 1 x Canopy Orange.
- 2 x Canopy Grommet.
- 1 x Canopy Mousse.
- 1 x Canopy Edge Protection.

Canopy Yellow/Orange [H0356-S]
- 1 x Canopy Yellow/Orange.
- 1 x Canopy Grommet.
- 1 x Canopy Mousse.
- 1 x Canopy Edge Protection.

Canopy Yellow/Green [H0357-S]
- 1 x Canopy Yellow/Green.
- 1 x Canopy Grommet.
- 1 x Canopy Mousse.
- 1 x Canopy Edge Protection.

Tail Spindle Shaft [H0329-S]

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Tail Boom Support [H0358-S]

Tail Boom [H0359-S]
- 1 x Aluminum Tail Side Plate.
- 1 x Flanged bearing Ø6xØ13x5mm.

Spacer Set For Tail Rotor [H0330-S]

Linkage HPS V2 [H0346-S]

Main Frame [H0354-S]

Tail Boom Support [H0358-S]

Landing Gear Support [H0374-S]

Yellow Landing Gear [H0375-S]

Canopy Locking [H0378-S]

Safety Landing Gear [H0379-S]

Canopy Yellow/Orange [H0356-S]

Canopy Yellow/Green [H0357-S]

Tail Side Plate [H0373-S]

Tail Boom [H0359-S]

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UPGRADES and ACCESSORIES

[BW4690] Main Blade For 3D Flight
- 1 x SAB HELI DIVISION Decal (set).

[HA112-S] Aluminum ESC Heat Sink
- 1 x Aluminum ESC Heat Sink.
- 4 x Socket Head Cap M3x6mm.
- 2 x Velcro Battery Strap.
- 4 x Heat Shrink - Clear.
- 1 x Rubber Canopy Edge Protection.

[HA016-S] [HA024-S] [HA025-S] [HA026-S] [HA112-S] [BW2720-G] [BW5104-G]

[HA016-S] - 2 x Wrench Tool M8,M6
[HA024-S] - 4 x O-ring 3050.
[HA025-S] - 2 x Velcro Battery Strap.
[HA112-S] - 1 x Rubber Canopy Edge Protection.

[SAB HELIDIVISION Jr Servo Horn [HA050]]
- 1 x Plastic Servo Horn.

[SAB HELIDIVISION Futaba Servo Horn [HA050]]
- 4 x JR Servo Horn.

[SAB HELIDIVISION New Black T-shirt [HM025-S-M-L-XL-XXL]]
- 1 x SAB HELI DIVISION New Black T-shirt.

[SAB HELIDIVISION Aluminum ESC Heat Sink [H0165-S]]
- 1 x Aluminum ESC Heat Sink.
- 4 x Socket Head Cap M3x6mm.
- 2 x Cup Point Set Screws M3x20mm.
- 12 x Washer Ø3,3xØ6x0,5mm.
- 4 x Metric hex locknut Nuts M3H4.

[SAB HELIDIVISION Black Polo Shirt [HM027-S-M-L-XL-XXL]]
- 1 x SAB HELI DIVISION Black Polo Shirt.

[SAB HELIDIVISION Black Hoodies [HM029-S-M-L-XL-XXL]]
- 1 x SAB HELI DIVISION Black Hoodies.

[SAB HELIDIVISION Neck Strap [HM034]]
- 1 x Neck Strap.

[SAB HELIDIVISION Stand [HM038]]
- 1 x SAB HELI DIVISION Stand (set).

[SAB HELIDIVISION Aluminum Cooling Motor Mount [H0316-S]]
- 1 x Aluminum Third Bearing Support.
- 1 x Aluminum Cooling Motor Mount.
- 1 x Flanged Bearing Ø6 x Ø13 x 5mm.
- 2 x Socket Head Cap Screw M3x8mm.
- 2 x Aluminum Finishing Washers.
- 2 x Spring 5.8 / 0.3 / LL 9.
- 2 x Socket Head Cap Screw M3x10mm.
- 2 x Spring 3 / 0.5 / LL 12.