



FLYLINE

INSTRUCTION MANUAL



Thank you for renting a PhotoShip One FlyLine cable cam system. The FlyLine is a point to point cable cam system that is self powered and easy to setup and operate. Most professional cable cam systems require tremendous amount of work to setup on location and require heavy expensive equipment that can take a box truck to haul.

FlyLine has fully adjustable cable pulleys and drive system as well as capability to mount up to four Kenyon KS4 stabilizing gyros for rock solid smooth footage. In most cases however, only one or two Kenyon gyros are required. These systems are point to point (AB) type cable cam systems which use a single cable anchored between two points. They require no heavy expensive and energy hungry ground based winches. The FlyLine systems employ a DC motor on the trolley to "drive" on the cable. They are able to drive up a slope of slightly over 10 degrees at maximum weight of around 15lb. They can travel on a level slope at up to 30lb all up weight. Power is provided by on-board lithium polymer battery packs. It is possible to reach speeds of up to 30mph (50kph) on an unsloped cable or move as slow as 18" per minute (0.5m per minute) for smooth slow motions. *

Braking is done electrically and is known as a Asynchronous Regenerative Braking (ARB). ARB is accomplished with our industrial robot motor driver which means you're putting power back into the battery when you decelerate or apply the brakes. Much like newer electric automobiles now do. The results with ARB are staggering. Putting as much as 50% of the power back into the battery for each acceleration/deceleration pair. The benefit is of course is greater duration/ distance from a set of charged batteries.



FlyLine is able to be controlled wirelessly via a joystick controller with a range of 1km (far greater than you'll run a FlyLine). The camera can also be connected to a wireless video system to send and display camera video feed in real time to an LCD at the camera operator station.

A common question we get is 'How long can it run on a battery?'. The answer is not so simple. You must consider the FlyLine like you would an electric car. The top concern with electric cars is not how long they last, but rather what is the maximum distance it can travel on a charged battery. The same is true with the FlyLine. It is possible to run a distance of 3-7 miles on a single charge. Doubling the batteries on board can extend to 15+ miles. This is of course assuming a level cable and moderate accelerations.

The FlyLine can accommodate a Canon 5D/7D, Nikon D4, Canon C300, Sony FS100/FS700, Red Epic or similar in size camera when equipped with our 3X Pro HD camera gimbal. Our camera gimbals have 3 axis motion. (Pan, Tilt, Roll). The system is controlled via RC airplane/ helicopter type wireless 2.4ghz controllers. One controller is used by a trolley drive operator and one controller is used by the camera operator for composing the shots.

Kenyon KS4 gyros are recommended for extremely smooth wobble free video. We are an authorized Kenyon dealer and can supply these gyros.

Recommended cable is 8mm Dyneema climbing rope. The 8mm Dyneema is rated at 12,000lb breaking strength. When stretched out to 100m and the FlyLine hung on the Dyneema expected tension on the rope shall be less than 1,500lb leaving a safety factor of 8.0. We have tested the FlyLine on a maximum length of 250m with no

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Large trees and scaffolding and light poles or other firmly fixed objects can be used to anchor to provided the objects can withstand 300-1,500lb of pulling tension at the rope connection point (depending on cable length). The longer the cable length the higher the tension on the cable must be. At a length of 150m it should be tensioned up to 1500lb. Of course it is REQUIRED that a qualified rigger calculate the cable and attachment loads and rig as required.

Specifications

- Size: 100 x 65 x 18 cm (including 3X Pro HD camera head)
- Weight: 5kg (with battery and gyros – without camera)
- Max. camera weight: 4.5kg
- Max camera size: 20 x 22 x 25 cm
- Max. speed: 40kph (25mph)
- Max. cable slope: 19% grade (11 degrees)
- Operating voltage: 11-16vdc
- Max amps: 50A
- Regenerative braking: Yes
- Closed loop proportional velocity control: Optional
- Gyro stabilized: Optional



Cable Setup

To operate the FlyLine you must first run a length of cable between two anchor points. As previously mentioned, be sure the anchor points are sufficient strength to support the tensioned cable. To tension the cable between two fixed points like trees or similar you can use a 4 ton manually operated winch as shown to the right.



One end of the cable is attached to one anchor. The cable is run to the winch which is attached to the other anchor. The winch is cranked to apply the proper tension. As rule of thumb, the cable is tensioned properly when the sag at mid-span when loaded with the FlyLine is about 10' per 500' span.



Another method is to use one fixed anchor and one movable anchor. The movable anchor is usually a heavy duty scissor lift, forklift, crane, etc. In this manner you attach the cable to the fixed anchor and the movable anchor and 'drive' the movable anchor backwards to apply proper tension on the cable.



Dyneema/AMSteel rope/cable will usually require re-tensioning once or twice an hour or so after initial tensioning. This is normal and is due to it stretching slightly. Keep watch of the sag and as it increases re-tension the cable accordingly.



The FlyLine operates best and is most efficient when the cable slope is 5 degrees or less. The slope angle is measured from each anchor point. At angles greater than 5 degrees up to 11 degrees the FlyLine will consume much more power when traveling on the upwards slope and also when holding in position. Battery duration can be affected by as much as 2x when operating on cable slopes greater than 5 degrees. For this reason it is recommended to monitor battery voltages often or install battery voltage telemetry. If the battery voltage drops too low and the FlyLine is on a sloped cable, the FlyLine system will shut down and the result would be the FlyLine traveling down the line by itself due to the force of gravity. The FlyLine could impact the anchor point causing substantial damage.

As a safety precaution we have determined a great solution as an emergency stop. We recommend at about 30' from each anchor that you wrap two large sized beach towels around the cable one time and let the ends drape down. These act as emergency stops. In a runaway trolley scenario the FlyLine would impact the towels. The towels wedge in between the FlyLine frames and outrigger pulleys and bring the system to a quick stop without damage to the FlyLine. It is a rather simple but effective solution.

Always consult a qualified rigger before setting up the rope/cable.

Adjusting Drive and Outrigger Pulleys

The center drive pulley and two outrigger pulleys can be adjusted depending on the cable tension. Adjustment of the pulleys will cause the cable to be pushed harder or less hard against the main drive pulley. Since the main pulley relies on tension against the cable it is important to adjust the pulleys properly.

The outrigger pulleys can be mounted in one of three hole selections in the FlyLine side frames. The default is the middle position. To apply more tension on the drive pulley the outrigger pulleys should be placed in the lowest hole selection. For less tension on the drive pulley the outrigger pulleys should be placed in the highest hole selection.

For even more finite adjustment the motor/drive pulley can also be adjusted up or down. The screws for the motor plate are in slots and can support about 20mm of travel up/down. Simply loosen the motor plate screws and adjust the motor/pulley up or down and re-tighten the screws. Usually though, the motor can be left permanently near the middle of the slots with the outrigger pulleys being of sufficient adjustment.

There is no specific formula for determine how much tension the cable should have on the drive pulley but it should be just tight enough that at 5with smooth application of about 75% power input in forward or reverse the drive pulley should not 'slip' on the cable.

Keep in mind weather conditions will affect the amount of traction the drive pulley will have against the cable. If the cable has ice or snow on it, traction can be drastically reduced. Please inspect the cable prior to running in adverse weather and clear snow/ice from the cable prior to operation.

FlyLine Trolley & Camera Head Controller Functions

If you have purchased the FlyLine as our Level III option it will have included two Spektrum wireless RC controllers. These are used to operate the FlyLine trolley and camera head. One person will use the trolley controller and another person will operate the camera head. The trolley operator is to keep visual contact with the FlyLine system at ALL times! Lack of attention to the location of the FlyLine on the cable can result in 'crashing' it into the end anchor points causing substantial damage to the FlyLine and potentially cause harm to persons nearby. We can't stress enough how important it is for the trolley operator to keep vigilant and aware of the FlyLine position.

The trolley controller is determined by looking at the LCD display after powering the unit up. It will display 'Trolley' on the screen. The camera head controller LCD will display 'Camera'. One controller can not be substituted for the other as each one is programmed to work specifically for each function as trolley or camera head. If you are experienced with the operation of a Spektrum DX8 radio system you could reprogram each controller to work as either trolley or camera head operation but we will not cover that in this manual. Those who have advanced experience can change the settings on the controllers at their own risk.

Trolley Controller

The trolley controller uses only one of the joysticks and two of the switches. The left joystick controls the FlyLine trolley motor throttle. The two switches that are used are the 'throttle hold' and 'flight mode' switches. Those switches are programmed such that no matter where the throttle stick position may be, either of the switches can be flipped which will deactivate the throttle stick and will cut the power to the motor. It does not matter which switch is flipped. Either will do the same job as the other. Bot could also be activated with the same result. Think of the switches as an emergency power cut that you can activate to quickly cut power to the motor. We recommend either of these switches to be activated anytime you have the FlyLine on the cable and are working on it (changing batteries, adjusting camera settings, etc). This will prevent the FlyLine from suddenly driving on the cable should someone bump the throttle joystick.

The throttle joystick default position must be neutral (mid-stick). Before powering up the FlyLine it is important that the throttle stick be placed in the middle position. (see FlyLine power up section later in this manual). The throttle joystick is proportional to power output to the motor. In other words, to drive the trolley very slow you would only move the joystick a small amount from the center position. To drive the trolley fast you would move the joystick to the maximum extent.

To stop and apply brakes you will move the throttle stick in the opposite direction. The level of braking power is determined by the amount of deflection in the opposite direction. Plan your braking well in advance. Heavily loaded FlyLine systems and/or operating on a downward slope will require a greater distance to brake to a stop. There's nothing worse than not properly planning your braking and crashing into the anchor point.

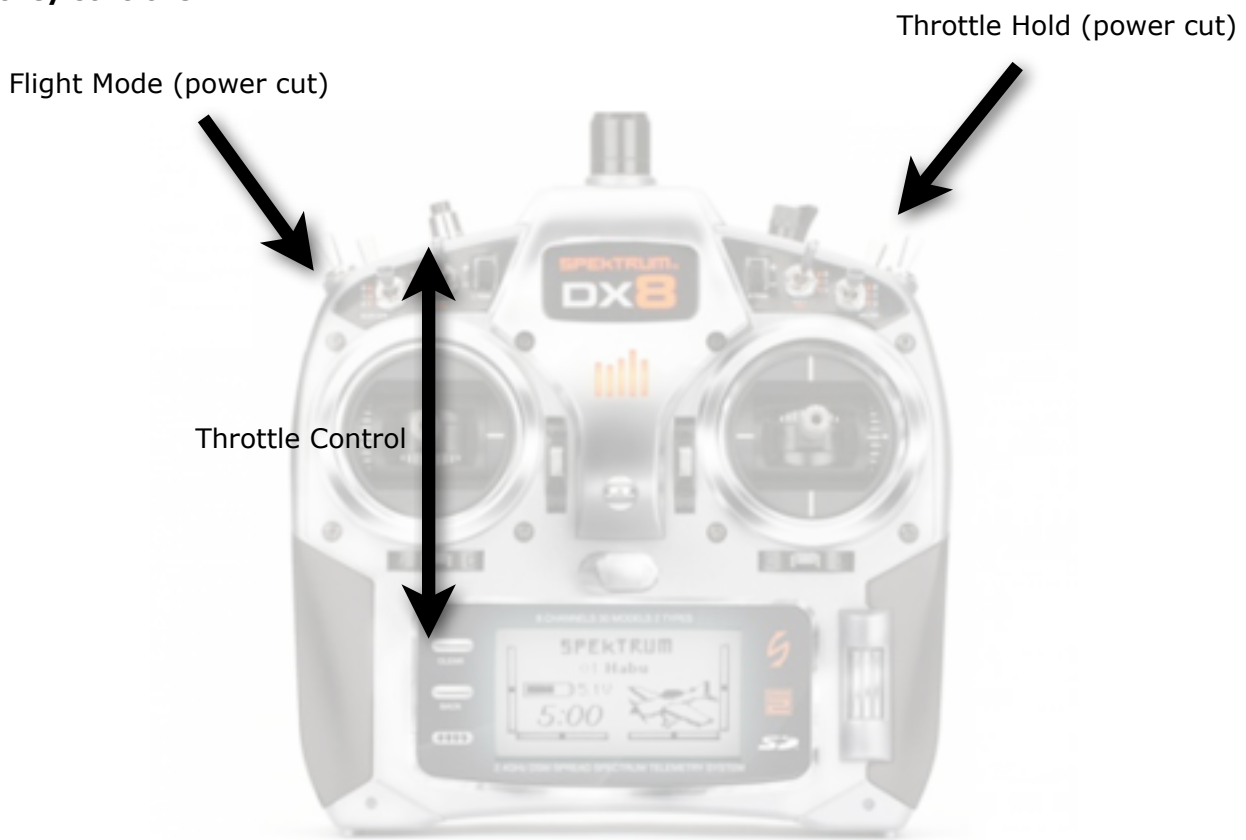
The trolley controller has an integrated real time trolley battery voltage and motor temperature telemetry system. You can view the telemetry data by rotating the rolling selector button on the transmitter to the telemetry screen. If the battery voltage on falls below 12.5v or the motor temperature exceeds 170 degrees F the transmitter will alert with an audible tone and vibration. To stop the alert you must bring the triggered item within allowed range (batteries higher than 12.5v or motor temp below 170).

Camera Head Controller

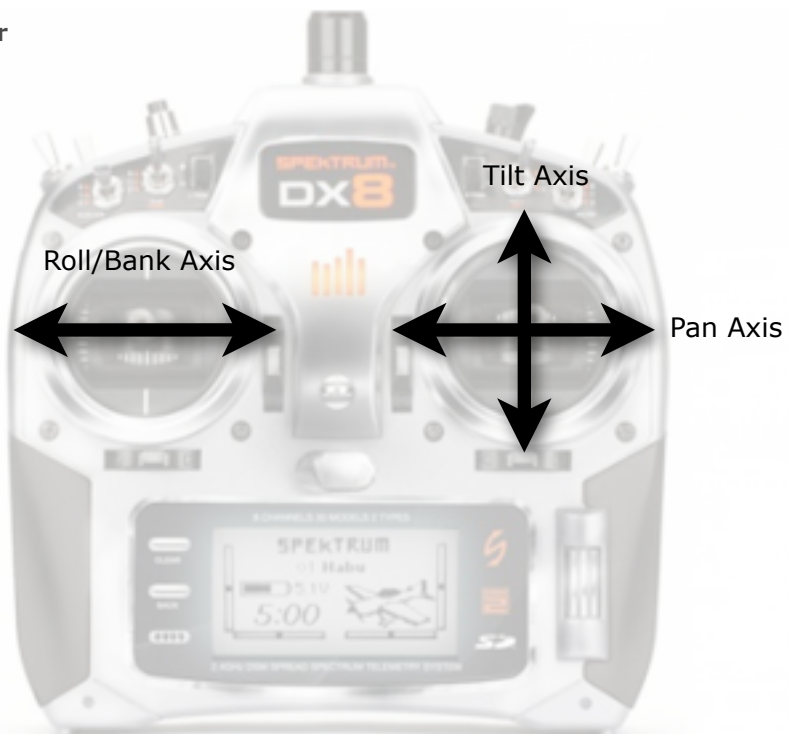
The camera head controller uses both joysticks. The right joystick controls pan and tilt axis. The left joystick controls the roll (dutch/bank) axis. The joystick controls are speed proportional. This means the speed at which the axis is controlled is determined by the amount of deflection of the joystick. Once the joystick is released and back in the center position the axis will halt movement and stay in the position it is in at the moment the joystick is released. If you have never remotely controlled a camera head with joysticks it will likely take some practice to get smooth shots properly composed. Do not be discouraged. It may take a few hours to get the hang of it.

The images below show which controls are used on the controllers.

Trolley Controller



Camera Head Controller



Powering up FlyLine

Proper installation of batteries and powering up of FlyLine is VERY important. Pay particular attention to the instructions to follow!

FlyLine is powered by Lithium Polymer batteries. It uses two 3-cell 11.1v or 4-cell 14.8v batteries. Capacity of the battery should be between 5,000 - 6,000mah. The two batteries are to be wired in parallel, NOT series!. By wiring them in parallel the capacity is doubled. Optionally you may install a total of four batteries for extended run time/distance but keep in mind that adding batteries also adds weight. Added weight consumes more power upon acceleration. In most cases two batteries is sufficient. NEVER let the battery voltage drop below 3.2v per cell under load while operating FlyLine. For a 3-cell battery that is 9.6 volts, for 4-cell that is 12.8 volts. Plan to change the batteries when the under load voltage gets down to 3.3 volts per cell. The trolley transmitter control has real time battery voltage and motor temperature telemetry. When the battery voltage drops below the minimum threshold the transmitter will emit an audible alert and will also vibrate. The same applies if the motor temperature exceeds 170 degrees F. To stop the alert the voltage and or motor temperature must return to the proper range.



FlyLine, when properly configured, has an emergency power cut feature built into the motor driver which will by the flip of the Throttle Hold or Flight Mode switch on the wireless controller transmitter will instantly cut power to the motor and apply light braking regardless of where the throttle stick position is set. This is useful when working on the FlyLine, changing batteries, or simply to stop the FlyLine if you become confused on how to operate the throttle stick (yes, that happens). See the Motor Driver Setup Manual for details on how to configure the emergency power cut feature.

To power up FlyLine follow these steps (in order):

1. Turn on your trolley transmitter (the trolley transmitter will display 'trolley' on the screen, the camera gimbal transmitter displays 'camera') and wait several seconds for it to fully power up and broadcast
2. Activate the Throttle Hold power cut (see FlyLine motor driver setup manual) switch on the transmitter
3. Place the throttle stick in the middle position (the throttle stick is the stick without spring return)
4. Power up the FlyLine by plugging in the batteries
5. Wait at least 5 seconds before attempting to drive the FlyLine
6. The FlyLine is now powered up and ready for operation.
7. Verify the throttle stick is in the neutral position, then deactivate the Throttle Hold switch
8. Apply throttle slowly in either direction to drive the FlyLine. While FlyLine is moving flip the Throttle Hold switch to test the emergency power cut feature.
9. FlyLine is now ready for operation

To power down FlyLine follow these steps (in order):

1. Activate the Throttle Hold power cut on the transmitter
2. Unplug the batteries from FlyLine
3. Turn off the transmitter
4. FlyLine is now powered down.

NOTE - NEVER APPLY FULL THROTTLE TO THE FLYLINE WHEN IT IS NOT ATTACHED TO THE CABLE. The drive wheel can rotate too fast when not under load and damage to the rubber tire in the drive wheel can result.

Charging FlyLine Trolley Batteries

Charging the batteries is very critical. The batteries that FlyLine uses are Lithium Polymer. Improperly charged, they can explode violently and catch fire. When properly charged they are quite safe and provide substantial power to size/weight. FlyLine systems shipped after February 15th, 2013 are equipped with 4-cell 14.8v lithium polymer batteries with cell balance plugs. If you are unfamiliar with balancing of lithium polymer batteries do a bit of reading and watching youtube videos on the subject. You will do well to fully understand the need for and methods of battery cell balancing. We ship with the FlyLine with Hyperion Sentry Lithium battery cell balancers/monitors. We recommend you use them during EVERY charge. To use the Hyperion Sentry you simply plug them into the battery balance lead (the small lead with 5 wires) and set the mode to 'Balance'. See Sentry manual for more information.



To charge the 14.8v lithium polymer batteries place a battery into the included white 'Liposack' and simply plug the Smart Charger into the wall power outlet. The Liposack is made from a special material that will help contain a fire in the event of a foul charge. The Smart Charger can accept 120-240vac (dual voltage). Next, plug the 14.8v lithium polymer battery into the charger's battery charging lead. The connector is polarized and will only fit in the proper direction. Now plug the Hyperion Sentry battery balancer/monitor to the battery balance lead and set the Sentry to balance mode (see Sentry manual). The LED 1 light on the Smart Charger will illuminate as soon as the charger is plugged into the wall power. LED 2 will change color according to the specifications shown below.

NEVER LEAVE CHARGING BATTERIES UNATTENDED! Always disconnect battery plugs by pulling on the plug NOT THE WIRE.

Charger Features:

- Intelligent charger designed for any 14.8V (4 cells) Lithium battery pack including Polymer Li-Ion and Cylindrical Li-Ion with capacity > 6000mAh
- Worldwide input AC power from 100-240VAC, 50-60Hz, USA AC plug
- Built in cooling fan to ensure charger long service life
- Safety protection
 - Over Voltage protection
 - Short Circuit protection
 - Output reverse protection
- Charging Current
 - 6.0 A standard charging rate
- Output: 16.8VDC
- Max Power output: 120W
- Charging time:
 - Charging time = (1.5 x Ah rate of the pack) / 6.0A charge current.
- Built in IC to cut off power automatically when battery is fully charge.
- LED indicator:
 - LED1 = Red = Power On
 - LED2 = Green = No Battery Connected
 - LED2 = Red = Battery Connected & Charging
 - LED2 = Green = Fully Charged
- Note:
 - You must connect charger to AC power before connect to battery pack. Otherwise, the charger will NOT charge the pack and you will not get a RED LED indicate charging.
 - You must connect the battery to the charger within 3 mins after charger's power on. Otherwise, the battery will be discharged.
- Charging terminal : EC4 connector
- Charging terminal: Black = negative, Red = positive
- Included 2 pcs 10.0A replacement fuse
- Dimension (LxWxH): 154mm(6.0") x 95mm(3.7") x 55mm(2.2")
- Weight: 2.0 lbs 1.2Oz (940g)

Charging FlyLine 3X Pro HD Camera Gimbal Batteries



3.7v 14500 batteries & charger

The 3X Pro HD camera gimbal requires 5-8 volts to operate. The wireless video transmitter requires 10 volts. The batteries we use are three 3.7v lithium 14500 size. three together total 11.1volts. They are the same size as a typical AA battery but you may NOT use AA alkaline, or AA rechargeable batteries because AA batteries are only 1.2-1.5 volts. You MUST use 3.7v lithium 14500 batteries.

To charge the batteries remove the battery holder from the 3X Pro HD. It is held on with Velcro. Remove the small screw that secures the battery door, then slide the battery door off the holder. Remove the batteries and place them in the wall chargers. Plug the wall charger into a power socket. The LED lights on the charger will illuminate red while the batteries are charging. When the batteries have fully charged the LED will illuminate green. Once full charged install them back into the battery holder. Take care to install them in the proper orientation. The charger can charge one or two batteries at the same time so place two batteries in one charger and the third battery in the second charger.

Do NOT use the charger to charge rechargeable AA nicad or nimh batteries! The charger is to be used for 3.7v lithium batteries only! Damage to the batteries or charger WILL occur.

Charging Gaii Vision LCD Receiver Battery

The Gaii Vision wireless video LCD receiver has an integrated 11.1v lithium battery. There is a multicolored set of wires with a white plug that exit the metal box on the back of the LCD. This is the battery charging plug. Simply plug it into the 3 cell port on the Titan B3 battery charger. The 3 led lights on the charger will illuminate red while charging and will change to green when complete. if you run the battery dead on the LCD and can not wait for the battery to charge you may use the Titan B3 charger as a power supply as well. It will power the LCD monitor and charge simultaneously.



Gaii Vision Wireless Video Operation



The Gaii Vision is a standard definition NTSC/PAL microwave video transmission system. It is intended to be connected to your camera's composite 'Video Out' connector. It will not work with SDI or HDMI signals. If your camera has only SDI or HDMI output you'll need to use a signal converter to NTSC/PAL composite (not included).

Gaii Vision works on 5.8ghz frequency. 5.8ghz can be susceptible to 'line of sight' interference. Thus, it is important that no objects are in line with the transmitter antenna and the LCD receiver. Objects such as trees, vehicles, or other structure can cause loss of signal quality. Also be sure no other devices that operate on 5.8ghz are in the vicinity of the Gaii Vision transmitter or receiver.

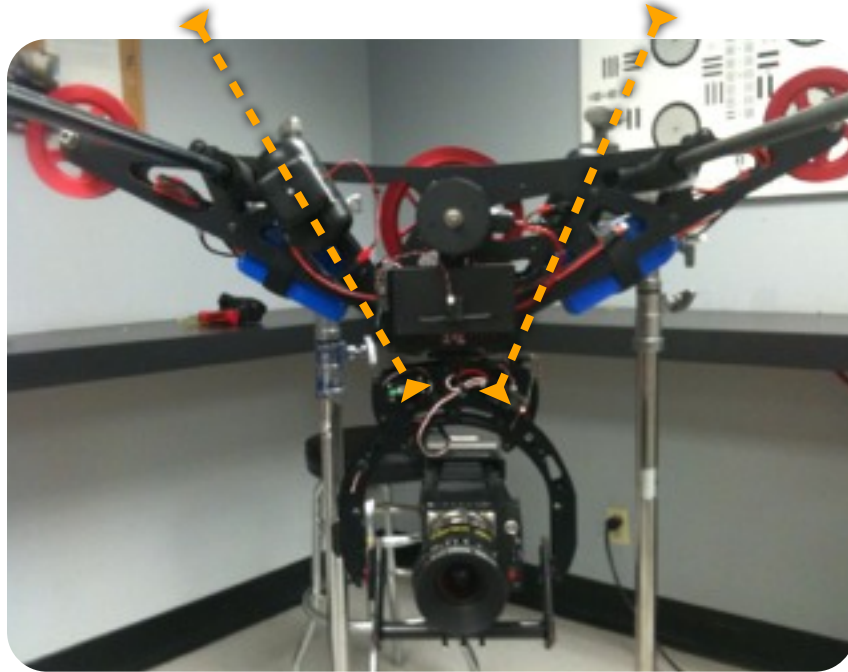
If you have powered up the transmitter and have a valid video signal connected and you see only a blue screen on the LCD check to make sure the LCD input is on the proper selection. The silver button on the far left of the LCD will toggle the inputs. Also make sure the transmitter unit and the receiver unit are set to the same channel. You can change the channels by inserting a paperclip into the small hole and pressing the button to toggle through the channels on both the transmitter and receiver. A red LCD display will show the channel number. be sure they match.

To turn on or off you MUST use the switch on the metal box on the back of the LCD. Turning off only the monitor with the button on the front will not turn off both the monitor and the receiver. Damage to battery can result.

Installing Kenyon Gyros



The FlyLine trolley can be equipped with Kenyon KS-2 or KS-4 gyros. The gyros have integrated power inverter and need only to be plugged into the small red connector on the FlyLine labeled 'GY'. The mounting screw of the gyro will attach to one of the FlyLine hexagonal spacers. One gyro is mounted on the side the motor protrudes from and the other gyro is mounted on the other side. It is important that the gyros be installed at the proper orientation. The gyros must be rotated about 20 degrees to one another for the best stabilization. See below.



We recommend using a separate battery to spool up the gyros to proper operational speed then install the batteries you will use to run the trolley. The spool up period takes about 10 minutes. The reason to use a separate battery is because the gyros will consume more power during spooling up than at normal operation and using a separate battery other than the main trolley batteries will extend the running time of the trolley.

Take care when handling the Kenyon gyros while they are in operation. Moving them too abruptly will cause the internal clutch to release. It is not a problem if the clutch releases as that is it's design but it is best to keep it to a minimum. Do NOT drop or handle the gyros roughly. They are finely built devices and can be damaged by rough handling.

Thanks for renting the FlyLine. Please contact us if you have any questions or concerns. Please complete the equipment checklist when packing the FlyLine for return. Return FlyLine to:

PhotoShip One, LLC
1849 S. 96th St.
Mesa, AZ 85209
602.743.5768
design@photoshipone.com