

1.14 RS232 Serial Data Interface (Optional):

An RS232 Serial Data Interface has been incorporated for aircraft requiring this type of connection. This feature allows customers to use the Alpha Systems I/F Module and Probe system to read a display response on an aircraft's existing flight display. This new configuration comes standard on newly purchased **IMs** and can be accessed via the 15 pin Dsub connector as follows:

- Pin 8; RS232 TXD
- Pin 6; RS232 Signal Ground
- Pin 4; RS232 Shield

The image below describes the RS232 Serial Data Protocol.

ILLUMINATED LEDS	DATA BYTES
NONE	0x00 ; 0x00 ; 0x00
RED TRIANGLE	0x03 ; 0x00 ; 0x00
RED TRIANGLE & RED CHEVRON	0x3F ; 0x00 ; 0x00
RED CHEVRON	0x3C ; 0x00 ; 0x00
RED CHEVRON & UPPER DOUGHNUT	0xFC ; 0x00 ; 0x00
UPPER DOUGHNUT	0xC0 ; 0x00 ; 0x00
WHOLE DOUGHNUT	0xC0 ; 0x03 ; 0x00
LOWER DOUGHNUT	0x00 ; 0x03 ; 0x00
LOWER DOUGHNUT & YELLOW CHEVRON	0x00 ; 0x3F ; 0x00
YELLOW CHEVRON	0x00 ; 0x3C ; 0x00
YELLOW CHEVRON & YELLOW TRIANGLE	0x00 ; 0xFC ; 0x00
YELLOW TRIANGLE	0x00 ; 0xC0 ; 0x00
YELLOW TRIANGLE & GREEN BAR	0x00 ; 0xC0 ; 0x03
GREEN BAR	0x00 ; 0x00 ; 0x03
ALL SEGMENTS	0xFF ; 0xFF ; 0x03
RED TRIANGLE, RED CHEVRON & UPPER DOUGHNUT	0xFF ; 0x00 ; 0x00
RED TRIANGLE, RED CHEVRON & WHOLE DOUGHNUT	0xFF ; 0x03 ; 0x00
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT & YELLOW CHEVRON	0xFF ; 0x3F ; 0x00
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT, YELLOW CHEVRON & YELLOW TRIANGLE	0xFF ; 0xFF ; 0x00

1.15 RS232 Display Adapter Module:

Alpha Systems AOA also offers an RS232 Display Adapter that allows an existing AOA flight system to interface with Alpha Systems AOA Displays.

Follow the table below to program the Serial Data Protocol:

RS232 Command Protocol

ILLUMINATED LEDS	RS232 DATA BYTES
NONE	0x30 ; 0xID ; 0x0D
RED TRIANGLE	0x31 ; 0xID ; 0x0D
RED TRIANGLE & RED CHEVRON	0x32 ; 0xID ; 0x0D
RED CHEVRON	0x33 ; 0xID ; 0x0D
RED CHEVRON & UPPER DOUGHNUT	0x34 ; 0xID ; 0x0D
UPPER DOUGHNUT	0x35 ; 0xID ; 0x0D
WHOLE DOUGHNUT	0x36 ; 0xID ; 0x0D
LOWER DOUGHNUT	0x37 ; 0xID ; 0x0D
LOWER DOUGHNUT & YELLOW CHEVRON	0x38 ; 0xID ; 0x0D
YELLOW CHEVRON	0x39 ; 0xID ; 0x0D
YELLOW CHEVRON & YELLOW TRIANGLE	0x41 ; 0xID ; 0x0D
YELLOW TRIANGLE	0x42 ; 0xID ; 0x0D
YELLOW TRIANGLE & GREEN BAR	0x43 ; 0xID ; 0x0D
GREEN BAR	0x44 ; 0xID ; 0x0D
ALL SEGMENTS	0x45 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON & UPPER DOUGHNUT	0x46 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON & WHOLE DOUGHNUT	0x47 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT & YELLOW CHEVRON	0x48 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT, YELLOW CHEVRON & YELLOW TRIANGLE	0x49 ; 0xID ; 0x0D

where ID = 0x61 for Primary Display
 where ID = 0x62 for Secondary Display
 where ID = 0x63 for Both Displays

ADJUST BRIGHTNESS	0x53 ; 0xXX ; 0x0D
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where XX = 0x30 to 0x39, 0x41 to 0x46

3.7 RS232 Communications:

The first configuration is the RS232 Display Adapter (DSTR-AOA-9300). This system allows the use of an aircraft's existing AOA system to interface with the Alpha Systems AOA Displays.

RS232 Display Adapter

The RS232/ARINC429 Display Adapter is a way for an existing flight system to communicate with Alpha Systems' displays.

RS232 Display Adapter Connectors

Display Connector - The Display Connector is a Hirose 10 pin connector used to connect the Display to the RS232 Adapter.

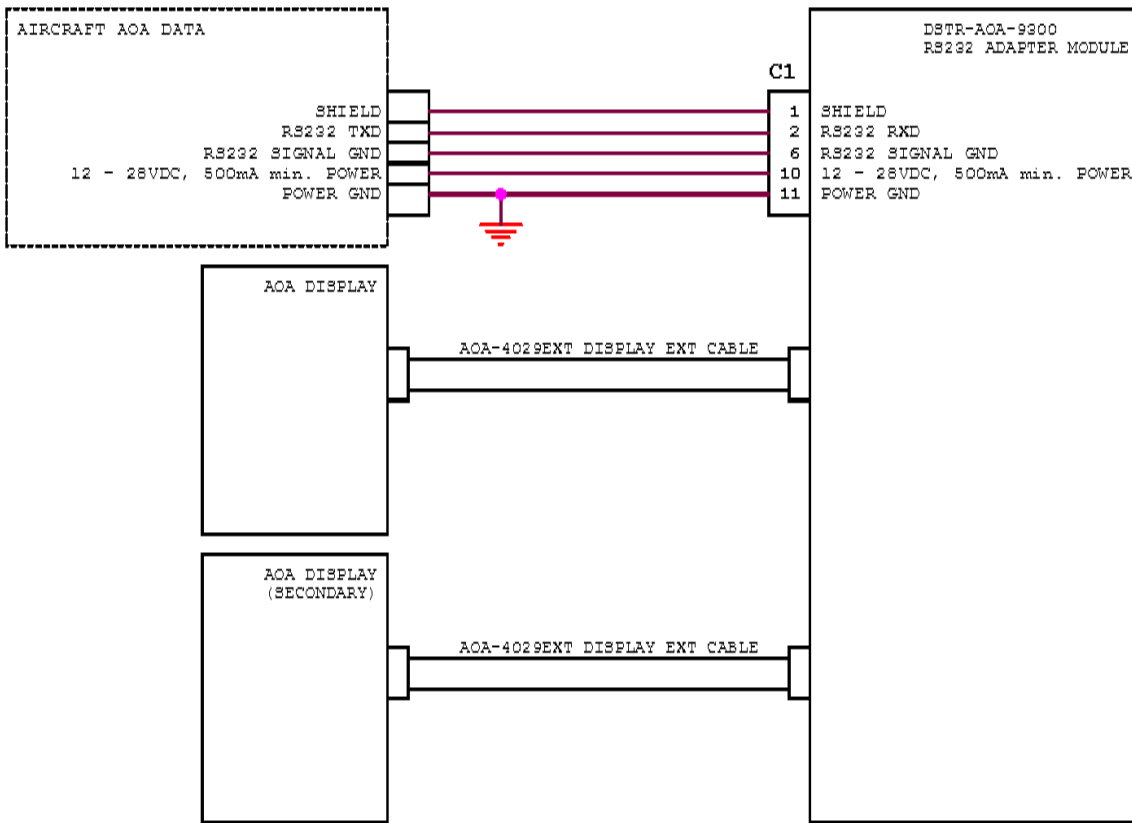
Power and RS232 Host Interface DB15 Connector - The Power and RS232 Host Interface Connector is a 15 position DSUB connector used to connect the RS232 Adapter to the Host System and contains the following signals:

- Pin 11; Power: +12 to +28 VDC, 500 mA min.
- Pin 10; Power Ground
- Pin 5; Adapter RS232 TXD (True RS232 or TTL Level); Adapter to Host (Not Used)
- Pin 2; Adapter RS232 RXD (True RS232 or TTL Level); Host to Adapter
- Pin 6; RS232 Signal Ground
- Pin 1; Shield

RS232 Interface Protocol

- Serial Protocol based on RS232
- 9600 baud, 1 start bit, 8 data bits, no parity, 1 stop bit
- Factory default set to RS232 levels (+/- 5 VDC Levels)
- Can be strapped to TTL (0 to 5 VDC) levels
- Maximum distance to Host: TBD

NOTE: ONE DSUB 15 CONN INCLUDED FOR INSTALLATION OF FLAP SYSTEM AT C1



Commands Strings from the Host Device

A Command String from the Host Device to illuminate a display segment(s) consists of a Display Segment Illumination Character followed by a Carriage Return Character as shown below:

DCDIDCR

Where;

DC (30-39, 41-49) One Display Segment Illumination Character

DID (61, 62, or 63) Display ID; 61 = Primary, 62 = Secondary, 63 = both

CR (0D) Carriage Return Character to end the command string

A Command String from the Host Device to change the display brightness consists of an Adjust Brightness Command Identifier, a Brightness Level Character, and a Carriage Return Character as shown below:

ADBLCR

Where;

AD (53) Command Identifier always a 53 hex

BL (30-39, 41-46) 16 Brightness Levels from Dimmest to Brightest Level

CR (0D) Carriage Return Character to end the command string

RS232 Command Protocol

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NONE	0x30 ; 0xID ; 0x0D
RED TRIANGLE	0x31 ; 0xID ; 0x0D
RED TRIANGLE & RED CHEVRON	0x32 ; 0xID ; 0x0D
RED CHEVRON	0x33 ; 0xID ; 0x0D
RED CHEVRON & UPPER DOUGHNUT	0x34 ; 0xID ; 0x0D
UPPER DOUGHNUT	0x35 ; 0xID ; 0x0D
WHOLE DOUGHNUT	0x36 ; 0xID ; 0x0D
LOWER DOUGHNUT	0x37 ; 0xID ; 0x0D
LOWER DOUGHNUT & YELLOW CHEVRON	0x38 ; 0xID ; 0x0D
YELLOW CHEVRON	0x39 ; 0xID ; 0x0D
YELLOW CHEVRON & YELLOW TRIANGLE	0x41 ; 0xID ; 0x0D
YELLOW TRIANGLE	0x42 ; 0xID ; 0x0D
YELLOW TRIANGLE & GREEN BAR	0x43 ; 0xID ; 0x0D
GREEN BAR	0x44 ; 0xID ; 0x0D
ALL SEGMENTS	0x45 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON & UPPER DOUGHNUT	0x46 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON & WHOLE DOUGHNUT	0x47 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT & YELLOW CHEVRON	0x48 ; 0xID ; 0x0D
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT, YELLOW CHEVRON & YELLOW TRIANGLE	0x49 ; 0xID ; 0x0D

where ID = 0x61 for Primary Display
 where ID = 0x62 for Secondary Display
 where ID = 0x63 for Both Displays

ADJUST BRIGHTNESS	0x53 ; 0xXX ; 0x0D
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where XX = 0x30 to 0x39, 0x41 to 0x46

Display I/F Module RS232 Transmit

The second way to communicate via RS232 is by using the Alpha Systems I/F Module and Probe to calculate AOA and transmit the information to an existing Primary Flight Display (PFD).

The RS232 Interface is found on the 15 pin Dsub I/O Connector of the AOA I/F Module. It consists of the following signals:

- Pin 5; RS232 TXD
- Pin 6; RS232 Signal Ground
- Pin 4; Shield

RS232 Interface Protocol

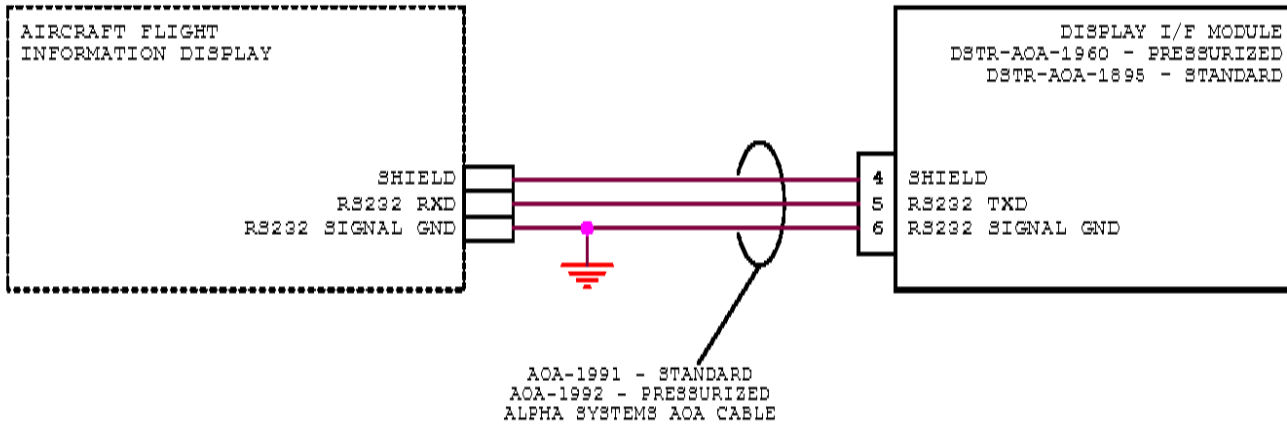
- Serial Protocol based on RS232
- 9600 baud, 1 start bit, 8 data bits, no parity, 1 stop bit
- Factory default set to RS232 levels (+5VDC to -5VDC)
- Can be strapped to TTL levels
- Maximum distance to Host: TBD

Output Serial RS232 Data Stream at Interface

The Output Serial Data Stream is a continuous stream of data consisting of an STX (02 hex) character, 3 bytes of hex data that correspond to the display segments that are currently illuminated, and an EOT (04 hex) character.

NOTE: USE THE CABLE MARKED "RS232 OUT" & THE WIRES WILL BE LABELED FOR EACH CONNECTION

NOTE: A SPECIAL RS232 AUXILIARY CABLE IS PROVIDED FOR INSTALLATION



RS232 Command Protocol:

ILLUMINATED LEDS	DATA BYTES
NONE	0x00 ; 0x00 ; 0x00
RED TRIANGLE	0x03 ; 0x00 ; 0x00
RED TRIANGLE & RED CHEVRON	0x3F ; 0x00 ; 0x00
RED CHEVRON	0x3C ; 0x00 ; 0x00
RED CHEVRON & UPPER DOUGHNUT	0xFC ; 0x00 ; 0x00
UPPER DOUGHNUT	0xC0 ; 0x00 ; 0x00
WHOLE DOUGHNUT	0xC0 ; 0x03 ; 0x00
LOWER DOUGHNUT	0x00 ; 0x03 ; 0x00
LOWER DOUGHNUT & YELLOW CHEVRON	00x0 ; 0x3F ; 0x00
YELLOW CHEVRON	0x00 ; 0x3C ; 0x00
YELLOW CHEVRON & YELLOW TRIANGLE	0x00 ; 0xFC ; 0x00
YELLOW TRIANGLE	0x00 ; 0xC0 ; 0x00
YELLOW TRIANGLE & GREEN BAR	0x00 ; 0xC0 ; 0x03
GREEN BAR	0x00 ; 0x00 ; 0x03
ALL SEGMENTS	0xFF ; 0xFF ; 0x03
RED TRIANGLE, RED CHEVRON & UPPER DOUGHNUT	0xFF ; 0x00 ; 0x00
RED TRIANGLE, RED CHEVRON & WHOLE DOUGHNUT	0xFF ; 0x03 ; 0x00
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT & YELLOW CHEVRON	0xFF ; 0x3F ; 0x00
RED TRIANGLE, RED CHEVRON, BLUE DOUGHNUT, YELLOW CHEVRON & YELLOW TRIANGLE	0xFF ; 0xFF ; 0x00