AV-20

Serial Interface Specification

(D-0021-0, AV-20, SERIAL INTERFACE SPECIFICATION, REV A)

AeroVonics LLC

Albuquerque, New Mexico

Revisions

Rev	Date	Description of Change	Author	PDF Digital Sig
A	04/8/2019	Initial Release	JDB	

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1   Description

The AV-20 supports a bi-directional serial interface for console and data logging type applications. Various real-time parameters can be monitored by external systems utilizing this interface.

The protocol is fully ASCII in nature (no binary data) and can be exercised through a simple terminal program by typing and observing results. All data is output in a streamed fashion; once a data type is turned on and the data rate defined, the data will continuously stream out until turned off.

2   Physical Interface

RS-232 bi-directional serial interface, 115K baud, No parity, One stop.

DB-9 Connector Pinout:

Pin 5 = Aircraft Power (+12VDC to +28VDC)

Pin 9 = Aircraft Ground

Pin 4 = Serial Output

Pin 3 = Serial Input

3   Protocol

3.1   Streaming Control

By default, no streaming data is output. To turn "on" a given data type, the following ASCII command is sent to the AV-20:

```
$out=dt,dl<cr><lf>
```

Where 'dt' is the Data Type, which ranges from '00' to '99' and matches the data type tag when output (see data types table below). The 'dl' indicates the time delay between outputting the data as follows:

```
DATA_RATE_100HZ    01
DATA_RATE_50HZ     02
DATA_RATE_25HZ     04
DATA_RATE_10HZ     10
DATA_RATE_5HZ      20
DATA_RATE_1HZ      99
DATA_RATE_0H       00
```

The dt and dl values are simple ASCII, must be two characters in length, and have a leading zero if required. The '$out=' command must be in lower case.

As many data items as desired may be turned on at any given time, but there are no bandwidth limits enforced. Once 100% of the RS-232 data stream is full, data may be dropped on the output stream in an unpredictable fashion.

All streaming control can be turned off by sending the following command:

```
$out=00,00<cr><lf>
```

3.2   Output Data Formats

Streaming output data is sent by the AV-20 using one of 3 data formats as follows:

Flag Type Data:	dt=ddddd<cr><lf>
Small Floats:	dt=sdd.ddddd<cr><lf>
Large Floats:	dt=sdddd.dd<cr><lf>

Where dt is the Data Type, which ranges from 00 to 99. Where 's' is the Sign (either '+' or '-').

Each line is terminated by a CR LF sequence (Decimal 13, Decimal 10). All values are padded with leading zeros, making each line a fixed width for easier parsing.

The format which is output is dependent on the associated data type and is internally fixed. For example, data type 02 will always be output in the large float format.

Formats for each data type are not listed here, but may be determined by turning the data type on and observing the output format.

4   Examples

Examples are as follows:

Sending the command:

```
$out=02,04<cr><lf>
```

Will start streaming the output roll at 25 Hz in the format:

```
02=+0001.5<cr><lf>
```

Output examples of the different data formats are as follows:

```
01=10101<cr><lf>
02=+0012.34<cr><lf>
03=-0013.44<cr><lf>
05=+1234.56<cr><lf>
46=+12.34566<cr><lf>
47=+22.34567<cr><lf>
```

```
48=+32.34566<cr><lf>
```

5   Streaming Data Types

The following data types can be output and numerically range from '00' to '48'. Additional data types will be defined in future software loads.

Data Type ID	Name	Description
00	NONE	Reserved
01	STATUS	Status (Not implemented)
02	ROLL	Current Roll (deg)
03	PITCH	Current Pitch (deg)
04	YAW	Current Yaw (deg)
05	BCA	Pressure Altitude (feet)
06	IAS	Current IAS (knots)
07	OAT	Outside Air Temp (A/D)
08	TAS	True Airspeed (knots)
09	AOA	Angle of Attack (deg)
10	VOLTS	Bus Volts (v)
11	SENP	Pitot Pressure (mb)
12	SENS	Static Pressure (mb)
13	MAGX	Mag X (not implemented)
14	MAGY	Mag Y (not implemented)
15	MAGZ	Mag Z (not implemented)
16	TEMPP	Pitot Sensor Temp (C)
17	TEMPS	Static Sensor Temp (C)
18	CMDPH	Pitot Heater Command
19	CMDSH	Static Heater Command
20	BTEMP	Board Temp (C)
21	GYRO 0 XR	X Gyro 0 Rate Raw (dps)
22	GYRO 0 YR	Y Gyro 0 Rate Raw (dps)
23	GYRO 0 ZR	Z Gyro 0 Rate Raw (dps)
24	GYRO 1 XR	X Gyro 1 Rate Raw (dps)
25	GYRO 1 YR	Y Gyro 1 Rate Raw (dps)
26	GYRO 1 ZR	Z Gyro 1 Rate Raw (dps)
27	ACCEL 0 XR	X Accel 0 Raw (g)
28	ACCEL 0 YR	Y Accel 0 Raw (g)
29	ACCEL 0 ZR	Z Accel 0 Raw (g)
30	ACCEL 1 XR	X Accel 1 Raw (g)
31	ACCEL 1 YR	Y Accel 1 Raw (g)
32	ACCEL 1 ZR	Z Accel 1 Raw (g)
33	OIT0	Bias Trend 0

34	OIT1	Bias Trend 1
35	OIT2	Bias Trend 2
36	RPYWEIGHT	Correction Weight
37	BIASWEIGHT	Bias Weight
38	GYROXC	X Gyro Rate Calibrated (dps)
39	GYROYC	Y Gyro Rate Calibrated (dps)
40	GYROZC	Z Gyro Rate Calibrated (dps)
41	ACCELXC	X Accel Calibrated (g)
42	ACCELYC	Y Accel Calibrated (g)
43	ACCELZC	Z Accel Calibrated (g)
44	ALIGNCNT	Align Count
45	AHRSRPYGATE	RPY Gate
46	AHRSBGATE	Bias Gate
47	UPDATERATE	Screen Update Rate (hz)
48	YAWT	Yaw Target
49	GYROXSUM	X Gyro Integrated
50	GYROYSUM	Y Gyro Integrated
51	GYROZSUM	Z Gyro Integrated
52	OI0	Bias Trend 0
53	OI1	Bias Trend 1
54	OI2	Bias Trend 2
55	FIFOCOUNT	FIFO Count
56	ROLLRATE	Roll Rate (dps)
57	PITCHRATE	Pitch Rate (dps)
58	YAWRATE	Yaw Rate (dps)
59	AMBLIGHT	Ambient Light Level
60	ALLBTN	Button Status
61	VS	Vertical Speed (fpm)
62	BATVOLT	Battery Voltage (v)
63	JERKACCUM	Jerk Accumulator
64	ALIGNERROR	Align Error
65	IASUNGATED	IAS Ungated (kts)
66	OATC	OAT (C)