13 Datalog

The MP2028^{g} provides an extensive internal datalog that can be used to analyze flights after the fact. The autopilot starts recording data in the datalog at the start of a flight (once GPS speed is greater than zero) and stops when the buffer is full. The MP2028^{g} will also start recording a datalog as soon as it initializes if the fake GPS lock has been enabled.

Data is recorded at a rate of five samples each second. The fields recorded in the datalog are listed in *Table 13.1 Datalog Fields*. The datalog is automatically cleared after the GPS locks and the sensors zero.

For instructions on retrieving the datalog from the MP2028^{g}, see *To copy a datalog using Flight Log Loader* on page 33.

Table 13.1 Datalog Fields

Col	Field	Notes
1	CurrentPitch	Current value of pitch in system units (radian × 1024)
2	CurrentRoll	Current value of roll in system units (radians × 1024)
3	dPAltitude	Target altitude – depending upon configuration, either the *pitch from altitude*, or *throttle from altitude* feedback loops will adjust pitch or throttle setting in an attempt to minimize the differences between target altitude and the actual altitude. This field is in feet × –8 (i.e. –80 is 10 feet above the ground).
4	yDot	Y accelerometer in system units (g × 100 – 100 is 32 feet per second squared).
5	dRoll	Target roll in system units (radians × 1024). The *ailerons from roll* feedback loop adjusts the ailerons to minimize the difference between target roll and actual roll.
6	Heading	GPS heading in degrees × 10
7	LocationE	Position in feet × 8 east of the origin
8	LocationN	Position in feet × 8 north of the origin

Col	Field	Notes
9	dPitch	Target pitch in system units (radians × 1024). The *elevator from pitch* feedback loop adjusts the elevator to minimize the difference between target pitch and actual pitch.
10	gpsSpeed	Speed from the GPS receiver in feet per second
11	AGL	Raw output of the ultrasonic transducer – divide by 36.5 to convert to feet. If the AGL board is not enabled, this field is not defined. Note that the AGL provides altitude information at a rate that is less than 5 Hz. As a result, there are numerous “zero” altitudes in this field. This is not a concern as they are filled out after the data is recorded in the datalog.
12	GPS Status	Status of the GPS receiver. See *Table 13.2 GPS Status* for a description of this field.
13	Servo 1 (ailerons)	Servo 1 position (fine servo)
14	Servo 2 (elevator)	Servo 2 position (fine servo)
15	Servo 3 (rudder)	Servo 3 position (fine servo)
16	Servo 4 (throttle)	Servo 4 position (fine servo)
17	Servo 5	Servo 5 position (fine servo)
18	Servo 6	Servo 6 position (fine servo)
19	Servo 7	Servo 7 position (fine servo)
20	Servo 8	Servo 8 position (fine servo)
21	cmd	Current command being executed. See *Table 13.4 Current Command* for a description of this field.
22	reserve+(Step × 256)	*reserve* is roughly proportional to the number of spare CPU cycles. *Step* identifies the current command being executed. To obtain step divide by 256 and discard the remainder.
23	CHANGED	Specifies which sensors have changed as well as the state of the RC link. See *Table 13.3 Changed Status Field* for a more complete description of the bit fields in this table.
24	TMPRT	Raw output of the temperature sensor. This value is not calibrated.
25	GPS_POS_E	GPS position (degrees east)
26	GPS_POS_N	GPS position (degrees north)

Col	Field	Notes
27	Current speed	Current speed, from the airspeed transducer in feet per second
28	Target speed	Desired speed in feet per second
29	currentAltitude	Altitude in feet × -8
30	cState	State of thread 0's current command
31	corrRoll	Roll transducer zero correction
32	corrPitch	Pitch transducer zero correction
33	GPS_POS_U	GPS altitude in meters
34	GPS_VEL_U	GPS velocity in the Z direction in meters per second
35	x_acc	X acceleration as read from the x accelerometer
36	compass	Heading from compass. If a compass is not present this field is not defined.
37	current Yaw or hover Offset X (helicopter mode)	Current angle of yaw or offset from the hover point in the body X direction
38	desired heading or hover Offset Y (helicopter mode)	Desired heading or offset from the hover point in the body Y direction
39	heading control PID loop velBodyX	Heading control PID loop or velocity in the body X direction
40	Climb state or velBodyY (helicopter mode)	Climb state or velocity in the body Y direction
41	Correction pitch dot	Correction pitch dot
42	Correction yaw dot	Correction yaw dot
43	Body pitch dot	Pitch dot, in body axis, in radians × 1024 per second × 21 (dividing by 375 will give degrees per second)
44	Body roll dot	Roll dot, in body axis, in radians × 1024 per second × 21 (dividing by 375 will give degrees per second)

Col	Field	Notes
45	Body yaw dot	Yaw dot, in body axis, in radians × 1024 per second × 21 (dividing by 375 will give degrees per second)
46	target heading	Target heading in degrees. The roll from heading loop adjusts target roll in order to minimize the difference between target heading and actual heading
47	Event	Indicator of exceptional circumstances. This field is for internal use only.

Fields 12 *GPS Status* and 23 *CHANGED* are described in detail in *Table 13.2 GPS Status* and *Table 13.3 Changed Status Field* and. Both of these fields are comprised of a number of separate elements packed together. These fields are easiest to examine if the number is converted into the binary numbering system. (The Windows calculator, in scientific view, will convert numbers into binary.)

Table 13.2 GPS Status

xxxx xxxx xxxx 0000	GPS receiver is generating fixes
xxxx xxxx xxxx 0001	No GPS time
xxxx xxxx xxxx 0010	Unused
xxxx xxxx xxxx 0011	PDOP too high[1]
xxxx xxxx xxxx 0100	No usable satellites
xxxx xxxx xxxx 0101	1 usable satellite
xxxx xxxx xxxx 0110	2 usable satellites
xxxx xxxx xxxx 0111	3 usable satellites
xxxx xxxx xxxx 1000	Chosen satellite is unusable
xxxx xxxx xxx1 xxxx	Synthesizer Fault
xxxx xxxx xx1x xxxx	Battery Powered Time Clock Fault
xxxx xxxx x1xx xxxx	
xxxx xxxx 1xxx xxxx	Almanac stored in the receiver is not complete or current
xxxx xxx1 xxxx xxxx	Battery backup failed
xxxx xx1x xxxx xxxx	Signal Processor error
xxxx x1xx xxxx xxxx	Antenna line fault
xxxx 1xxx xxxx xxxx	Excessive ref. frequency error
xx00 xxxx xxxx xxxx	Manual GPS - differential corrections are ignored
xx01 xxxx xxxx xxxx	Manual GPD - differential corrections must be present