

## **Component Features & Specifications for H.A.R.V. (High Altitude Research Vehicle)**

Charles D. Hodges – Sam Houston State University – 2015

### **1 – Hobbyking SK450 Glass Fiber Quadcopter Frame 450mm<sup>1</sup>**



#### **Features**

Built from top quality glass fiber and polyamide nylon. Pre-threaded brass sleeves for all of the frame bolts. Has a yellow orientation ball to keep you flying in the right direction.

#### **Specs:**

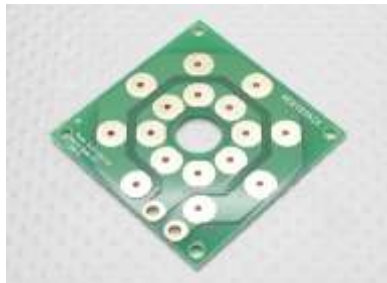
Width: 450mm

Height: 80mm

Weight: 300g (w/out electronics)

**Weight: 1203g = 2.65lbs (completed H.A.R.V)**

### **2 – Hextronik Power Distribution Board Quad DIY<sup>2</sup>**



#### **Features:**

Current: 8 x 20A outputs (MAX)

Power input: 8 x contact points

Power output: 8 x contact points

Dimensions: 50x50x2mm

Weight: 7.6g (PCB only)

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<sup>1</sup> [www.hobbyking.com/hobbyking/store/\\_\\_654\\_\\_569\\_\\_Multi\\_Rotors\\_Parts-Hobbyking\\_SK450\\_Parts.html](http://www.hobbyking.com/hobbyking/store/__654__569__Multi_Rotors_Parts-Hobbyking_SK450_Parts.html)

<sup>2</sup>

[http://hobbyking.com/hobbyking/store/\\_\\_31223\\_\\_Hobbyking\\_Multi\\_Rotor\\_Power\\_Distribution\\_Board\\_DIY\\_8\\_x\\_output\\_PCB\\_.html](http://hobbyking.com/hobbyking/store/__31223__Hobbyking_Multi_Rotor_Power_Distribution_Board_DIY_8_x_output_PCB_.html)

### 3 – Hobby King 20A ESC 3A UBEC<sup>3</sup>



#### **Specs:**

Constant Current: 20A  
Motor Type: Sensorless Brushless  
Burst Current: 25A  
Size: 54 x 26 11mm  
Battery: 2-4S Lipoly / 5-12s NiXX  
BEC: 5v / 3A  
Weight: 30g

#### **Programming Functions:**

Battery Type: Lipo / NiXX  
Brake: On / Off  
Voltage Protection: Low / Mid / High  
Protection mode: Reduce power / Cut off power  
Timing: Auto / High / Low  
Startup: Fast / Normal / Soft  
PWM Frequency: 8k / 16k  
Helicopter mode: Off / 5sec / 15sec (Start up delay)

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<sup>3</sup> [http://hobbyking.com/hobbyking/store/uh\\_viewItem.asp?idProduct=40684](http://hobbyking.com/hobbyking/store/uh_viewItem.asp?idProduct=40684)

#### 4 – NTM Prop Drive Series 28-30S 900kv / 270w (short shaft version)<sup>4</sup>



##### **Specs:**

Model: NTM Prop Drive Series 28-30S 900kv

Kv: 900rpm/v

Max Power: 215W @ 12v (3S) / 270W @ 15v (4S)

Max current: 18A

Shaft: 3mm

ESC: 25~30A

Cell count: 3s~4s Lipoly

Bolt holes: 16mm & 19mm

Connection: 3.5mm Bullet-connector

Bolt thread: M3

Weight: 66g

##### **Prop Tests:**

13x4E - 11.1v - 194W - 17.4A - 1.04kg thrust

12x6E - 11.1v - 195W - 17.8A - 1.01kg thrust

11x7E - 11.1v - 188W - 17.0A - 0.89kg thrust

10x5E - 11.1v - 133W - 12.0A - 0.75kg thrust

9x6E - 11.1v - 120W - 10.7A - 0.68kg thrust

9x6E - 14.8v - 234W - 15.8A - 1.05kg thrust

8x4E - 14.8v - 159W - 10.6A - 0.75kg thrust

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[http://hobbyking.com/hobbyking/store/\\_\\_42710\\_\\_NTM\\_Prop\\_Drive\\_Series\\_28\\_30S\\_900kv\\_270w\\_short\\_shaft\\_version\\_USA\\_warehouse\\_.html?strSearch=ntm%20prop%20drive%2028-30s%20900](http://hobbyking.com/hobbyking/store/__42710__NTM_Prop_Drive_Series_28_30S_900kv_270w_short_shaft_version_USA_warehouse_.html?strSearch=ntm%20prop%20drive%2028-30s%20900)

## 5 – Standard accessory pack for NTM Prop Drive 28 series motors<sup>5</sup>



### **Features:**

CNC Machined (take a close look at the cross mount, even that is machined rather than punched) from billet 6061 alloy for strength and balance. The propeller adapter is a press fit to ensure balance.

### **Specs:**

Shaft Diameter: 5mm

Shaft Length: 19mm

Cross Plate Bolt Holes: 34mm

Weight: 13.8g (Total)

## 6 – Turnigy 3300mAh 3S 30C Lipo Pack<sup>6</sup>



### **Specs.**

Minimum Capacity: 3300mAh

Configuration: 3S1P / 11.1v / 3Cell

Constant Discharge: 30C

Discharge plug: 4mm Bullet-connector

Peak Discharge (10sec): 40C

Pack Weight: 297g

Pack Size: 137 x 43 x 22mm

Charge Plug: JST-XH

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<sup>5</sup>

[http://hobbyking.com/hobbyking/store/\\_\\_24527\\_\\_NTM\\_Prop\\_Drive\\_28\\_Series\\_Accessory\\_Pack\\_US\\_Warehouse\\_.html?strSearch=ntm%20prop](http://hobbyking.com/hobbyking/store/__24527__NTM_Prop_Drive_28_Series_Accessory_Pack_US_Warehouse_.html?strSearch=ntm%20prop)

<sup>6</sup>

[http://hobbyking.com/hobbyking/store/\\_\\_15003\\_\\_Turnigy\\_3300mAh\\_3S\\_30C\\_Lipo\\_Pack\\_US\\_Warehouse\\_.html?strSearch=turnigy%203300](http://hobbyking.com/hobbyking/store/__15003__Turnigy_3300mAh_3S_30C_Lipo_Pack_US_Warehouse_.html?strSearch=turnigy%203300)

## 7 – Turnigy 9X 9Ch Transmitter w/ Module & 8ch Receiver (Mode 2) (v2 Firmware)<sup>7</sup>



### **Specs:**

Number of Channel: 8ch ppm/9ch pcm

Encoder type: ppm/pcm

Display: 128\*64LCD

Simulator Interface: Yes

Support Type: Heli/Acro/Glid

Low Voltage Show: Yes

Support user: 8

Buzzer: Yes

Stick model: 4

Subtrim: Yes

2.4 GHz

### **Required:**

Battery

### **Included:**

Turnigy 9x 9Ch Transmitter

Turnigy RF9X-V2 module

Turnigy 9X8C-V2 8-channel receiver

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<sup>7</sup>

[http://hobbyking.com/hobbyking/store/\\_\\_19673\\_\\_Turnigy\\_9X\\_9Ch\\_Transmitter\\_w\\_Module\\_8ch\\_Receiver\\_Mode\\_2\\_v2\\_Firmware\\_US\\_Warehouse\\_.html?strSearch=turnigy%209x](http://hobbyking.com/hobbyking/store/__19673__Turnigy_9X_9Ch_Transmitter_w_Module_8ch_Receiver_Mode_2_v2_Firmware_US_Warehouse_.html?strSearch=turnigy%209x)

## 8 – Balancer Charger 50W 6A Battery Turnigy Accucel-6 Accucell LiPo LiFe NiMh NiCd<sup>8</sup>



### **Features:**

- Microprocessor controlled
- Delta-peak sensitivity (NiMH/NiCd)
- Individual cell balancing
- Li-ion, LiPo and LiFe capable
- Ni-Cd and NiMH capable
- Large range of charge currents
- Store function, allows safe storage current
- Time limit function
- Input voltage monitoring. (Protects car batteries at the field)
- Data storage (Store up to 5 packs in memory)
- Battery break in and cycling.

### **Specs:**

- Input Voltage: 11~17v
- Li-ion/Poly cells: 1~6
- Charge Current Range: 0.1~6.0A
- Pb battery voltage: 2~20v
- Ni-MH/NiCd cells: 1~15
- Circuit power: Max Charge: 50W / Max Discharge: 5W
- Weight: 355g

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<sup>8</sup> [www.ebay.com](http://www.ebay.com)

9 – 10x4.5 SF Props 2pc Standard Rotation/2 pc RH Rotation - Complete w/ spacer rings<sup>9</sup>



10 – Mobius Action Camera 1080P HD Mini Sports Cam - Wide Angle Edition<sup>10</sup>



**Features:**

1080P HD Video Mini Action Camera

Uses a Japanese Wide-Angle Lens with HFOV of 116 Degrees

Dimensions (inches): 2 x 1 x 1

Weight: 1.37 oz

80 Minutes Battery Life

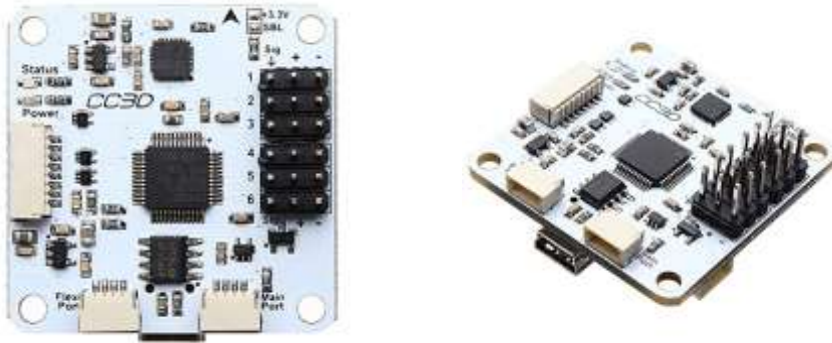
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<sup>9</sup>

[http://hobbyking.com/hobbyking/store/\\_\\_25821\\_\\_10x4\\_5\\_SF\\_Props\\_2pc\\_Standard\\_Rotation\\_2\\_pc\\_RH\\_Rotation\\_Red\\_.html](http://hobbyking.com/hobbyking/store/__25821__10x4_5_SF_Props_2pc_Standard_Rotation_2_pc_RH_Rotation_Red_.html)

<sup>10</sup> [www.amazon.com](http://www.amazon.com)

## 11 – OpenPilot CC3D Flight Controller STM32 32-bit Flexiport<sup>11</sup>



### **Features:**

MultiRotor controller with auto-level, including TriCopters, QuadCopters and HexaCopters  
Flybarless Helicopter controller with auto-level  
Fixed Wing UAV controller  
Powerful STM32 32-bit microcontroller running at 90MIPs with 128KB Flash and 20KB RAM  
3-axis high-performance MEMs gyros and 3-axis high-performance MEMs accelerometer  
Tiny 36mmx36mm 4 layer PCB for superior electrical noise reduction and flight performance.  
Software support for Windows, Mac and Linux  
Direct high speed USB support with no drivers required, a truly plug and play device.  
Spektrum satellite receiver support  
Futaba S-BUS hardware support and PPM  
Innovative Flexi-port technology for superior port flexibility  
4Mbits on-board EEPROM for configuration storage

### **Specs:**

Size: 36x36mm  
Weight: 5.7g  
Mounting: M3 holes @ 30.5mm square

### **Included:**

CC3D Flight controller Rev C with V4 bootloader pre-installed  
Full cable set to match the onboard ports

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<sup>11</sup> [www.amazon.com](http://www.amazon.com)