

Data Communication Protocol **Host Computer to FAS-A**

Overview

This section codifies the communication protocol between an FAS-A and a host computer. Utilizing these protocols the host computer can 1) acquire angles and bits data from the FAS-A and 2) read and write to its on-board memory. Armed with these protocols, FAS-A users can write their own applications in any number of programming environments.

Physical Cabling

Review the Hardware section of this manual to confirm the RS-232 connection between the FAS-A and the host computer.

RS-232 Host Signals Definition

<i>Signal Name</i>	<i>Direction</i>	<i>Function</i>
TxD Transmit Data	Host to FAS-A	Asynchronous Serial Data from Host
RxD Receive Data	FAS-A to Host	Asynchronous Serial Data to Host
GND Signal Ground	N/A	Signal Ground Reference

RS-232 Host Computer Settings

Baud: 9600
Parity: N(one)
Data Bits: 8
Stop Bits: 1

Protocol Notes

- Commands are generated by the host computer and responses are generated by the FAS-A.
- All commands and all responses have a fixed number of bytes.
- The FAS-A will not generate unsolicited data.
- The programmer should be aware that communication delays (albeit a few milliseconds) must be considered at the application level. Care should be taken to allow sufficient delay between the issuance of successive host computer commands so that commands do not run together and therefore become interpreted by the FAS-A as one command. Likewise, if a host computer command which returns an FAS-A response is issued, care must be taken to retrieve the actual response from the communications buffer without truncation or concatenation of preceding or following responses.
- MSB = Most Significant Byte; LSB = Least Significant Byte
- An FAS-A Memory Location Map is available upon request.

Command Table

<i>Base Command</i>	<i>Definition</i>
0x69	Send Accelerometer and Two Angles
0x6A	Send Two Angles
0x6B	Send One Angle
0x6C	Send Accelerometer
0x6F	Send Accelerometer and One Angle
0x62 et al	Read Internal Non-Volatile Memory
0x65 et al	Write Internal Non-Volatile Memory

Send Accelerometer and Two Angles command

Function: To request current bits and angles (+/-70 degree mode) from the FAS-A

Command: 0x69

Response Data: 8 data bytes defined as follows:

Ax bits MSB
Ax bits LSB
Ay bits MSB
Ay bits LSB
X angle MSB
X angle LSB
Y angle MSB
Y angle LSB

Notes: To convert Ax or Ay bits to an integer, use this formula:
 $\text{Bits} = (\text{MSB} * 256 + \text{LSB})$
To convert X or Y angles to an integer, use this formula:
 $\text{Angle} = (\text{MSB} * 256 + \text{LSB}) / 10430 * (180/\text{Pi})$

Send Two Angles command

Function: To request current angles (+/-70 degree mode) from the FAS-A

Command: 0x6A

Response Data: 4 data bytes defined as follows:
X angle MSB
X angle LSB
Y angle MSB
Y angle LSB

Notes: To convert X or Y angles to an integer, use this formula:
 $\text{Angle} = (\text{MSB} * 256 + \text{LSB}) / 10430 * (180/\text{Pi})$

Send One Angle command

Function: To request current angle (360 degree mode) from the FAS-A

Command: 0x6B

Response Data: 2 data bytes defined as follows:
X angle MSB
X angle LSB

Notes: To convert X angle to an integer, use this formula:
 $\text{Angle} = (\text{MSB} * 256 + \text{LSB}) / 5215 * (180/\text{Pi})$

Send Accelerometer command

Function: To request current bits from the FAS-A

Command: 0x6C

Response Data: 4 data bytes defined as follows:
Ax bits MSB
Ax bits LSB
Ay bits MSB
Ay bits LSB

Notes: To convert Ax or Ay bits to an integer, use this formula:
 $Bits = (MSB * 256 + LSB)$

Send Accelerometer and One Angle command

Function: To request current bits and angle (360 degree mode) from the FAS-A

Command: 0x6F

Response Data: 6 data bytes defined as follows:
Ax bits MSB
Ax bits LSB
Ay bits MSB
Ay bits LSB
X angle MSB
X angle LSB

Notes: To convert Ax or Ay bits to an integer, use this formula:
 $Bits = (MSB * 256 + LSB)$
To convert X angle to an integer, use this formula:
 $Angle = (MSB * 256 + LSB) / 5215 * (180/Pi)$

Read Internal Non-Volatile Memory command

Function:	To read the value in an EEPROM location of the FAS-A
Command:	0x62 + Delay + Memory Location
Delay:	100 millisecond interval between the sending of the 0x62 and the Memory Location
Memory Location:	1 byte integer between 2 and 254 representing an EEPROM location (see FAS-A Memory Location Map for details)
Response:	3 data bytes defined as follows: Value MSB Value LSB Memory Location
Notes:	To convert Value MSB and LSB to an integer, use this formula: Value = (MSB * 256 + LSB)

Write Internal Non-Volatile Memory command

Function:	To write a value to an EEPROM location of the FAS-A
Command:	0x65 + Delay + 0x71 + Memory Location + Value MSB + Value LSB + 0xAA
Delay:	100 millisecond interval between the sending of the 0x65 and the 0x71
Memory Location:	1 byte integer between 2 and 254 representing an EEPROM location (see FAS-A Memory Location Map for details)
Value MSB:	Value \ 255
Value LSB:	Value And 255
Response:	2 data bytes defined as follows: Value MSB Value LSB
Notes:	To convert Value MSB and LSB to an integer, use this formula: Value = (MSB * 256) + LSB