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# 附件文件B-云台与飞控的协议-中文版

## 云台与飞控采用TTL串口协议

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| **串口通讯** | | | |
| 波特率-115200 | 数据位-8 | 停止位-1 | 校验位-无 |

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| **协议内容** | | | | | | |
| **1：云台接收，总长度67字节** | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** |
| 0XC3 | 0X5E |  |  | 命令 | 0 | 云台控制模式 |

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| **云台控制模式** | |
| B7~B5：云台控制模式 | |
| 手动锁定模式 | 0 |
| 自动控制 | 1 |
| 垂直朝下 | 2 |
| 手动跟随模式 | 3 |
| 跟踪模式 | 4 |
| 0,3,4模式下，飞控发给云台的控制信号是角速率  1,2模式下是角度 | |
| B4~B0：保留 | |

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| **命令：U8类型** | |
| 拍照 | 0x1B |
| 录像 | 0x1C |
| 放大 | 0x1D |
| 缩小 | 0x1E |
| 停止变倍 | 0x3F |
| 校准云台的陀螺仪 | 0x1A |

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| **13** | **14** | **15** | **16** | **17** | **18** |
| 云台滚转控制信号 | | 云台俯仰控制信号 | | 云台指向控制信号 | |
| 云台滚转控制信号：S16类型  单位：0.01 deg或0.01 deg /s | | 云台俯仰控制信号: S16类型  单位：0.01 deg或0.01 deg /s | | 云台指向控制信号: S16类型  单位：0.01 deg或0.01 deg /s | |

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| **55** | **56** | **…….** | **65** | **66** |
| 直接控制相机的焦距 | |  | CRC高8位 | CRC低8位 |
| 直接控制相机的焦距：U8类型  暂时不支持 | |  |  |  |

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| **协议内容** | | | | |
| **2：云台回传，总长度64字节** | | | | |
| **0** | **1** | **2** | **3** | **4** |
| 0X5E | 0XC3 | 云台设备类型 | 云台固件版本 | 命令返回值 |
|  |  | 云台设备类型：U8类型 | 云台固件版本：U8类型  云台状态：U8类型 | 命令返回值：  如果成功就返回：上传的命令  如果失败就返回：上传的命令|0X80 |

注意：关于命令的处理方法，发送一个命令后，不管收到成功还是失败的回传都需要把发送的命令清零，然后才能再发一个，如果发出命令如果没有收到任何回传就一直发。

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| **5** | **6** | **7** |
| 云台状态 | 相机焦距 | |
| 云台状态：U8类型：  正在初始化：0  正在工作：1  停止工作：2  暂停： 3  故障：4 | 相机焦距：U16类型：暂时不支持 | |

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| **8** | **9** | **10** | **11** | **12** | **13** | **……** | **62** | **63** |
| 云台滚转角 | | 云台俯仰角 | | 云台指向角 | |  | CRC\_H | CRC\_L |
| 云台滚转角 : S16类型  单位：0.01 deg | | 云台俯仰角: S16类型  单位：0.01 deg | | 云台指向角: S16类型  单位：0.01 deg | |  |  |  |

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| **注意事项** |
| Crc校验函数  u16 CalculateCrc16(volatile u8 \*ptr,u8 len)  {  u16crc;  u8 da;  u16 crc\_ta[16]={  0x0000,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,  0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,  };  crc=0;  while(len--!=0)  {  da=crc>>12;  crc<<=4;  crc^=crc\_ta[da^(\*ptr>>4)];    da=crc>>12;  crc<<=4;  crc^=crc\_ta[da^(\*ptr&0x0F)];  ptr++;  }  return(crc);  } |

# Attachment-File B-Gimbal and FC agreement-en

**Gimbal and FC using TTL Serial Port Protocol**

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| **Serial Communication** | | | |
| Baud Rate-115200 | Data Bits-8 | Stop Bits-1 | Check Bit-No |

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| **Agreement Content** | | | | | | |
| **1：Gimbal receive ,total length of 67 bytes** | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** |
| 0XC3 | 0X5E |  |  | command | 0 | gimbal control mode |

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| **Gimbal Control Mode** | |
| B7~B5：gimbal control mode | |
| Manual lock mode | 0 |
| Auto control | 1 |
| Vertical downwards | 2 |
| Manual follow | 3 |
| Tracking mode | 4 |
| On 0,3,4 mode , the FC transmit control signal to gimbal is angle rate  On 1,2 mode is angle | |
| B4~B0：reserve | |

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| **Order :U8 type** | |
| Pic | 0x1B |
| Video | 0x1C |
| Zoom in | 0x1D |
| Zoom out | 0x1E |
| Stop | 0x3F |
| Calibrate gimbal Gyro | 0x1A |

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| **13** | **14** | **15** | **16** | **17** | **18** |
| Gimbal Roll control signal | | Gimbal Pitch control signal | | Gimbal Pan control signal | |
| Gimbal Roll control signal ：S16 type  Unit：0.01 deg or 0.01 deg /s | | Gimbal Pitch control signal: S16 type  Unit：0.01 deg or 0.01 deg /s | | Gimbal Pan control signal: S16 type  Unit：0.01 deg or 0.01 deg /s | |

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| **55** | **56** | **…….** | **65** | **66** |
| Direct control of the camera's focal length | |  | CRC high 8 bits | CRC low 8 bits |
| Direct control of the camera's focal length：U8 type  not support recently | |  |  |  |

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| **Agreement content** | | | | |
| **2：Gimbal past back ,total length of 64 bytes** | | | | |
| **0** | **1** | **2** | **3** | **4** |
| 0X5E | 0XC3 | Gimbal device type | Gimbal firmware Version | command return value |
|  |  | Gimbal device type：U8 | Gimbal firmware Version：U8 type  Gimbal status：U8 type | command return value：  if successful, return it  ：command of upload  if failure ,return it ：command of upload  |0X80 |

Attention : On the command processing, send a command, regardless of the success or failure of the return, must be to send the command cleared, and then send one again, if send command but you do not receive any return ,pls always made it.

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| **5** | **6** | **7** |
| Gimbal status | Camera focal length | |
| Gimbal status：U8 Type：  Initializing：0  Working ：1  Stop work：2  Pause： 3  Trouble：4 | Camera focal length：U16 Type：not support recently | |

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| **8** | **9** | **10** | **11** | **12** | **13** | **……** | **62** | **63** |
| Gimbal Roll angle | | Gimbal Pitch angle | | Gimbal Pan angle | |  | CRC\_H | CRC\_L |
| Gimbal Roll angle : S16 Type  Unit：0.01 deg | | Gimbal Pitch angle: S16 Type  Unit：0.01 deg | | Gimbal Pan angle: S16 Type  Unit：0.01 deg | |  |  |  |

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| **Attention** |
| Crc Check function  u16 CalculateCrc16(volatile u8 \*ptr,u8 len)  {  u16crc;  u8 da;  u16 crc\_ta[16]={  0x0000,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,  0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,  };  crc=0;  while(len--!=0)  {  da=crc>>12;  crc<<=4;  crc^=crc\_ta[da^(\*ptr>>4)];    da=crc>>12;  crc<<=4;  crc^=crc\_ta[da^(\*ptr&0x0F)];  ptr++;  }  return(crc);  } |