AQ32Plus CLI Commands

3/1/2013

John Ihlein

The following tables describe the Command Line Interface (CLI) commands available to setup the AQ32Plus software. I use the Hercules software package to read from and write to the CLI. The CLI is available over the USB Virtual Com port. The terminal settings for Hercules are:

Name = COMxx where xx = the comm port number of the AQ32 Virtual Com port, Baud = 115200, Data size = 8, Parity = none, Hanshake = Xon/Xoff, and Mode = Free.

A quick note about Hercules. Single character commands can be entered directly via the keyboard. Multi-character commands must be entered in one of the 3 send boxes in the lower half of the screen. Once the complete command is typed in, the CLI command can be sent to the AQ32 board by clicking on the ‘send’ button.

When applying power, the blue LED will light for 15 seconds. The board may be moved during this time period. When the green LED comes on, the board must remain stationary, although it does not need to be level. The VCP is initialized at this point and Hercules comm port may be opened if desired. When both LEDs are on solid, the board is performing some run time sensor calibrations. After the sensor calibration is complete, the blue LED will flash at 5 Hz, and the green LED will flash at 1 Hz. This heartbeat flashing indicates the system is ready for flight will respond to CLI commands.

Any of the CLI’s will print a list of commands when a ‘?’ is typed in Hercules. Note that there is little to no error checking done in the input values. For this reason, after a data entry is made, the parsed data is displayed. It is your responsibility to make sure the data is what you intended before saving it to EEPROM. All values for a given command must be entered even if you are not changing their value.

Main CLI

Note there is no prompt displayed for the main CLI

|  |  |
| --- | --- |
| Command ‘a’  Display Rate PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘A’  Set roll rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘b’  Display Attitude PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘B’  Set pitch rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘c’  Display Velocity PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘C’  Set yaw rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘d’  Display Position PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘D’  Set roll attitude PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘e’  Display Loop Delta Times. Displays the delta time for the:  1000 Hz Interrupt  500 Hz Loop  100 Hz Loop  50 Hz Loop  10 Hz Loop  5 Hz Loop  1 Hz Loop | Command ‘E’  Set pitch attitude PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘f’  Display Loop Execution Times. Displays the time to execute the:  1000 Hz Interrupt Service Routine  500 Hz Loop  100 Hz Loop  50 Hz Loop  10 Hz Loop  5 Hz Loop  1 Hz Loop | Command ‘F’  Set heading PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘g’  Display the 500 Hz Accel Data. Displays:  Body referenced X acceleration  Body referenced Y acceleration  Body referenced Z acceleration | Command ‘G’  Set nDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘h’  Display 100 Hz Earth Axis Accel Data. Displays:  Earth referenced X acceleration  Earth referenced Y acceleration  Earth referenced Z acceleration | Command ‘H’  Set eDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘i’  Display 500 Hz Gyro Data. Displays:  Body axis roll rate  Body axis pitch rate  Body axis yaw rate | Command ‘I’  Set hDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘j’  Display 10 Hz Mag Data. Displays:  Body axis mag X  Body axis mag y  Body axis mag z | Command ‘J’  Set n PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘k’  Display Vertical Axis Data. Displays:  Earth referenced Z acceleration  Pressure altitude  hDot estimate  h estimate | Command ‘K’  Set e PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘l’  Display Attitudes. Displays:  Roll attitude  Pitch attitude  Heading | Command ‘L’  Set h PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘m’  Display GPS Data. Displays:  Latitude  Longitude  Altitude  Groundspeed  Groundtrack | Command ‘M’  Access MAX7456 OSD CLI |
| Command ‘n’  Display GPS Statistics. Displays:  Fix Type  Number of Satellites  Date  Time  hDop | Command ‘N’  Access Mixer CLI |
| Command ’o’  Not Used | Command ‘O’  Access Receiver CLI |
| Command ‘p’  Not Used | Command ‘P’  Access Sensor CLI |
| Command ‘q’  Not Used | Command ‘Q’  Access Receiver CLI |
| Command ‘r’  Display Mode States. Displays:  Flight Mode State – Rate/Attitude  Heading Hold State – Engaged/Disengaged  Altitude Hold State – Engaged/Disengaged/Panic | Command ‘R’  Reset and Enter Bootloader. After both green and blue LEDs come on, close VCP. Hex files may be loaded via uart1 or uart3, DFU files may be loaded via USB port. Uart loading has not been verified to work. |
| Command ‘s’  Display Raw Receiver Values. Displays:  RX Channel 1  RX Channel 2  RX Channel 3  RX Channel 4  RX Channel 5  RX Channel 6  RX Channel 7  RX Channel 8  Use TX endpoints and centering (where applicable) so that these read 2000-3000-4000 for analog channels and 2000-4000 for discretes. Order not important in this display. | Command ‘S’  Reset System. Close VCP after issuing command,. VCP may be reopened after both LEDs illuminate during power up sequence. |
| Command ‘t’  Display Processer Receiver Commands. Displays:  Aileron (Roll) Command: -1000/0/1000  Elevator (Pitch) Command: -1000/0/1000  Rudder (Yaw) Command: -1000/0/1000  Throttle: 2000/4000  Mode:2000/4000 or 2000/3000/4000  Alt Hold: 2000/4000  Aux1: 2000/4000  Aux2: 2000/4000  Order is important. If not correct use Receiver CLI B command to change order. | Command ‘T’  Not Used. |
| Command ‘u’  Display Command in Detent Discretes. Displays:  Roll command in detent: true/false  Pitch command in detent: true/false  Yaw command in detent: true/false | Command ‘U’  Not Used. |
| Command ‘v’  Display ESC PWM Outputs. Displays:  ESC 1 PWM output: 2000/4000  ESC 2 PWM output: 2000/4000  ESC 3 PWM output: 2000/4000  ESC 4 PWM output: 2000/4000  ESC 5 PWM output: 2000/4000  ESC 6 PWM output: 2000/4000  ESC 7 PWM output: 2000/4000  ESC 8 PWM output: 2000/4000 | Command ‘V’  Reset EEPROM Parameters and Reset System. Close VCP after issuing command,. VCP may be reopened after both LEDs illuminate during power up sequence. |
| Command ‘w’  Display Servo PWM Outputs. Displays:  Servo 1 PWM output: 2000/4000  Servo 2 PWM output: 2000/4000  Servo 3 PWM output: 2000/4000 | Command ‘W’  Write EEPROM Parameters. |
| Command ‘x’  Terminate CLI Display | Command ‘X’  Not Used. |
| Command ‘y’  Access ESC Calibration. NOTE: Remove propellers before issuing this command!! | Command ‘Y’  Not Used. |
| Command ‘z’  Not Used | Command ‘Z’  Not Used. |
| Command ‘1’  Enable High Speed RF Telemetry Output 1. High Speed Data Out over Uart3. Currently set to display:  500 Hz Body X Acceleration  500 Hz Body Y Acceleration  500 Hz Body Z Acceleration  but subject to change | . |
| Command ‘2’  Enable High Speed RF Telemetry Output 2. High Speed Data Out over Uart3. Currently set to display:  500 Hz Roll Rate  500 Hz Pitch Rate  500 Hz Yaw Rate  but subject to change |  |
| Command ‘3’  Enable High Speed RF Telemetry Output 3. High Speed Data Out over Uart3. Currently set to display:  Roll Rate  Roll Rate Command  but subject to change |  |
| Command ‘4’  Enable High Speed RF Telemetry Output 4. High Speed Data Out over Uart3. Currently set to display:  Pitch Rate  Pitch Rate Command  but subject to change |  |
| Command ‘5’  Enable High Speed RF Telemetry Output 5. High Speed Data Out over Uart3. Currently set to display:  Yaw Rate  Yaw Rate Command  but subject to change |  |
| Command ‘6’  Enable High Speed RF Telemetry Output 6. High Speed Data Out over Uart3. Currently set to display:  Roll Attitude  Pitch Attitude  Heading  but subject to change |  |
| Command ‘7’  Enable High Speed RF Telemetry Output 7. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change |  |
| Command ‘8  Enable High Speed RF Telemetry Output 8. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change |  |
| Command ‘9’  Enable High Speed RF Telemetry Output 9. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change |  |
| Command ‘0’  Disable High Speed RF Telemetry Outputs 1-9 | Command ‘?’  Display Short Summary of all CLI Commands |

MAX7456 CLI

MAX7456 ->

|  |  |
| --- | --- |
| Command ‘a’  Display OSD Configuration. |  |
| Command ‘b’  Enable OSD Altitude Display. | Command ‘B’  Disable OSD Altitude Display. |
| Command ‘c’  Enable OSD Artificial Horizon Display. Mutually exclusive with OSD Attitude Display. | Command ‘C’  Disable OSD Artificial Horizon Display. |
| Command ‘d’  Enable OSD Attitude Display. Mutually exclusive with OSD Artificial Horizon Display. | Command ‘D’  Disable OSD Attitude Display. |
| Command ‘e’  Enable OSD Heading Display. | Command ‘E’  Disable OSD Heading Display. |
| Command ‘i’  Set OSD Status to Installed, Write EEPROM, and Reset System. Close VCP after issuing command,. VCP may be reopened after both LEDs illuminate during power up sequence. |  |
| Command ‘q’  Set English Display Units | Command ‘Q’  Set Metric Display Units. |
| Command ‘r’  Reset MAX7456 OSD. |  |
| Command ‘s’  Display MAX7456 Character Set. |  |
| Command ‘t’  Download MAX7456 OSD Font. |  |
| Command ‘u’  Set OSD Status to Uninstalled, Write EEPROM, and Reset System. Close VCP after issuing command,. VCP may be reopened after both LEDs illuminate during power up sequence. |  |
| Command ‘v’  Change Default Video Standard. If NTSC, set PAL. If PAL, set NTSC. | Command ‘W’  Write EEPROM Parameters. |
| Command ‘x’  Exit MAX7456 CLI. | Command ‘?’  Display Short Summary of all CLI Commands |

MIXER CLI

Mixer ->

|  |  |
| --- | --- |
| Command ‘a’  Display Mixer Configuration. Displayed data changes dependent on which mixer is selected. | Command ‘A’  Set Mixer Configuration. Data entry is as follows:  A1 thru A21 where:  1 = Gimbal(Standalone) 12 = VTail RPY Comp  2 = Flying Wing 13 = Y4  3 = Bi Copter 14 = HEX Plus  4 = Tri Copter 15 = Hex X  5 = Quad Plus 16 = Y6  6 = Quad X 17 = Octo Flat 8 Plus  7 =VTail No Comp 18 = Octo Flat \* X  8 = VTail Y Comp 19 = Octo X\* Plus  9 = VTail RY Comp 20 = Octo X\* X  10 = VTail PY Comp 21 = Free Mix  11 = VTail RP Comp |
| Command ‘b’  Display Free Mixer Matrix Elements. | Command ‘B’  Set PWM Rates. Data entry is as follows:  BESC;Servo where:  ESC = ESC PWM rate  Servo = Servo PWM rate |
|  | Command ‘C’  Set BiCopter Left Servo Parameters. Data entry is as follows:  CMin;Mid;Max where  Min = Left servo minimum position  Mid = Left servo center position  Max = Left Servo maximum position |
|  | Command ‘D’  Set BiCopter Right Servo Parameters. Data entry is as follows:  DMin;Mid;Max where  Min = Left servo minimum position  Mid = Left servo center position  Max = Left Servo maximum position |
|  | Command ‘E’  Set Flying Wing Servo Directions. Data entry is as follows:  ERollLeft;RollRight;PitchLeft;PitchRight where:  RollLeft = Left wing servo roll direction, +/-1  RollRight = Right wing servo roll direction, +/-1  PitchLeft = Left wing servo pitch direction, +/-1  PitchRight = Right wing servo pitch direction, +/-1 |
|  | Command ‘F’  Set Flying Wing Servo Limits. Data entry is as follows:  FLeftMin;LeftMax,RightMin;RightMax where:  LeftMin = Left wing servo minimum position  LeftMax = Left wing servo maximum position  RightMin = Right wing servo minimum position  RightMax = Right wing servo maximum position |
|  | Command ‘G’  Set Number of Free Mix Motors. Data entry is as follows:  GNumber where  Number = Number of motors controlled by free mixer. Range 1 thru 8. |
|  | Command ‘H’  Set Free Mix Matrix Element. Data entry is as follows:  HRow;Column;Element where:  Row = Matrix row  Column = Matrix columm  Element = Vaue at Row, Column |
|  | Command ‘I’  Set Gimbal Roll Servo Parameters. Data entry is as follows:  IMin;Mid;Max;Gain where:  Min = Servo minimum position  Mid = Servo center position  Max = Servo maximum position  Gain = Servo gain |
|  | Command ‘J’  Set Gimbal Pitch Servo Parameters. Data entry is as follows:  JMin;Mid;Max;Gain where:  Min = Servo minimum position  Mid = Servo center position  Max = Servo maximum position  Gain = Servo gain |
|  | Command ‘K’  Set TriCopter Servo Parameters. Data entry is as follows:  KMin;Mid;Max where:  Min = Servo minimum position  Mid = Servo center position  Max = Servo maximum position |
|  | Command ‘L’  Set V Tail Angle. Data entry is as follows:  LAngle where:  Angle = Angle between horizontal and vtail |
|  | Command ‘M’  Set Yaw Direction. Data entry is as follows:  M1 or M-1 where  1 = Normal yaw direction  -1 = Reversed yaw direction |
|  | Command ‘W’  Write EEPROM Parameters. |
| Command ‘x’  Exit Mixer CLI | Command ‘?’  Display Short Summary of all CLI Commands |

RECEIVER CLI

Receiver ->

|  |  |
| --- | --- |
| Command ‘a’  Display Receiver Configuration Data | Command ‘A’  Read RX Type. Data entry is as follows:  AX where:  X =1, Parallel RX (default)  X= 2, Serial RX  X=3, Spektrum Satellite  Write EEPROM, and Reset System. Close VCP after issuing command,. VCP may be reopened after both LEDs illuminate during power up sequence. |
| Command ‘b’  Set Maximum Rate Command. Data entry is as follows:  bmaxRate where:  maxRate = maximum rate command, default = 300 DPS | Command ‘B’  Set RC Control Order. Data entry is as follows:  BAERT1234 where:  AERT1234 may be entered in any order such that top level CLI command ‘t’ displays RX commands in proper order. |
| Command ‘c’  Set Maximum Attitude Command. Data entry is as follows:  cmaxAttitude where:  maxAttitude = maximum attitude command, default = 60 degrees | Command ‘C’  Set Spektrum Resolution. Data entry is as follows:  C0 or C1 where:  C0 = Spektrum low resolution, 1024 bit  C1 = Spektrum high resolution, 2048 bit |
|  | Command ‘D’  Set Number of Spektrum Channels. Data entry is as follows:  D6 thru D12, indicating 6 to 12 channels. |
|  | Command ‘E’  Set RC Control Points. Data entry is as follows:  EmidCmd;minChk,maxChk,minThrot;maxThrot where:  midCmd = receiver center pulse, default = 3000  minChk = min check value, default = 2200  maxChk = max check value, default = 3800  minThrot = min throttle value, default = 2200  maxThrot = max throttle value, default = 4000 |
|  | Command ‘W’  Write EEPROM Parameters |
| Command ‘x’  Exit Receiver CLI | Command ‘?’  Display Short Summary of all CLI Commands |

SENSOR CLI

Sensor ->

|  |  |
| --- | --- |
| Command ‘a’  Display Sensor Data | Command ‘A”  Set MPU6000 DLPF. Data entry is as follows:  A0 thru A3 where:  0 = 256 Hz  1 = 188 Hz  2 = 98 Hz (default)  3 = 42 Hz |
| Command ‘b’  Execute MPU6000 Calibration. This calibration must be run before attempting flight. | Command ‘B’  Set Accel Cutoff. Data entry is as follows:  BAccelCutoff where:  AccelCutoff = Acceleration cutoff value in G’s. Default value 1.0 |
| Command ‘c’  Execute Magnetometer Calibration. This calibration must be run before attempting flight. | Command ‘C’  Set kpAcc/kiAcc. Data entry is as follows:  CkpAcc;kiAcc where:  kpAcc = MARG kpAcc, default = 5.0  kiAcc = MARG kiAcc, default = 0.0 |
|  | Command ‘D’  Set kpMag/kiMag. Data entry is as follows:  DkpMag;kiMag where:  kpMag = MARG kpMag, default = 5.0  kiMag = MARG kiMag, default = 0.0 |
|  | Command ‘E’  Set h dot est/ h est Comp Filter A/B. Data entry is as follows:  EA;B where:  A = Comp Filter A constant, default = 0.005  B = Comp Filter B constant, default = 0.005 |
|  | Command ‘W’  Write EEPROM Parameters. |
| Command ‘x’  Exit Sensor CLI | Command ‘?’  Display Short Summary of all CLI Commands |

GPS CLI

GPS ->

|  |  |
| --- | --- |
| Command ‘a’  Display GPS Installation Data | Command ‘A’  Set GPS type to No GPS |
|  | Command ‘B’  Set GPS type to MediaTek 3320 Binary |
|  | Command ‘C’  Set GPS type to MediaTek 3329 NMEA |
|  | Command ‘D’  Set GPS type to Ublox |
|  | Command ‘W’  Write EEPROM Parameters |
| Command ‘x’  Exit GPS CLI | Command ‘?’  Display Short Summary of all CLI Commands |

ESC Calibration

ESC calibration is flexible. The user is able to set low, mid, or high throttle values at will. This means the user controls the timing of these signals, and should be able to calibrate most ESCs. It also means the user can program ESC parameters by following the ESC’s programming guide. Be sure to remove propellers before executing this calibration routine for your own safety!!

MPU6000 Calibration

MPU6000 calibration aims to calibrate the temperature sensitivity of the device wrt to sensor bias. The AQ32 board should be cooled ~10 to 20 degrees below ambient temperature. Then plug in the USB port and immediately execute the MPU6000 calibration. A set of readings will be taken right away. 10 minutes later, another set will be taken after the sensor has warmed. Constants will then be calculated and displayed. Be sure to save them in EEPROM. Make sure the board stays still during this calibration.

RF CLI

Note there is no prompt displayed for the RF CLI

A small subset of the main CLI commands are available for use over telemetry radios. The telemetry radios are connected to uart 3 tx/rx. In the future, the uart port will be changed to uart 1 for better compatibility with standard AeroQuad software. RF telemetry has been verified using xBee radios. For shorter range, a Bluetooth adaptor could probably be used, but this has not been tried as of yet. The abbreviated command list for the RF CLI follows.

|  |  |
| --- | --- |
| Command ‘a’  Display Rate PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘A’  Set roll rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘b’  Display Attitude PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘B’  Set pitch rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘c’  Display Velocity PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘C’  Set yaw rate PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘d’  Display Position PID values. Values displayed are:  B, P, I, D, Windup Guard, and D calculation source. | Command ‘D’  Set roll attitude PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘x’  Terminate CLI Display | Command ‘E’  Set pitch attitude PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘1’  Enable High Speed RF Telemetry Output 1. High Speed Data Out over Uart3. Currently set to display:  500 Hz Body X Acceleration  500 Hz Body Y Acceleration  500 Hz Body Z Acceleration  but subject to change | Command ‘F’  Set heading PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘2’  Enable High Speed RF Telemetry Output 2. High Speed Data Out over Uart3. Currently set to display:  500 Hz Roll Rate  500 Hz Pitch Rate  500 Hz Yaw Rate  but subject to change | Command ‘G’  Set nDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘3’  Enable High Speed RF Telemetry Output 3. High Speed Data Out over Uart3. Currently set to display:  Roll Rate  Roll Rate Command  but subject to change | Command ‘H’  Set eDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘4’  Enable High Speed RF Telemetry Output 4. High Speed Data Out over Uart3. Currently set to display:  Pitch Rate  Pitch Rate Command  but subject to change | Command ‘I’  Set hDot PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘5’  Enable High Speed RF Telemetry Output 5. High Speed Data Out over Uart3. Currently set to display:  Yaw Rate  Yaw Rate Command  but subject to change | Command ‘J’  Set n PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘6’  Enable High Speed RF Telemetry Output 6. High Speed Data Out over Uart3. Currently set to display:  Roll Attitude  Pitch Attitude  Heading  but subject to change | Command ‘K’  Set e PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘7’  Enable High Speed RF Telemetry Output 7. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change | Command ‘L’  Set h PID data. Data entry is as follows:  AB;P;I;D;windupGuard;dErrorCalc where:  A = the command  B = B PID gain, should be left at 1.0 for now  P = Proportional PID gain  I = Integral PID gain  D = Derivative PID gain  windupGuard = value of the integral windup limit  dErrorCalc = 1 to calculate the D term from the controller error, 0 to calculate the D term from the controller state |
| Command ‘8  Enable High Speed RF Telemetry Output 8. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change | Command ‘W’  Write EEPROM Parameters. |
| Command ‘9’  Enable High Speed RF Telemetry Output 9. High Speed Data Out over Uart3. Currently set to display:  Not Used  But subject to change |  |
| Command ‘0’  Disable High Speed RF Telemetry Outputs 1-9 | Command ‘?’  Display Short Summary of all CLI Commands. |

SETUP OUTLINE

1. Run MPU6000 calibration.
2. Run Magnetometer calibration
3. Save calibration data
4. Select receiver type. If Spektrum, select number of channels and resolution, then save it.
5. Adjust Transmitter centering adjustments so channel throw is 2000-3000-4000 for aileron, elevator, and rudder channels. Throttle and 2 position switch throws should be 2000-4000. Three position switch throw, if used, should be 2000-3000-4000
6. Adjust channel order for Roll, Pitch, Yaw, Throttle, Aux1, Aux2, Aux3, Aux4 control order. The Aux channels may be re-ordered to map switch to function control to your preferences.
7. Select Mixer type. Setup and save any additional data required by selected mixer.
8. Calibrates ESCs if required.