

FOXTECH™

*FLY HIGHER &
SEE FARTHER*

**ALL-IN-ONE GOGGLES
USER MANUAL**

FV01

Before the use of this FPV system, please read carefully this manual
and keep it properly for future reference.

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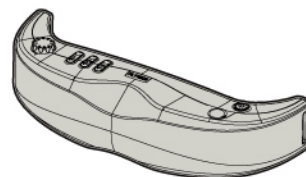
NOTICE

- The FPV system cannot be used unless it conforms to the local laws and regulations on wireless application and can be used only for models.
- If this product undergoes the modification, adjustment and parts replacement by others rather than us, we will not bear any consequence resulting therefrom.
- Never use this product in the environment having same frequency; otherwise, the consequence of troubled flying will occur due to interfered images.
- Please carefully check and test the functions of this product before use; Do not take off before these functions are tested normal.

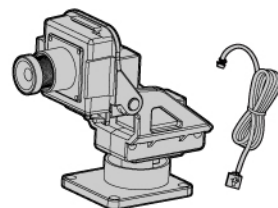
START GUIDE

1. Wireless Video FPV Introduction
 - The full name of WIRELESS VIDEO FPV is First Person View of the Wireless Video, which is called "FPV" in short.
2. About the Components of FPV System

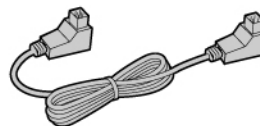
① GS920 Glasses (1)



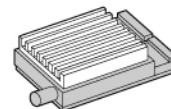
② CM210 video camera (1)



③ Data cable (1)



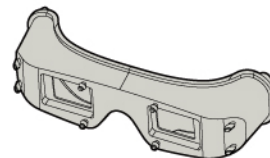
④ TS321 2.4G wireless AV transmitter (1)
TS351 5.8G wireless AV transmitter (1)



⑤ Antenna (2)



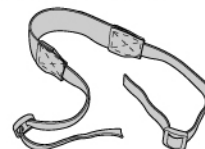
⑥ Shade (1)



⑦ AV cable



⑧ Elastic Bandage (1)



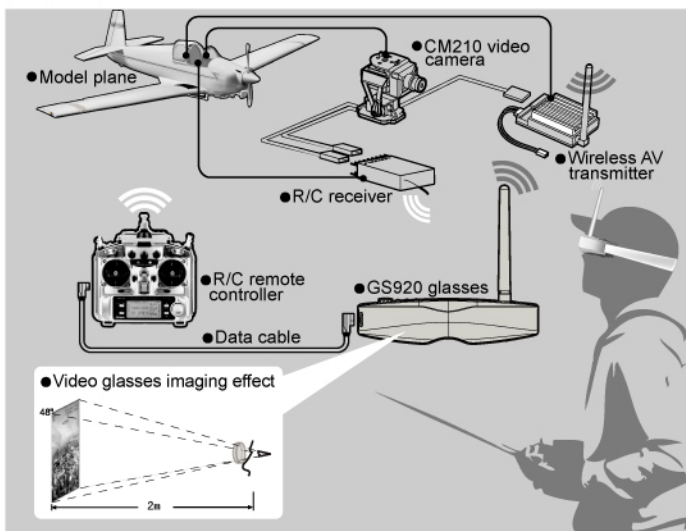
3. Working Principle of FPV System:

① This system consists of two modules:

- Video camera and transmitter module: On the plane model, a video camera and an video transmitter are installed; the video camera has an electrical pan-tilt that can move upward, downward, leftward and rightward; and the pan-tilt controls the upward, downward, leftward and rightward movements according to the glasses' head tracking signals received by R/C receiver.

- Reception and display module: The operator wears glasses that are inbuilt with a wireless AV receiver and a virtual large screen real-time image display. The glasses and the R/C remote controller are connected via a data cable. The R/C remote controller supplies power for the glasses via the data cable while the glasses send the output signals of the head tracker to the R/C remote controller; then the remote controller transmits in wireless manner the head tracker signals and model control signals together to the R/C receiver on the model; the videos and audios taken by the video camera on the model plane; then the glasses can receive the video and audio signals transmitted from the model plane within certain distance. The operator wearing glasses can view images from the virtual display in the glasses and hear sound from the headset in the glasses. With this FPV system, the operator can have virtual flying experience.

② Work principle diagram:



4. R/C Device Compatible with FPV System

- ① The models of the R/C remote controller supported by this FPV system include FUTABA FF-7, FF-8, FF-9, T9Z, T12MZ and T14MZ. For other types of RC controllers, please consult the distributor.
- ② The operation demonstration in this manual uses FF9 R/C.

INSTALLATION

1 Install Glasses Antenna (as indicated in Fig. 1)

- According to the working frequency, choose a 2.4GHz or 5.8GHz antenna and install it onto the SMA port of the glasses by turning it tight. The antenna shall keep in vertical state.

2 Install Transmitter Antenna (as indicated in Fig. 2)

- According to the working frequency, choose a 2.4GHz or 5.8GHz antenna and install it onto the SMA port of the transmitter by turning it tight. The antenna shall keep in vertical state.

Fig. 1

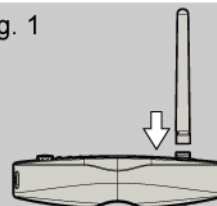
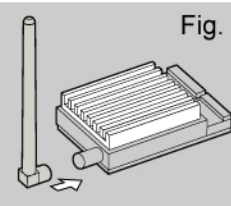
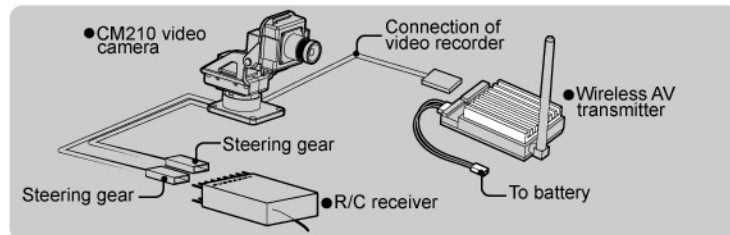


Fig. 2

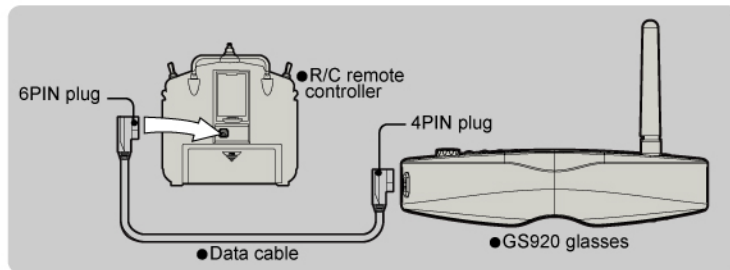


3 Install Transmitter, Camera Head and R/C Receiver



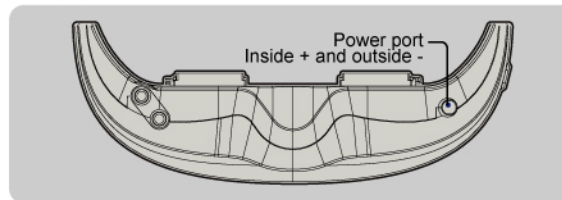
4 Install Glasses and R/C Remote Controller:

- Firstly, power off the R/C remote controller, insert the 4PIN plug on one end of the data cable into the data socket of the glasses, the 6PIN plug on the other end of the data cable into the DSC socket on the back of the R/C remote controller.



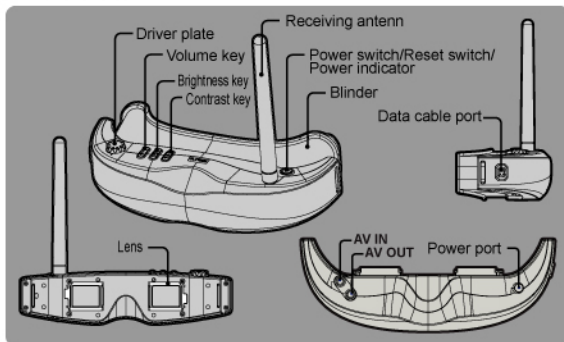
5 The glasses are powered externally

- The glasses can work with external power supply provided by the R/C remote controller via the data cable. If no R/C remote controller is used for power supplied for the glasses, the external power port of the glasses can be used for the power supply for the glasses. The voltage of the external power supply shall be at 8-13V. And the specs for the power port of the glasses are 2.5mm, positive inside and negative outside.



OPERATION GUIDE FOR VIDEO GLASSES

1. Schematic Diagram of Glasses:



2. Power on/off Video Glasses:

- Press the power key on the glasses for about 3s to power on the glasses; in such case, the power indicator will be on; press the power key on the glasses for about 3s again to power off the glasses; in such case, the indicator will be off.

3. Menu Function Explanation :

- ① Turn the driver plate to the position of "0", then the screen of the glasses will display the main operation menu:

1. RX frequency --- 2.4GHz
2. PAN CH select --- CH5
3. TILT CH select --- CH6
4. PAN range ----- +/-45°
5. TILT range ----- +/-45°
6. Color
7. AUTO correct-----ON

② The functions of keys in the Menu

- Volume increase key moving among menu items
- Volume reduce key moving among menu items
- Brightness increase key confirm
- Brightness reduce key back to previous menu

- ③ Turn the driver plate to the position of non-zero and then exit from the main operation menu.

1) Functions explanation

- ① **1. RX frequency----2.4GHz** Set working frequency at 2.4GHz/5.8GHz: If 2.4GHz is chosen, the glasses can receive 8 channels of wireless AV signals with frequencies at 2.4GHz; If 5.8GHz is chosen, the glasses can receive 8 channels of wireless AV signals with frequencies at 5.8GHz.
- ② **2. PAN CH select CH5** PAN CH select CH5 Set head tracker signal output channel of PAN axis: choose CH5 and insert the servo head of PAN servo of the pan/tilt to the CH5 of RC receiver.
- ③ **3. TILT CH select----CH6** Set head tracker signal output channel of TILT axis: choose CH6 and insert the servo head of TILT servo of the pan/tilt to the CH6 of RC receiver.
- ④ **4. PAN range----- +/-45°** Set the sensing range of PAN axis of head tracker +/- 45° : The maximum testing angle in horizontal direction is 45°. +/- 90°: The maximum testing angle in horizontal direction is 90°.

- ⑤ **5. TILT range----- +/-45°** Set the sensing range of TILT axis of head tracker +/- 45° : The maximum testing angle in vertical direction is 45°. +/- 90°: The maximum testing angle in vertical direction is 90°.

- ⑥ **6. Color** Set the color saturation level of the display

Press volume increase key to increase color saturation level of the display

Press volume reduce key to reduce color saturation level of the display

- ⑦ **7. AUTO correct-----ON** the automatic compensation of the head tracker

ON: When the sensed head tracker movement angle deviates more than +/- 40 from the actual movement angle, the goggle compensates the movement angle to actual angle.
 +/- 20: When the sensed head tracker movement angle deviates more than +/- 200 from the actual movement angle, the goggle compensates the movement angle to actual angle
 +/- 10: When the sensed head tracker movement angle deviates more than +/- 200 from the actual movement angle, the goggle compensates the movement angle to actual angle
 OFF: Auto correction function is then disabled.

4. Volume, Image Brightness and Contrast Adjustment:

- ① For the following operations, make sure the driver plate is not at the position of "0".
- ② Volume adjustment: Press the volume key "+" to turn up, "-" turn down.
- ③ Image brightness adjustment: Press the brightness key "+" to brighten images, and "-" to darken images.
- ④ Image contrast adjustment: Press the contrast key "+" to increase contrast, and "-" to decrease contrast.

5. Glasses Wireless Reception Channel Adjustment:

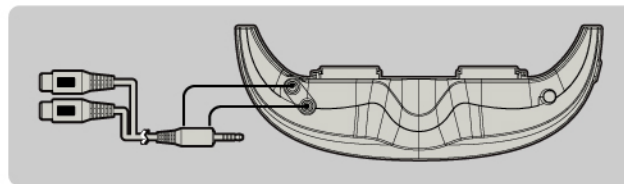
- ① If the transmitter uses 2.4GHz, in the menu settings of the glasses, choose the frequency 2.4GHz; if the transmitter uses 5.8GHz, in the menu settings of the glasses, choose the frequency 5.8GHz.
- ② Rotate the driver plate to choose 1-8 reception channels and make sure the channel number of the glasses is the same as and consistent with that of the transmitter.
- ③ During testing, if bad image quality occurs due to interference, switch to the other channels to avoid such interference.
- ④ It is noticeable that, during flight, you cannot adjust the channel of the transmitter, so, before flight, test the useable channels.

6. Use of Glasses AV in/out:

- ① AV in: The composite video signals and analogue audio signals from peripheral devices (such as DVD, MP4) are input the AV IN socket of the glasses; the operator can see the images on the screen of the glasses and hear the sound from the headset of the glasses.
- ② AV Out: The AV signals received in wireless manner by the glasses will be outputted from the AV OUT socket of the glasses via AV cable, connected to DVR or screen to display images and make sound.
- ③ Use of headset: By inserting a standard 3.5mm headset into the AV IN socket of the glasses, you can hear the sound received by the glasses in wireless manner.

7. Replacement of dispersing lens (optional):

The design of the glasses allows for replacing lens in order to facilitate those with short sight. The dispersing lens is optional and include such specifications as 200°, 400° and 600°.



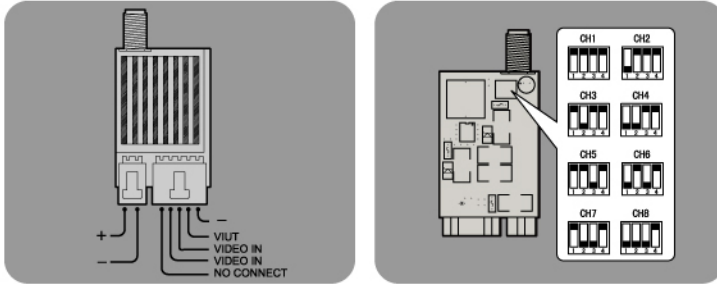
OPERATION GUIDE FOR VIDEO CAMERA AND TRANSMITTER

1. Power on/off Video Camera and Transmitter:

Insert the power plug into the battery socket to power the video camera and transmitter while pull the power plug out to power them off.

2. Wireless Transmitter Channel Adjustment:

Adjust the toggle switch to adjust among Channels 1-8.



3. Video Camera Lens Focus Adjustment:

- When the screen of the glasses displays unclear images, rotate the lens with hand to adjust the focus until the images are clear.
- When the images are unclear due to the dirt on the lens, clear the lens with soft cloth or other special tools.

REMOTE CONTROLLER PARAMETERS

The instructions in this manual adopt FUTABA T9CHP R/C remote controller.

1. Set Video Camera Pan-tilt Working Channel

- If the pan-tilt of the video camera is set at CH5, CH6, then set [TRAINER]5CH, 6CH of the R/C remote controller at FUNC.

```

<TRAINER> 1:AIL OFF
            2:ELE OFF
▶ OFF      3:THR OFF
            4:RUD OFF
CH5:AUX2   5:GEA FUNC
▶ OFF     6:FLP FUNC
            7:AU1 OFF
            8:AU2 OFF
    
```

2. Set R/C Remote Controller DSC Function

- When the DSC switch H of FF9 is pulled to the upward position, then the screen will display "ON". During use, H switch should be kept at ON.

```

<TRAINER> 1:AIL OFF
            2:ELE OFF
▶ ON       3:THR OFF
            4:RUD OFF
CH1:AIL   5:GEA FUNC
▶ OFF     6:FLP FUNC
            7:AU1 OFF
            8:AU2 OFF
    
```

START USING FPV SYSTEM

1. Image Reception and Sound Test of Wireless Transmission:

- Power on the video camera, the transmitter and then the video glasses, adjust the channel numbers of the video glasses and the transmitter until they become the same. In such case, you can see the videos taken by the video camera on the screen in the glasses and hear the sound sensed by the mic of the video camera from the headset.
- If the effect of images is unsatisfactory, you can adjust brightness and contrast to reach the optimal effect.

2. Test of Head Tracking Function System:

- Set the parameters of the R/C remote controllers according to the related instructions and then pull the DSC switch on.
- Move the glasses upward, downward, leftward and rightward, observe whether the video camera pan-tilt will bring the video camera to move upward, downward, leftward and rightward.

3. Test of Reception Distance of Wireless Transmission:

- Keep the transmitter and the glasses in certain distance and observe whether the images on the screen of the glasses are normal.

4. If the system passes all above launch your plane and enjoy FPV flight.

The application of the following functions must be supported by the other products of the Company.

OTHER FUNCTIONS

- AV during flight: The videos received by the video glasses can be output to the external DVR via AV OUT to record down the whole flight.
- Flight with GPS: If GPS devices are installed on the model plane, then you can see flight height, distance and position of flight, battery voltage, current, etc on the screen of the glasses.
- See movies with FPV system: Connect the AV signals of such devices as DVD, MP4, DVB, etc to the transmitter, then the glasses can receive AV signals in wireless manner within certain scope and thus wireless cinema can be realized.

PRECAUTIONS OF USING THE FPV SYSTEM

1. The wireless transmission and reception distance of the FPV system:

- The wireless transmission and reception distance of the FPV system may vary greatly due to the barriers between the receiver and the receiver, because the FPV system transmits images and sound with very high frequency, 2.4GHz and 5.8GHz. Under such high frequency, wireless waves can have only rectilinear transmission. With small barriers, the transmission distance in air between the transmitter and the receiver is the longest; if there are such barriers as mountains, houses, trees, etc, the distance will become short. Therefore, during use, if the quality of images is becoming worse at certain distance, it indicates the flight will exceed the maximum transmission distance. In such case, shorten the flight distance in order to prevent image signal loss and FPV system failure.

2. How to prevent the remote controller being interfered:

- First, it must be made clear why wireless receiving and transmitting devices have interference problem? Two wireless systems working at the same frequency will produce interference or interfere with each other. The actual consequences include bad reception signals or signal interruption and shortened wireless communications working distance.

3. About the working frequency of the FPV system:

- This system uses 2.4GHz or 5.8GHz wireless transmitting and receiving devices. This frequency belongs to ISM frequency band, which is civilian one opened by the government, so you can use it without any application to the competent authority of the government. However, as anyone can use the open ISM frequency band for their devices, the FPV system may interfere with the devices at this frequency of others, or the FPV system will be interfered with by the devices of others at the same frequency.

4. How to prevent the FPV system producing interference or being interfered:

There are two methods to solve the problem of the FPV system of interfering or being interfering:

- ① We can avoid interference by setting the working frequency of the glasses. If the current frequency is interfered and thus images are of low quality or short distance, we can adjust the frequency selection button of the glasses to change the working frequency of the glasses; in addition, we need to change the frequency of the wireless transmitter of the video camera to the corresponding working frequency.
- ② Choose one open field or the place without ISM frequency transmitting devices nearby.

5. Selection of the wireless reception and transmission frequency of the PFV system:

- If you use non-2.4GHz R/C devices, you should set the working frequency of the PFV system at 2.4GHz in order to obtain the best FPV flight distance and this will depend on the maximum control distance of your R/C devices.
- If you use 2.4GHz R/C devices, you should use 5.8GHz FPV transmitting and receiving function in order to avoid the interference caused due to the same frequency and this depends on the maximum control distance of your R/C devices.

6. The use of more two FPV systems at the same time in the same field or within the effective receiving scope:

- Make sure that every FPV system choose a different channel and the spacing between the channel numbers of the FPV systems is large enough to prevent mutual interference of the same frequency and achieve the optimal application effect.

Troubleshooting

1 The glasses display has no images:

- ① Check if the power supply voltage of the glasses is at 8-13V or if the glasses are powered on.
- ② Check if the reception frequency of the glasses is at 2.4GHz or 5.8GHz and consistent with that of the transmitter; check if the reception channel of the glasses is consistent with that of the transmitter.
- ③ Check if the power supply voltage of the transmitter is at 8-13V and the power plug is inserted properly.
- ④ Check if the video camera plug is inserted into the transmitter.
- ⑤ Check if the antennas of the glasses and the transmitter are installed.

2 The head tracking system does not work:

- ① Check if the steering gear cable plug of the pan-tilt of the video camera is inserted into the corresponding channel socket of the R/C receiver.
- ② Check if the channel number set under "Head tracker signal output channel" in the glasses is consistent with that of the R/C receiver inserted into the steering gear cable of the pan-tilt of the video camera.

3. Bad image signals received by the glasses or short wireless transmission distance:

- ① Check if the FPV system chooses 2.4GHz frequency when 2.4GHz R/C remote controller is used. The FPV system should choose 5.8GHz frequency.
- ② Check if there are wireless transmitting devices of the same frequency nearby with interference. The FPV system should choose any other frequency to avoid such interference frequency or avoid using the system in the same field with the same frequency.
- ③ Check if the antennas of the glasses and the transmitter are installed.
- ④ Check if there are mountains, houses, trees etc between the glasses and the transmitter. Always use the FPV system in an open field.

SPECIFICATIONS:

GS920

Displays resolution	VGA 640X480RGB, 922K pixel color displays
Field of View	32°diagonal
Virtual Image Size	48 inches diagonal at 2m
Wireless receiver frequency	2.4GHz 8channel 5.8GHz 8channel ,
Antenna connector	SMA
Power supply	8—13V, 300mA

CM210

Imaging Sensor	1/3 inches CCD Sensor, pixels: 628x582 ,
Horizontal Resolution	420 TV Lines
View Angle	90°
Lens focus:	3.6mm
Vided Output level	1Vp-p@ 75Ω
Audio Output level	1Vp-p@ 10KΩ
Power supply	9-13V

TS321

Wireless transmit frequency	2.4GHz 8channel ,
Antenna connector	SMA
Vided input level	1Vp-p@ 75Ω
Audio input level	1Vp-p@ 10KΩ
Power supply	8—13V
Transmission distance	2000m

TS351

Wireless transmit frequency	5.8GHz 8channel ,
Antenna connector	SMA
Vided input level	1Vp-p@ 75Ω
Audio input level	1Vp-p@ 10KΩ
Power supply	8—13V
Transmission distance	800m