Trouble shooting continued..

Symptom	Cause	Solution
Camera does not follow head tracking	Head tracking not on (no audio clicks from headset when moving head) Command board not on same channel as headset	Hold head steady and depress function switch (should hear a beep) Set command board channel switch to headset
Camera not pointing straight:	Accumulated error over time User changed position Servo center not adjusted correctly	Depress headset function switch to re-center camera Center head tracker and adjust pots on Command Board to tweak center pt.
Camera drifts off to side	Bad biasing on head tracking gyro Bad gyro reading	Wait 2 seconds, turn head back and forth to 45 degrees. and/or: Hold head steady, depress function switch to re-bias gyro
Camera movement erratic	Other 433 interference Exceeding range	Reduce operating range Ensure 433 TX antenna is upright and not damaged
Camera movement not smooth	Servo gear damaged	Replace 9g servo.

Warranty

Due to the intended use, the system is warranted for 30 days defective workmanship and only if the system can be returned in new condition.
The video headset will be warranted for repair for 2 years if no signs of excessive use. Buyer will be responsible for shipping costs. If beyond the warranty period Fat Shark will provide repair services.

PRODUCT WARNING

IF YOU CANNOT ACCEPT THE FOLLOWING LIMITATION DO NOT BUY THIS PRODUCT OR RETURN UNUSED IMMEDIATELY:
THE FOLLOWING IS JUST A PARTIAL LIST OF 2.4 GHZ DEVICES: X10 CAMERAS, BABY MONITORS, WIFI, WIRELESS SPEAKERS, CORDLESS PHONES, BLUE TOOTH, MICROWAVE OVENS, SPEKTRUM RC CONTROLLERS, WIRELESS GAME CONTROLLERS, WIRELESS KEYBOARDS, WIRELESS HEADSETS.

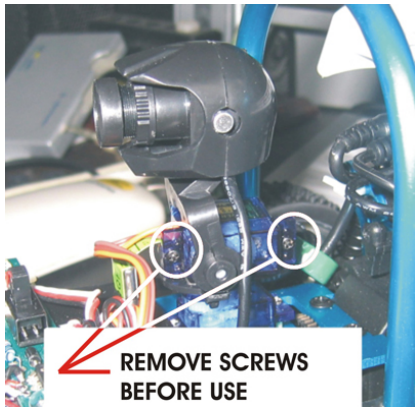
PRODUCT CANNOT BE DEEMED DEFECTIVE DUE TO INTERFERRENCE WITH OTHER DEVICES. THIS IS BEYOND THE CONTROL OF THE MANUFACTURER.

DO NOT LEAVE HEADSET EXPOSED TO DIRECT SUNLIGHT. SUNLIGHT WILL MAGNIFY THROUGH THE OPTICS AND BURN HOLES IN THE LCD SCREEN. THIS WILL NOT BE COVERED BY WARRANTY

FPV RC RACER

Quick start

1. Prepare batteries:
   (a) Charge car battery pack according to car manual charging instructions.
   (b) Install fresh batteries in the headset and RC controller.
2. Remove 2 screws from pan mechanisms. These screws are for shipping and setting of double sided foam tape. Tape is used to hold camera in place and will allow the camera to dislodge from mechanism in advent of impact to minimize camera and/or servo damage. When tape adhesion becomes too low, replace. Use screws to hold mechanism in place while adhesive sets.



3. Extend antenna on RC controller and turn on (turn on radio before car to prevent run away or errant movement).
4. Turn on car, (switch by driver steering wheel)
5. Turn on video headset by switching to the 2nd position (NORM).
6. Ensure the camera transmitter and headset are on the same channel.
7. You should now see the camera image in the headset.
   NOTE: QVGA headset will appear dark until it acquires a solid image (up to 3 seconds)
8. **While keeping the headset steady depress the HT reset switch once (best if placed on table – tracking won't start until a stable reading is registered from the gyros)** After a few seconds Headset will beep which indicates the head tracking is activated.
9. Drive

The User is responsible for operating this device in a legal and responsible manner.

Trouble shooting

Symptom	Cause	Solution
Picture not clear	Channel selection on TX not same as on headset.	Ensure both TX and headset are on the same channel
	Another 2.4GHz device is operating nearby	Change your location or change channel
	Objects or people are between you and the TX	Ensure a clear line of sight between TX and headset
White horizontal static lines	Interference from other 2.4Ghz equipment.	Change channel
		Change location
Range not far	Interference from other equipment	Change location
	Head set antenna not installed	Ensure antenna is firmly seated onto SMA connector
Image is fuzzy	User is near sighted (optics is set for focusing at 2m distance)	Wear contact lenses.
	Interpupillary distance not suitable to your face	Adjust IPD sliders
	Camera lens out of focus	Adjust camera lens (and ensure locking ring is snug)
Lens fogs up	Temperature difference between your face and the headset lenses causes condensation.	Wear headset on head during prep to allow lens to head up to your body temperature. Apply anti-fog solution to lens
Image is black	Setting not on NORM (for receiving camera image	Set channel position on NORM for wireless use and AV in for RCA cables
	Lens cap not removed from camera	Remove lens cap
Poor image or lots of lines	Low headset battery	Battery pack must output at least 3.65V for proper operation.
	Interference	

RCV922 Headset

Optics:
- FOV 46 degrees diagonal
- Interpupillary (IPD) distance: 60.5mm – 68mm
- Image size: 80" @ 7'

Audio:
- Stereo (volume adjustment on earphone cable)

User Controls:
- 4 channel selection
- Contrast/brightness

Electrical:
- Power supply: 3.65 - 5V
- Power consumption: 230/450mA (direct/wireless)

System: NTSC/PAL auto select

Mechanical:
- Ergonomic molded shape. Foam seal for comfort and ambient light reduction.
- Weight: 150g (without battery) Adjustable headband

Display
- Two full color micro LCD's
- Color arrangement: RGB stripe
- Resolution 922,000 pixels per eye
- 640 X 480 lines (VGA)

Interface
- 2.4 Ghz, 4 channel receiver
- 3.5mm RCA port

Head tracking:
- 2 axis gyroscopic
- 433Mhz direct link
- FHSS (digital frequency hop)

Transmitter

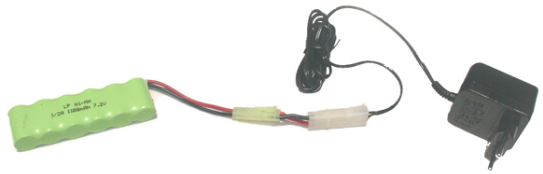
- Transmitting power: 10mW
- Power consumption: 50mA
- Transmit distance: 100m line of sight
- Channels: 4, synchronization of stereo audio and video
- Transmitting frequency: 2.4Ghz,

Contents Checklist:

Video Headset with integrated head tracking.
Headset battery pack (holds 3 AAA size batteries)
Earphones with adjustable volume control
120cm AV cable (male RCA terminated)
2.5 dBi headset antenna
2.4Ghz AV transmitter (pre-mounted on RC Racer)
5V TX power supply
30cm AV cable (female RCA terminated)
FPV RC Racer
3ch RC radio
7.2V NiMh RC battery pack
9V RC battery charger
FPV manual
RC car manual
Extra set eye foam for custom fitting
Extra set pan/tilt brackets for replacement

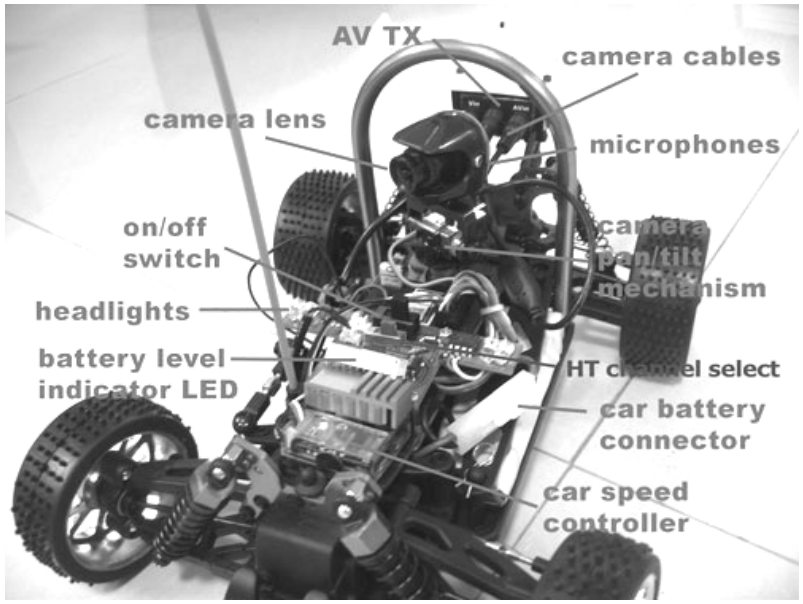
Power Supply Uses

(1) Battery Charger: Used for charging 7.2V car battery pack



(2) TX power supply: used for powering the TX when removed from the FPV Racer and connected to alternative video sources

FPV Racer Product Overview:
The FPV RC Racer consists of 3 primary components:
(1) RC Car, (2) Video Headset and (3) RC Radio.
The following provides a detailed description of the function of the RC car and the video headset. The RC radio is independently covered by its own manual.



(1) FPV RACER CAR COMPONENTS:

AV Transmitter (TX).
The AV TX is the 2.4Ghz, 4channel transmitter that mounts onto the back of the car. It transmits the camera image direct to the video headset. It is imperative that the AV TX and the headset RX are on the same channel. The AV TX can be removed from the RC car and connected to other video sources to wireless transmit to the video headset.

Helmet Camera.
The helmet camera comes with a 3.6mm wide-angle lens. The camera is a high resolution 420 TVL for crisp images. The camera connects directly to, and is power ed off the AV TX (the TX in turn is powered off the FPV Command Board). The camera cable splits into a power connector and a 3.5mm AV connector – ensure both connectors are correctly and completely inserted into the TX.
On either side of the helmet is a microphone to pick up stereo sound. Due to the proximity of the motor, microphone sensitivity is quite low.

AV in: Connect 3.5mm AV cable here (or FPV Racer camera cable)
Power out: Connect 3.5mm camera cable here. Note: Vout is 3.3V
3.5 – 9V in: Connect power supply or battery here. LDO voltage regulator accepts large voltage range

AV IN/OUT PORT (headset and TX)
AV Cable Pin Out

	1	2	3	4
Fat Shark, Archos, Gigabeat, Creative Zen Vision Series, Cown iAudio, Apple iBook	Ground	Video	Right	Left
Standard Camcorder Cable	Right	Ground	Video	Left
iPod Video	Video	Ground	Left	Right
Zune	Video	Ground	Right	Left

Yellow: Video White: Audio Left Red: Audio Right

Recording Video
Connect RCV922 AV cable to AV out port on underside of headset. Connect recording device to cables and set up as per manufacturer directions. Note: Cables pins are not all the same (see above chart), be sure to connect to RCV headset using the included cables.

Head Tracking Operation:
Inside the headset are sensors that monitor the head motion on 2 axis (pan and tilt). The head motion information is transmitted direct to the RC vehicle via a 433Mhz transmitter. The headset channel switch simultaneously switches the 2.4Ghz RX and the 433Mhz TX. On the car, you must change the 433channel switch and the AV TX channel switch. The head tracking is activated (and re-centered) by depressing the function switch.
Since the head tracker has no external fixed reference, the gyro will slowly drift towards center to compensate for accumulated errors.
The centering drift does not happen at the maximum servo angle (so you can steadily look left or right at maximum camera angle without incurring drift correction – useful for track racing where you are routinely turning a dominant direction).
The center point is continuously recalculated based on head movement. While driving, you can correct the center point by turning your head left and right about 45 degrees. This will re-bias the center point. If still not centered, continue to look straight and let the camera drift back to center point. Even with the self-centering calculations it may occasionally become necessary to manually reset the center position by depressing the Function button.

Starting the Head tracking:
Depress the function joystick down once and wait for the headset to emit beep sequence before moving. The headset must read the gyros without movement before starting, if the headset is moving, the HT will never start. Best if can be placed on fixed surface like a table to start the tracking. Allow up to 4 seconds for the HT to start.

Transmitter Controls:

.

4 Channel switch: Note channel number positions

Camera lens is held in place by a locking collar. Vibration may loosen lens and become out of focus. Ensure locking ring is snug.
Pan/ Tilt Mechanism
The helmet camera is mounted onto dual 9g servos for pan and tilt motion. The range of the servos is 90 degrees (45 degrees from center). Servos may become damaged with repeated impacts; they can be replaced with any standard 9g servo (providing the servo gear head is the same diameter).

FPV Command Board
This is the heart of the FPV racer, it is a multifunction board that houses the 433Mhz head tracking receiver, pan/tilt controller, low battery LCD display, headlights and provides power to the AV TX and camera. The master on/off switch controls all the independent components. The pan/tilt servos are connected to the Command Board (not the RC RX).

The headlights are controlled by the accessory channel of the RC receiver (the 3 pin cable plugs into channel 3 of the RX and is controlled by the accessory switch on the RC radio). **Note; it is critical that the headlight connector is plugged into the RC RX.** The ground wire of the connector completes the Command Board ground circuit back to the battery (via the RC RX)

The battery power display is a LED bar graph that indicates battery voltage, it can be viewed through the camera when the driver looks down.

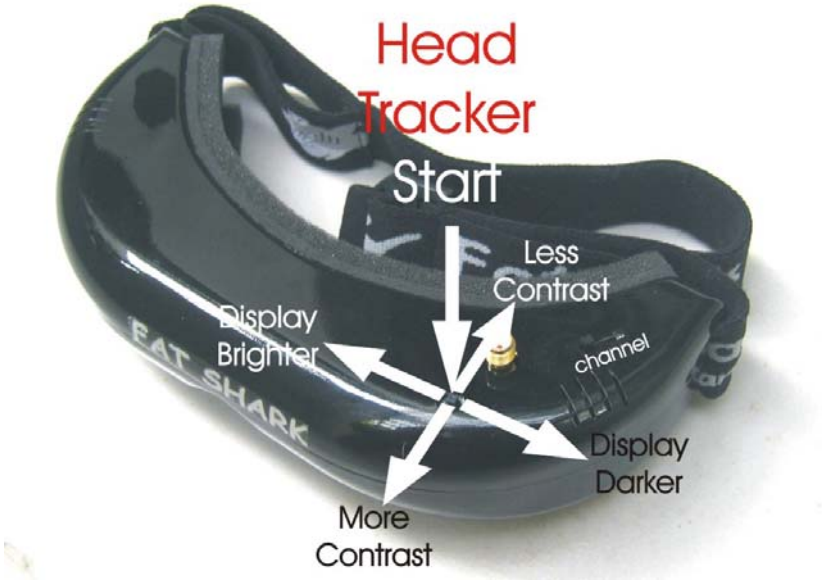
Due to variations in the center position of servos, the Command Board has 2 pots that can be tweaked to make the center point of the camera image match the center point of the head tracking pan and tilt. To adjust, center the head tracking and adjust the servo pots so the camera is looking dead center.

Speed Controller
The function of the speed controller is to control the motor speed via input from the RC receiver. The speed controller provides power to the RC receiver and the FPV Command Board. This is similar to any standard speed controller except that instead of having its own independent on/off switch, it is terminated with a connector so the on/off function is controlled by the Command Board.

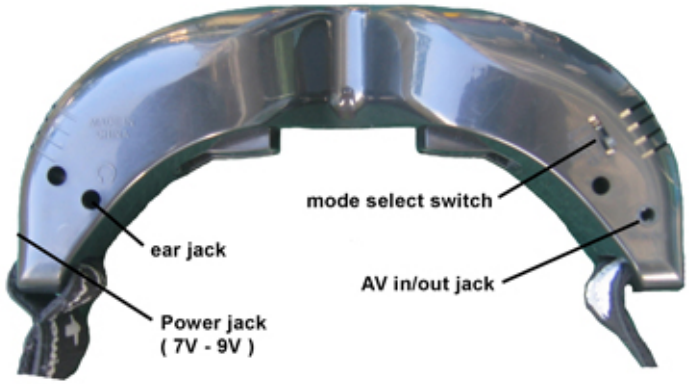
RC RX
The RC RX is a 3 channel RX that controls steering, speed and accessory (headlights). There is nothing special about the RC radio (RX and controller) except that it is 3 channels. The RC radio functions independently from the rest of the car and can be swapped out with other RC radios – PROVIDED IT IS NOT 2.4GHZ. 2.4Ghz controllers will be affected by the 2.4Ghz AV transmitter.

7.2V RC Battery
The FPV RC Racer comes equipped with a 7.2V NiMh battery pack and charger for decent performance. The car performance can be vastly improved simply by upgrading to a 7.4V Lithium Polymer pack (available from all hobby stores). We strongly recommend you become familiar with driving the RC car with the 7.2V battery first.

(2) VIDEO HEADSET OPERATION



Channel Select Switch: Changes channels
SMA connector: Antenna attachment
Function stick (5 position switch): center press is head tracking start/re-center. On RCV922, pressing the control switch in the four side directions controls display brightness and contrast (RCV230 has no display controls)



Mode Select Switch:
Position 1: Off
Position 2: AV out. For recording video (not using video glasses) LCD is turned off, receiver is on and can output the camera image via the AV cable for viewing on an external display of recording device
Position 3: NORM. Wireless operation. LCD will display camera. AV port can simultaneously output video image (connect the included AV cable).
Position 4: AV in. Direct connect operation. Receiver is off and video can be fed to the headset display via AV cables (for viewing portable media players or direct connect to home game systems).
Ear Jack: To connect earphones. Volume adjustment on earphone cable.
AV in/out Jack: To connect AV cable
Power Jack: Connect 3.7V – 5V in

For maximum distance it is very important that a clear line of sight exists between the transmitter and the video headset. 2 of the worst causes of interference are human bodies and reinforced concrete.

It is normal for the headset receiver to become warm to touch during use (particularly in the antenna region and top middle).