XPROHELI

[DYS 3 Axis Gimbal User Manual]

This user manual provides information on the specifications, installation and functions of the DYS 3 Axis Brushless Gimbal system.

Revision History

Version	Date	Revision Description
1.0	8/05/2014	Manual Creation

Table of Contents

1. Welcome

Message from CEO:

On behalf of XProHeli I would like to thank you for your purchase of the DYS 3X gimbal for GoPro.

Our team at XProHeli respectfully requests that you take the time to read this manual to the fullest extent before using your new DYS 3X for the first time.

The DYS 3X gimbal is a great step up from the XPG as it adds a new cinematic dimension to your shots with the addition of a 3rd axis of stabilization. We have tested several 3 axis gimbals and feel this gimbal when setup properly is the best solution for our applications.

While the XPG has been and is still an excellent performing top leading 2-Axis gimbal, the competition in this market with the new gimbals coming out of China has forced us to go into the obsolescence phase with the XPG after only 1 short year. We still have plenty of parts available for these units so don't hesitate to contact us for replacement frame parts, motors or controllers if needed.

If you have any questions, concerns or need help please do not hesitate to email or call us:

support@xproheli.com
Phone: 541-639-8828
Mailing Address:

XProHeli
20810 Sockeye Place
Suite #110
Bend, OR 97701

Customer satisfaction is our priority. If your not happy were not happy!

Thanks,

Hans Skjersaa

Warning & Disclaimer!

The DYS 3Xgimbal is capable of capturing incredible footage, and as exciting as it is we at XProHeli want to remind customers that operating RC aircraft with the DYS 3X should be done with great care and precaution.

There have been several incidences of people throughout the world seriously injured by RC Helicopters (even some deaths!)

Multi-rotors are not a toy. People under the age of 18 years old should not operate any multi-rotor unless supervised by an experienced adult. The props on the XP2 like other multi-rotors are sharp and can cause serious damage to people and property.

Never fly around people who are unaware of the damage these devices can cause.

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2. QUICK START

Overview

Important!

Never power up your DYS 3X gimbal without your GoPro mounted to it! Doing so can cause damage.

The DYS 3X is configured and custom tuned by XProHeli with the addition of a custom soldered mode button to access different features in the software. Setup of this gimbal is done in a few steps, mounting the gimbal, installing the camera and finally powering the unit on.

Please take care in unpacking the contents and be conciencious of how you handle the gimbal. Gimbals are not yet bullet proof so be careful not to snag a loose wire or neglect the gimbal. Water will damage the gimbal as will lots of dirt / debris.

Never power the gimbal with any power source other than a 3S rated voltage (11.1 – 12.5 volts). Doing so will ruin the control board.

Specifications

Supported Camera:	GoPro Hero 3/3+
Weight:	238g (316g with GoPro Hero 3)
Working Rotation Range:	Tilt Axis: +-90º
	Roll Axis: +- 40º
	Yaw Axis: +- 270º
Input Power:	3 S (11.1V)
Software Requirements:	Windows XP, Vista/7/8, Mac OSX
Motors:	Brushless, rewound 14 poles
Run-Time:	45 min (800mA battery)
100% Tested & Configured in Bend, OR USA	

Unpacking your DYS 3X

The DYS 3X comes packed as shown below:

Packed Contents:

- (1) DYS 3X Gimbal with XP Lander mounting plate
- (1) Bag of accessory mounts (for other multirotors)
- (1) 1.5mm Allen Key
- (1) 2mm Allen Key
- (1) 5/32” Allen Key
- (1) ¼-20” x ½” Hex Button Head Screw
- (1) Mounting Band (rubber) – optional for GoPro
- (1) Pack Black Tarot dampeners (recommended for best footage)

XProheli provides additional optional dampeners from Tarot that we feel are superior to the stock DYS dampeners. You can experiement with each set or combination but we feel the black works best.

Mounting Your GoPro

Overview

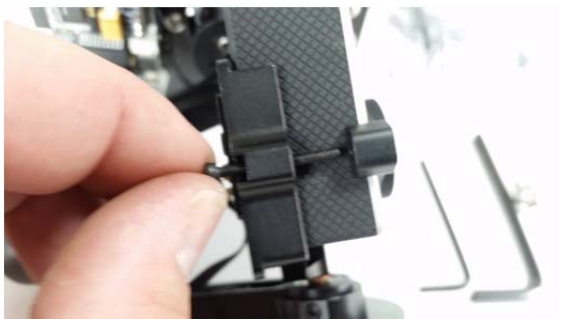
Quick Tip!

For best performance always make sure you adjust the Roll plate for balance when changing to different GoPro configurations!

The DYS 3X comes with a machined retaining lens housing to secure the GoPro to the camera tray of the gimbal:

Install the camera onto the gimbal by using the (2) small 1.5mm allen screws and 1.5mm allen key. These screw into the back of the retaining ring, one on the top and one on the bottom:

Screw in bottom:



Should look like this when mounted properly:

Mounting for ND / Polarizing Filters:

You can also use the provided mounting band to secure the GoPro to the gimbal. This is a good mounting solution if you are using a light weight filter from Snake River or Polar Pro. We recommend a filter with a weight of 20 grams or less (minimal impact on PID settings)

XP2 / Multi-rotor Installation

Overview

Installation of the DYS 3Xon your XP2 quadcopter is done in a few simple steps. First is removal of any existing gimbal or GoPro landing gear plate, mounting of the DYS 3X and then finally the remote tilt lead wire hook-up. This section is specifically for the XP2, however if you are a Phantom V1 user please reference this YouTube video for the DYS 3X install:

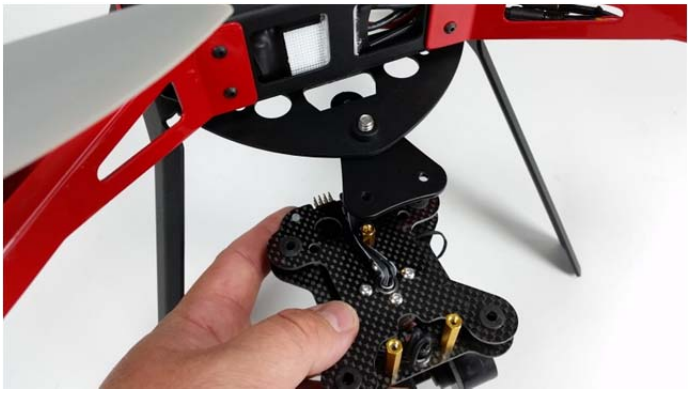
https://www.youtube.com/watch?v=Bz1Dh3itkOM

Installation

1. Prepare your XP2 by removing the lower horizontal GoPro mounting plate (if applicable).

2. If you purchased the DYS 3XHandle or ProGrip, carefully unscrew the fasteners on the top of the DYS 3X to the handheld mount.

3. Using the provided XP Lander adapter plate, screw the plate onto the lander frame with the provided ¼-20" adapter hex screw.



4. Align the DYS 3X Gimbal mounting stand offs with the 3 holes in the adapter plates and fasten using the provided M3x8 screws.

5. Plug in the JST power lead to the back of the gimbal. It is optional to use the auxiliary power from your XP2 power harness or use a small lipo battery back such as the XProHeli 800mAh battery.

Mounting to Pro-Grip (dual handles)

Quick Tip!

Make sure your XP2 main flight battery does not touch or rub against the back of the gimbal, this can cause undesired vibrations to the DYS 3X resulting in poorer quality footage.

Align the DYS 3X Gimbal mounting stand offs with the 3 matching holes in the top of the Pro-Grip mounting plate and fasten using the provided M3x8 screws.

The battery is typically mounted on the top plate of the ProGrip with Velcro. Handles are relatively easy to mount, once complete it should look like this:

Powering On DYS 3X

Once your Gimbal is mounted and the camera is secured you can now power the gimbal on by connecting the battery pack to the JST power lead wire on the DYS 3X.

Upon startup the gimbal will go through a 5 second gyro calibration with the buzzer beeping intermittently. If this does not happen at start up it means that the software is set to skip the gyro calibration on power up. This can be set either way, we recommend leaving the gyro calibration off.

If you find that the gimbal starts up and is off center like this:

Gently rotate the gimbal with your hand until the yaw motor 'centers' on the next set of poles. It may take 5-10 seconds for the gimbal to center at the 0 position.

If you find that the gimbal acts erratic on start up. Simply press the mode button 1 time to ensure it is in mode 1 and then with the gimbal still, press and hold the button for 5 seconds to initialize a manual gyro calibration. The motors will power off and the controller will calibrate the sensor for the temperature of the room or area you are filming in.

Operating Modes

The DYS 3X has a custom mode function button on the front of the gimbal that allows you to access multiple operating features on the fly. Each DYS 3X is setup by us with the following functions:

- **Mode 1** - Follow Pan only
- **Mode 2** - Follow Pan + Pitch
- **Mode 3** - Set Camera angles by hand (motors turn OFF for 2 seconds, hold camera at desired angle - gimbal now holds this angle)
- **Mode 4** - Lock Mode (camera remains pointed forward at all times - does not follow hands)
- **Mode 5** - Customized by user in Software package
- **Gyro Calibration** – Hold 5 seconds, keep gimbal still as possible.

Using FPV with the DYS 3X

To use FPV with the DYS 3X gimbal you will need a low profile lightweight/flexible FPV cable like this one:

If you do not have this cable it is available on our website.

3. SimpleBGC SOFTWARE

IMPORTANT!

Your DYS 3X comes preconfigured with a tune that works really well for the GoPro Hero 3/3+.

Make sure you backup your Profile settings prior to making any changes!

DO NOT LOAD 'USE DEFAULTS' and overwrite the controller!! Doing this will reset your gimbal controller completely and you will have to perform the setup recovery procedures.

Overview

This section provides information and instructions on the SimpleBGC Software and how to make specific changes to your software settings to help with getting the best performance from your DYS 3X.

The 32 bit controller in each DYS 3X comes with a licensed bootloader from Basecam Electronics (Alexmos). This license allows you to download and flash your controller with the latest firmware when new releases are available. Please note that any upgrades or downgrades to the firmware on your DYS 3X are will most likely require you to reconfigure all the settings on the controller. Unless you are an advanced user and are comfortable configuring the sensor and making the proper adjustments, we do not recommend you change the firmware.

Future firmware releases will be carefully monitored and test at XProHeli before making a recommendation to upgrade. If there is a firmware version that we feel is superior to the original shipped version we will put together a step by step video on the firmware upgrade process and necessary adjustments.

Connecting DYS 3X to Your Computer

Connect the board to your computer with a mini USB cable. The first time you connect the board to your computer, it may install the drivers automatically. If not, you can download the latest drivers from the following link:

www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx

After you install the driver, a new virtual COM port will be created. You need to choose this COM port in the SimpleBGC GUI software application to initiate the connection.

Caution: It is safe to connect both USB and the battery simultaneously, but be very careful not to reverse the polarity of the battery, because it will burn out the controller and may damage your PC!

Download the SimpleBGC GUI & User Manual

SimpleBGC GUI 2_40b8.zip

SimpleBGC 32bit 2_40b8 GUI User Manual

The SimpleBGC GUI software application enables you to do the following:

- Update the firmware
- Make changes to the settings of your controller
- Tune settings for optimal performance
- Adjust settings for various modes of operation

USING SimpleBGC GUI

After you start the software and select the correct COM port from the list, click "Connect." When the connection is established, all board settings and profiles will be loaded into the software. You can re-load the current board parameters anytime by clicking the "**READ**" button.

After adjusting parameters in the software, you should write them to the controller board by clicking the "**WRITE**" button. Only the current profile parameters will be saved to the board. To return to the default settings, select the "**USE DEFAULTS**" button.

To choose a different profile, select it from the list of profiles located in the upper right corner of the window. You can store different settings as five different profiles onto the controller board. You can switch profiles saved on the board by choosing the profile in the software or by pressing the **MENU** button, if configured on your controller board.

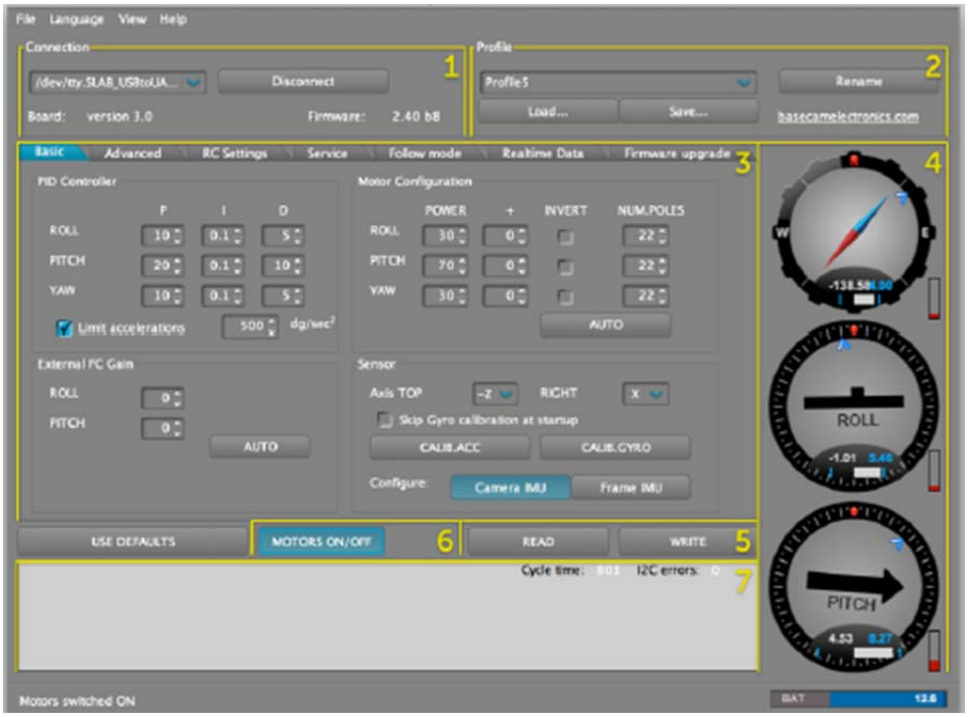
Remember that some settings are common for all profiles and can not be saved on a per profile basis. Parameters such as sensor orientation, hardware configuration, RC inputs, and motor outs are the same across all profiles. The software starts in English. To change the interface language, choose one in the “language” menu and restart the program.

SAVE BACKUPS OF YOUR PROFILE SETTINGS!

The first thing you should do prior to making any adjustments or changes to the the software is save a backup of your gimbals Profile settings to your computer. To do this connect the gimbal to the GUI and Select Profile 1 -> Save As, then save the profile to a specified backup folder on your computer. Do this fro Profiles 1, 2 and 4.

SimpleBGC GUI Layout

SimpleBGC GUI has a fairly intuitive layout with several sections:



1. ***Connection*** – COM-port selection and connection status.

2. ***Profile*** – Select, rename, load, and save different profiles. The DYS 3X Profiles are configured as follows:

    a. Profile 1 – Follow Mode (Pan only)
    b. Profile 2 – Follow Mode (Pan + Pitch)
    c. Profile 3 – Unused (3 clicks set manual tilt angles defined in service tab)
    d. Profile 4 – Lock Mode (follow modes off)

    Note: to switch modes on the DYS 3X while connected to the GUI simply select Profile 1,2 or 4 and click write.

3. ***Configuration*** – Central part of the window, organized into seven tabs:

    i. **Basic Tab** – Basic gimbal stabilization settings. Do not change these settings unless you are familiar with their functions. See performance tuning section for more details.

    ii. **Advanced Tab** – More precise tuning options – for fine tuning you should not need to adjust any of these parameters.

    iii. **RC Settings** – Settings to control the gimbal roll/pitch/yaw orientation with RC inputs.

    iv. **Service** – Specify the behavior of the MENU button (located on the bottom of the control box) and tune the battery monitoring service.

    v. **Follow Mode** – Settings related to this special mode of camera control.

    vi. **Realtime Data** – Realtime sensor data monitoring. This screen is helpful in tuning your gimbal performance.

    vii. **Firmware Upgrade** – Firmware and SimpleBGC GUI software versions and update options. Upgrade firmware at your own risk!

4. ***Control Panel*** – Graphic visualization of gimbal orientation angles for all three axes.

    • **Black arrows** display the angles.

• **Blue arrows** are a 10x time magnification to provide higher precision.

• **Red marks** show target angles that the gimbal should hold.

• Thin blue lines show the peak deflection from the central, neutral point. Blue digits show peak deflection amplitude, which provides an estimation of stabilization quality.

• Vertical red bars to the right of the scales show actual power level from 0 to 100%.

5. ***READ, WRITE, USE DEFAULTS*** buttons are used to transfer settings to/from the controller board.

NOTE: USE DEFAULTS BUTTON WILL OVERWRITE ALL DYS 3X SETTINGS

6. ***MOTORS ON/OFF*** button – manually turn on/off power to motors.

7. Tips, status or error messages (in red color) are displayed at the bottom of the screen. Overall cycle time and I²C error count is also displayed.

8. Battery voltage indicator with warning sector. (Bottom right of screen)

Performance Tuning

Overview

The DYS 3X comes preconfigured with PID settings that perform exceptionally well with cameras ranging from 400-750g. These settings are regularly used by us for various camera configurations and net excellent stabilization results.

Depending on your filming style for handheld or aerial use you may find the need to tune a few parameters in the

software such as the reaction speed or the start and stop points of the follow-mode features.

If you are doing very high speed moves or are running a camera payload in the upper range you may find even better stabilization quality by adjusting some of the PID motor power parameters. Recommended PID settings for specific cameras are available from our training/downloads page – these will be updated on a regular basis.

Optionally manual PID tuning can be done as well with reference to the Realtime Data tab. See *Manual PID tuning* section.

Tuning Follow Modes

Both Profiles 1 and 2 have active follow mode features:

- Profile 1 – Follow YAW active
- Profile 2 – Follow YAW / Follow PITCH, ROLL active
- Profile 4 – Disabled

Note that if you make adjustments to Profile 1 and want those changes to carry over to Profile 2 you must make sure to copy those values from Profile 1 to Profile 2 and write them to the controller as both profiles are independent of each other.

Follow mode stabilization is determines the angles of the gimbal frame by estimating the angle values from each motors magnetic field. If the motor accidently skips steps from bumping into the gimbal the position estimation will be off and you will have to correct the camera position by hand. If the gimbal begins acting erratic simply power off the gimbal and power back on to restart the synchronization. In rare cases you may have to perform a Gyro calibration (long 5 second hold of mode button)

Follow YAW: This mode is activated on Profile 1. This mode only enables the follow mode feature for the YAW axis and keeps the PITCH/ROLL axis in 'lock' mode level to the horizon. This mode is the most popular for handheld use and multirotor use.

Follow PITCH, ROLL: This mode is activated on Profile 2. This mode will allow both the PITCH and ROLL axis to follow the frame of the gimbal with the following parameters:

- **Follow ROLL start degrees:** Set the PITCH angle (in degrees) where the ROLL axis enters Follow mode. Below this angle, ROLL remains locked to the horizon. The purpose of this setting is so the ROLL does not remain locked at high degree pitch angles.

- **Follow ROLL mix degrees:** Set the PITCH range (in degrees) where the ROLL axis gradually transitions from 'lock' mode to 'follow' mode. To disable ROLL follow completely set the Roll start/mix values to (0,90). To permanently enable the ROLL follow mode set start/mix values to (0,0)

Note: The DYS 3X is preconfigured in Profile 2 to only activate the follow PITCH feature.

Tuning Follow mode features (Profile 1/2)

There are a few primary variables that can be adjusted to change the reaction speed and settings of the YAW (pan) axis.

- **Dead band, degrees**: Increasing this value will adjust the starting point (+/- degrees from center) that the camera begins to follow your hands left to write. A smaller value here will 'tighten' the reaction zone from the zero point and begin to follow to the left or right sooner.

  A larger value here will give your hands more freedom of movement to the left and right before the camera begins to follow. You can set this range where your preference suites your needs. The rotation of an outer frame or handles does not
  affect the camera within this degree band. This setting helps to skip small pan jerks when you operate gimbal by hands during fast or dynamic movements.

- **Expo curve:** you can specify the strength of the follow mode when the outer frame moves left/right or up/down from a neutral position. For example: when the expo curve is enabled (i.e. is not flat), small or medium declination of an outer frame will cause very fine control even if I-term is configured high. But the strength of control exponentially grows when angles of declination becomes close to 60 degrees. It gives a big freedom in camera operation: from fine and smooth control to very fast movements.

- **OFFSET**: it is a very important to properly configure the initial position of the motor's magnetic poles, because all further calculations use this information.

  For YAW axis you can adjust the zero point heading relative to the frame heading – so if you notice that the camera is offset just slightly from center to the left or right and is not straight in line you can raise or lower this value to adjust the camera angle.

  For PITCH and ROLL axis there is an option to calibrate offset automatically. To do this, power on system, hold frame leveled, and press AUTO button. Don't forget to write setting when finished. If the camera after power on is not leveled, you need to adjust the offset setting. (This is preconfigured when shipped)

- **Speed:** This value allows you to adjust the speed of the camera rotation for a specific axis. A higher value nets a faster camera movement, a lower values nets a slower camera movement. Don't set too high of values that the motors can't handle (MAX 10). If the value is too high the motors will skip steps and the stabilization synchronization will be off – causing the gimbal to act erratic. If a high value is desired make sure to have the acceleration limiter set so that it will help to set a larger speed value without causing the motors to skip or miss steps.

Manual PID Tuning

For novice DYS 3X users we do not recommend immediately diving into motor and PID tuning. This section is for advanced users who are familiar with all the parameters of the software. Always remember to make a backup of your profile settings so you can easily reload and have record of your original PID settings!

Prerequisites:

To start with fine tuning your PIDs you should have your original DYS 3X Profile settings loaded. Your motor polarity should be correct and your IMU sensor should be calibrated and configured properly.

Tuning is achieved by referencing the Real Time Data tab in the GUI. You should have the gimbal on a table mounted and locked to the DYS 3X stand. The battery should be fully charged for the tuning process.

Tuning Process:

Set gimbal to Profile 4 (LOCK MODE) Start with the PITCH axis, then ROLL then YAW. Begin by deflecting the camera with your hand on each axis and watch the speed and smoothness of the return action of the GYRO data on the Real Time Data graph. Your goal in tuning is to raise the P and D value for each axis as high as possible without causing high frequency feedback or unwanted vibrations.

i. Set "I" to a small value of 0.04 or less.

ii. Slowly increase "P" until the motor starts to oscillate.

iii. Increase "D" in small increments until the oscillations stop.

iv. Repeat steps ii and iii until high-frequency vibration occurs. You may feel the vibration by hand and see a noisy line on the gyro graph. At this point, you have identified the maximum values for "P" and "D" for

PITCH for your setup. Decrease each slightly and proceed to step v.

v. Repeat steps i through iv for ROLL. Stabilization of ROLL may cause instability in PITCH. If so, reduce P and D slightly for PITCH. Cross-axis interference is most pronounced when the gimbal construction is less rigid.

vi. Repeat steps i through v for YAW.

vii. Increase "I" for PITCH until low-frequency oscillation appears. Then, decrease "I" slightly to keep the gimbal stable. You can reduce "I" as much as 20%, if needed.
viii. Repeat step vii for ROLL and YAW.

ix. When all axes are tuned, test the gimbal. While tuning you can reference the gyro data in the Realtime Data graph to estimate stabilization quality. The picture below is an example of 3 manual deflections of the camera on the pitch axis with the orange line representing the stabilization back to level.

Each axis should have a smooth return in the Realtime Data tab as shown:

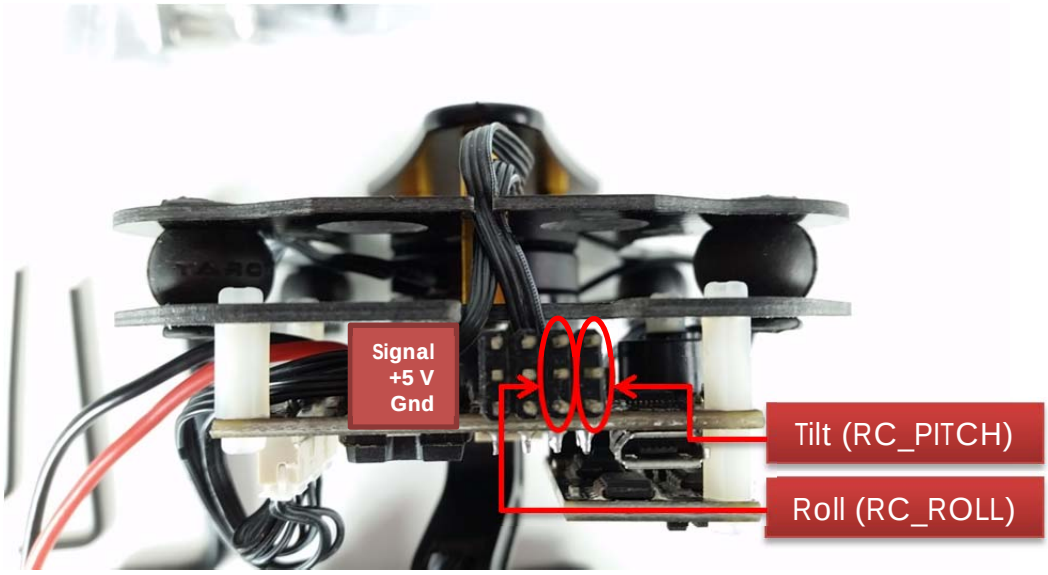
In general a well tuned configuration will net less than 1 degree of error on ROLL, PITCH and YAW axis in normal operation.

Setup for 2nd Operator / Tilt Control

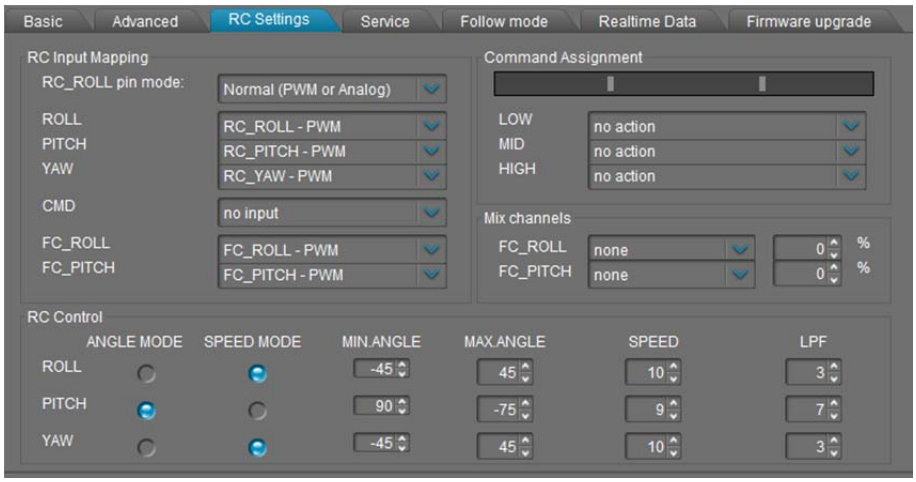
Connecting a RC system to the DYS 3X is optional for pitch/roll/tilt control. Operation with a 2nd operator using a RC system will allow control and aiming of the gimbal independently from the direct physical movements of the gimbal unit.

Several different RC protocols including standard PWM, Sum-PWM and Futaba S-Bus are supported. Setup for each of these control systems is slightly different in the software (for Futaba and Sum-PWM refer to online Basecam Manual for proper setup).

Typical 2nd operator setup using Normal PWM receiver:



RC Settings in GUI



i. **ROLL, PITCH, YAW** – Controls the position of the camera.

ii. **CMD** – Allows you to execute specified actions. Configure your 2- or 3-position switch on your RC transmitter for a specified channel and assign it to the CMD channel. Its range is split into 3 sections : LOW, MID, HIGH. When changing the position of your RC transmitter switch, the signal jumps from one section to another, and the assigned command is executed.

iii. **FC_ROLL, FC_PITCH** – Used to mark any PWM input to be a signal from the external flight controller. (This is an advanced feature that we do not recommend)

RC MIX – You can mix 2 inputs together before applying them to the ROLL, PITCH or YAW axis. This feature enables you to control the camera from two sources, a joystick and RC transmitter, for example. You can adjust the proportion of the mix from 0 to 100%.

ANGLE MODE – The RC transmitter will control the camera angle directly. The full RC range will move the camera from min to max angles, as specified above. If the RC transmitter stick does not move, the camera stands still. The speed of rotation depends on the "SPEED" and acceleration limiter settings.

SPEED MODE – The RC transmitter will control the rotation speed. If the stick is centered, the camera stands still. If the stick is deflected, the camera starts to rotate but does not exceed the min-max range specified. Speed is slightly decreased near the minmax borders to yield steady accelerations. The speed of rotation is proportional to stick angle and the SPEED setting. RC control inversion is allowed in both control modes.

MIN.ANGLE, MAX.ANGLE – Sets the range of angles controlled from an RC transmitter or in Follow Mode. To reverse the control, set the higher value first and lower value second. For example, if you want to configure a camera to go from leveled position to down position, set 0-90 (or 90-0 to reverse movement).

LPF – Sets control signal filtering. The higher the value, the smoother the reaction to stick commands. This filter avoids fast stick movements but add commands. This filter avoids fast stick movements but adds some reaction delay to stick movement.DYS 3XSOFTWARE

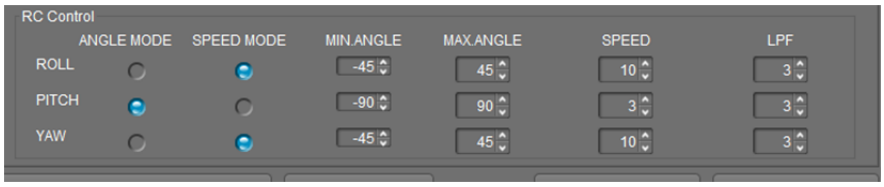
Tilt control setup for DX8 Radio

Typically tilt control on the DYS gimbal for single operator setups is programmed on Aux3 of your DX8 / AR8000 radio. To control the tilt a servo signal wire will connect from your AR8000 receiver directly to the back of your gimbal on the RC_PITCH control input pins (see picture above pg 25.)

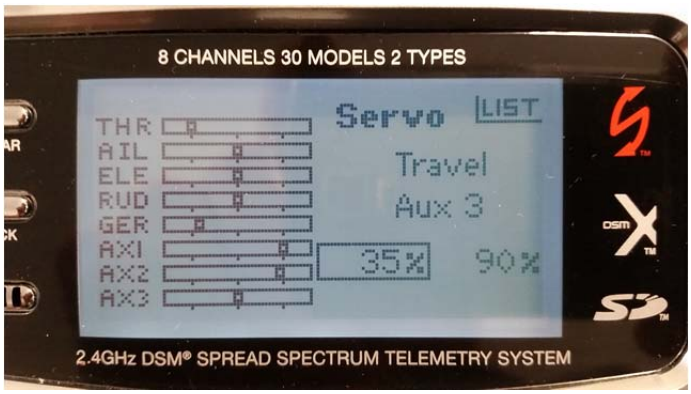
We typically setup the 3-position FLAP switch on the DX8 to control the tilt of the camera. Top position is typically close to 0 degrees facing forward, middle position is about 45 degrees down and bottom position is full 90 degree tilt.

Here are the radio and software settings:

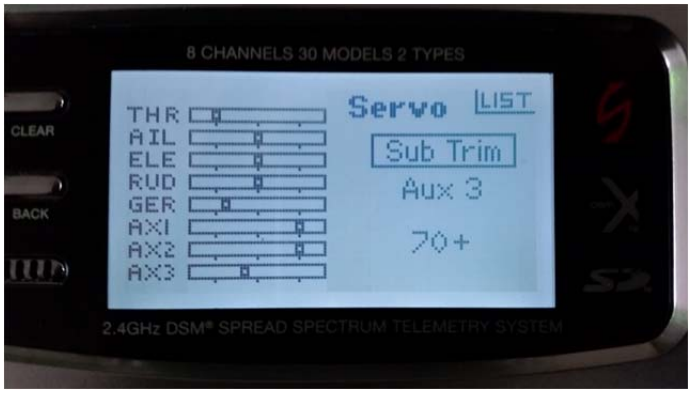
RC Settings Tab (PITCH):



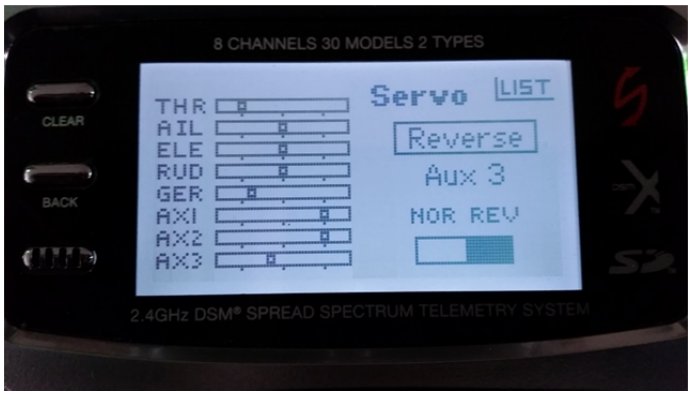
Travel Settings:



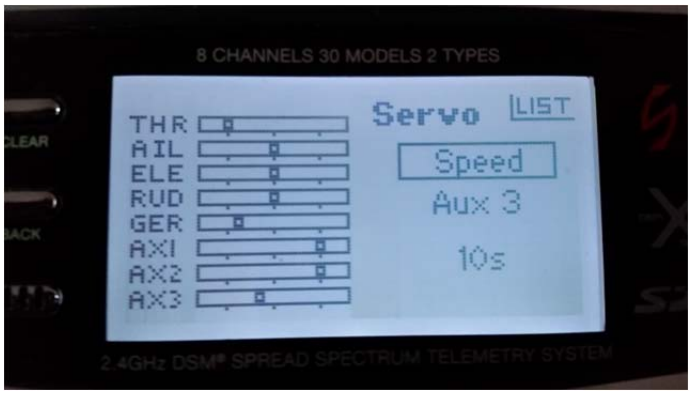
Sub-Trim Settings:



Reverse Channel Settings:



Speed Settings (adjust to preference):



DYS 3X Recovery Procedures

Overview

This section provides instructional steps to bring your DYS 3X back to the original pre-configured settings. In the rare event that you have to reflash your controller due to a corrupt file or erased memory bank you can also use this section as a recovery guide.

Prior to performing the recovery steps your camera should be mounted and balanced and your gimbal should be mounted to the DYS 3X stand so that the gimbal can move about freely on the Roll, Pitch and Yaw axis.

Recovery Steps:

1. Load / Write 2.40B8 Firmware (this can be done using the 2.41B4 GUI in the Upgrade tab)

2. With Motors OFF in GUI, Load and write Backup Profiles 1, 2 & 4.

   Note: IF you did not backup your Profiles please email support and we will send you a copy of each.

3. Connect Battery – Motors Turned OFF in GUI

4. Perform GYRO Cal (Press Cal Gyro)

5. Perform 6-Point IMU Calibration
   https://www.youtube.com/watch?v=Xb64-QisyvE&feature=youtu.be

6. Set Motor Polarity by powering Motors ON and click AUTO (under Motor Configuration Basic Tab)
   a. Gimbal should rotate each axis and identify direction of movement. When complete the

INVERT boxes will be checked or unchecked for proper motor direction.

b. Click Write

7. Copy INVERT values and make sure they are the same for Profiles 2 & 4.

8. Select Profile 1 click write

9. With motors ON and gimbal frame level, go to Followmode tab and Click AUTO in OFFSET section – When finish click write. Make sure these values are the same through Profiles 1, 2 & 4

Troubleshooting

PROBLEM	Possible Causes	Solutions
Motors Don't Spin	• Power Supply is not connected • Power supply polarity is inverted • POWER value set to 0	• Check all connections • Double check POWER settings

Camera trys to stabilize but falls to side	• Camera not balanced
	• There is a broken motor winding or one phase of motor has failed
	• POWER not set high enough
		• Balance the Camera
		• Check Motor windings
		  o Roll/Pitch ABC phase resistance = 14.5-16 ohms
		  o Pan ABC phase resistance = 11.5-12.5 ohms
		• Increase Power Value

During fast YAW rotations, camera horizon deflects on Roll and slowly comes back level	• Bad Accelerometer Calibration • Sensor is mounted crooked / not parallel to motor axis	• Perform 6 Point IMU calibration • Align Sensor Square with Axis
During Fast motion with acceleration, camera deflects and then slowly comes back level	This is normal affects of acceleration	Try to increase Gyro Trust value in Advance tab (default DYS 3X values should not cause this)
Camera slowly drifts by any or all axes just after power on	This is from BAD gyro calibration.	Recalibrate Gyro (5 second press of menu button or through GUI)
High Frequency Oscillations	Sensor Feedback as result of too high D parameter	Check the Realtime Data graphs to determine which axis is problem and lower D value
Low Frequency Oscillations	Sensor feedback as result of too high D or P parameter	Lower P Value, Increase D value
GUI cannot connect to board	Wrong COM port selected. GUI and firmware version mistmatch	Try different COM port – check driver installation. Check Firmware and GUI version