Aircraft Bus Emulator, Version 3

Product Specification and Interfaces

Signature Page

Prepared by:

David W. Dodson

David W. Dodson
Engineering Manager

11/17/2020
Date

Reviewed by:

Mark Russell

Mark Russell
SQA

11/17/2020
Date

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

Document Change Record

Revision	Description of Change	Approved By	Approval Date
A	Initial publication, Rev A Hardware and Software	Dave Dodson	04/06/2016
B	Hardware Modifications for 10 msec Frames, Rev B Hardware and Software	Dave Dodson	10/17/2017
C	Added connector definition.	Dave Dodson	05/20/2019
D	Replaced reference images. Updates for ABE 3.1. Made a grounding fix to the hardware to prevent resets from static electric shock.	Sean Hoops Ron Penner	11/17/2020

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

Table of Contents

1 Aircraft Buss Emulator 1.1-5
1.1 Overview 1.1-5
1.1.1 USB Connection to the PC 1.1-5
1.1.2 ABE Capabilities 1.1-5
1.1.3 Required Connectors 1.1-5
1.1.4 Driver Installation 1.1-6
1.2 ABE Physical Dimensions 1.2-7
1.3 ABE Pin Out 1.3-8
1.3.1 D-SUB 62 ARINC TX/RX Connector 1.3-8
1.3.2 D-SUB 62 Discrete and Serial Connector 1.3-10

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

1 Aircraft Buss Emulator

1.1 Overview

ABE (Aircraft Bus Emulator) is a device that connects to a PC via USB, it collects data on standard aircraft communication busses, packages the data, and then passes those packages on to the PC over the USB connection. Likewise, it can take in data from its PC host and push that data out over standard aircraft communication busses.

1.1.1 USB Connection to the PC

The ABE uses USB as a source of power and for data transfer.

1.1.2 ABE Capabilities

Each ABE device provides the following connections to potential aircraft communication busses:

1. 8 ARINC 429 Transmit Ports
2. 16 ARINC 429 Receive Ports
3. 12 ARINC Input Discretes
4. 12 ARINC Output Discretes
5. 8 Configurable Serial ports (RS 422, 485, 232)

These are commonly used communication busses and discretes in the avionics industry.

1.1.3 Required Connectors

The ABE has two identical 62-pin high density female D-sub connectors. These connectors are used for discrete, serial, and ARINC 429 output/input. In general, one connector is used for ARINC 429 transmit/receive while the other is used for serial and discrete transmit/receive.

The actual connector used in the ABE is:

Manufacturer: NorComp Inc
Part Number: 181-062-213R561

This is a common part and there are other manufacturers. To view this part, visit DigiKey's web site at the following URL:

DigiKey Link: https://www.digikey.com/products/en?keywords=181-262rfe-nd

1.1.3.1 Mating Connector

A potential mating connector for the two ABE D-sub connectors is:

Manufacturer: HARTING
Part Number: 09564005604

As with the female connectors installed in the ABE, this is a common part and there are other manufacturers that could be used. To view this part, visit DigiKey's web site at the following URL:

DigiKey Link: https://www.digikey.com/products/en?keywords=1195-2332-ND

1.1.3.2 Potential Shell for the Mating Connector

Generally a shell is desired for the mating connector, though it is not absolutely required. If a shell is desired, then the part discussed in this Section may be suitable. The actual shell used may depend on thickness of the cabling. A potentially suitable back shell is:

Manufacturer: ITT Cannon, LLC
Part Number: 980-2000-348

To view the above part, visit DikiKey's web site at the URL:

DigiKey Link: https://www.digikey.com/products/en?keywords=%091003-1946-ND

1.1.4 Driver Installation

When the ABE is plugged into a Windows based machine windows will install drivers for the ABE and each serial port attached.

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

1.2 ABE Physical Dimensions

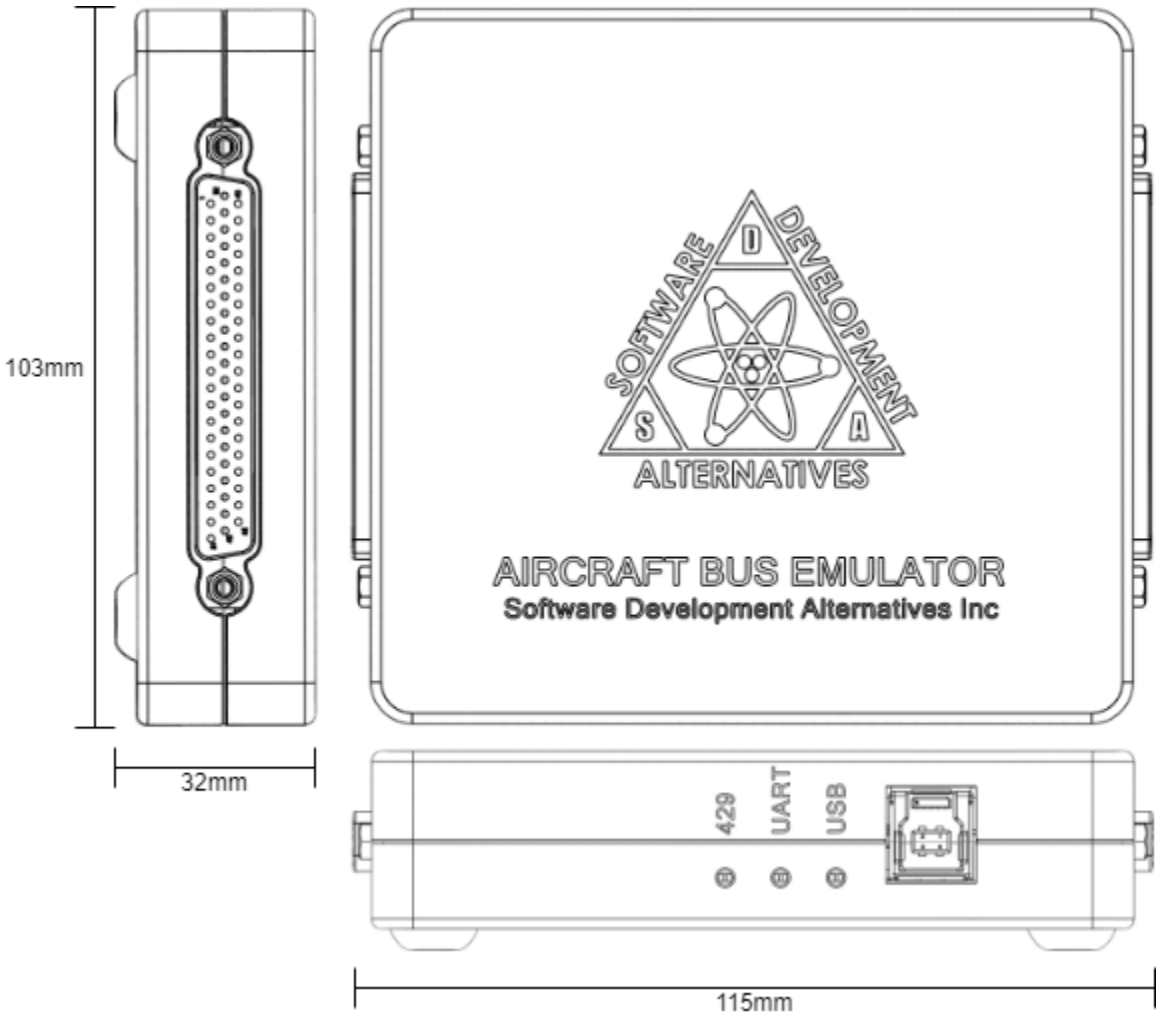
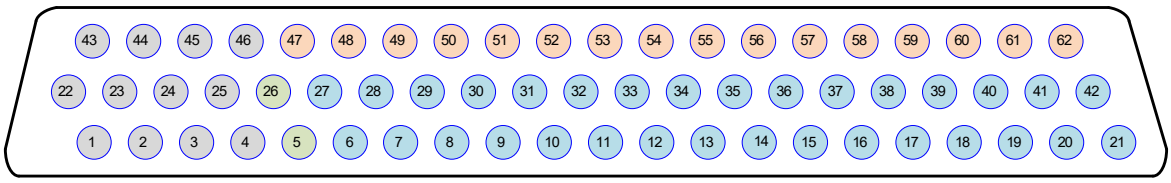


Figure 1.2-1 ABE Physical Dimensions

1.3 ABE Pin Out

1.3.1 D-SUB 62 ARINC TX/RX Connector

This connector contains the physical connection for all ARINC 429 Transmit and Receive ports supported by ABE.



D-Sub 62 Receptacle (Female Socket Contacts locations shown)

Figure 4.1-1 Front View of D-SUB 62 ARINC 429 TX/RX Connector

Pin	Pin Name	Signal Name
Pin 1	Internal Use only	Internal Use only
Pin 2	Internal Use only	Internal Use only
Pin 3	Internal Use only	Internal Use only
Pin 4	Internal Use only	Internal Use only
Pin 5	GND	Ground
Pin 6	RX_N2	A 429 Receive 1 N
Pin 7	RX_P2	A 429 Receive 1 P
Pin 8	RX_N4	A 429 Receive 3 N
Pin 9	RX_P4	A 429 Receive 3 P
Pin 10	RX_N6	A 429 Receive 5 N
Pin 11	RX_P6	A 429 Receive 5 P
Pin 12	RX_N8	A 429 Receive 7 N
Pin 13	RX_P8	A 429 Receive 7 P
Pin 14	RX_N10	A 429 Receive 9 N
Pin 15	RX_P10	A 429 Receive 9 P
Pin 16	RX_P12	A 429 Receive 11 P
Pin 17	RX_N12	A 429 Receive 11 N
Pin 18	RX_P14	A 429 Receive 13 P
Pin 19	RX_N14	A 429 Receive 13 N
Pin 20	RX_P16	A 429 Receive 15 P
Pin 21	RX_N16	A 429 Receive 15 N
Pin 22	Internal Use only	Internal Use only
Pin 23	Internal Use only	Internal Use only
Pin 24	Internal Use only	Internal Use only
Pin 25	Internal Use only	Internal Use only
Pin 26	GND	Ground

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

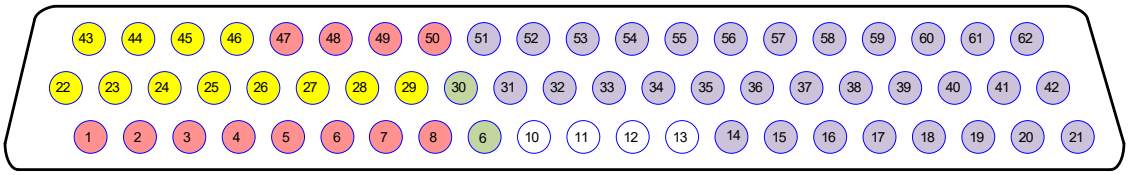
Pin 27	RX_N1	A 429 Receive 0 N
Pin 28	RX_P1	A 429 Receive 0 P
Pin 29	RX_N3	A 429 Receive 2 N
Pin 30	RX_P3	A 429 Receive 2 P
Pin 31	RX_N5	A 429 Receive 4 N
Pin 32	RX_P5	A 429 Receive 4 P
Pin 33	RX_N7	A 429 Receive 6 N
Pin 34	RX_P7	A 429 Receive 6 P
Pin 35	RX_N9	A 429 Receive 8 N
Pin 36	RX_P9	A 429 Receive 8 P
Pin 37	RX_P11	A 429 Receive 10 P
Pin 38	RX_N11	A 429 Receive 10 N
Pin 39	RX_P13	A 429 Receive 12 P
Pin 40	RX_N13	A 429 Receive 12 N
Pin 41	RX_P15	A 429 Receive 14 P
Pin 42	RX_N15	A 429 Receive 14 N
Pin 43	Internal Use only	Internal Use only
Pin 44	Internal Use only	Internal Use only
Pin 45	Internal Use only	Internal Use only
Pin 46	Internal Use only	Internal Use only
Pin 47	TX_N1	A 429 Transmit 0 N
Pin 48	TX_P1	A 429 Transmit 0 P
Pin 49	TX_N2	A 429 Transmit 1 N
Pin 50	TX_P2	A 429 Transmit 1 P
Pin 51	TX_N3	A 429 Transmit 2 N
Pin 52	TX_P3	A 429 Transmit 2 P
Pin 53	TX_N4	A 429 Transmit 3 N
Pin 54	TX_P4	A 429 Transmit 3 P
Pin 55	TX_N5	A 429 Transmit 4 N
Pin 56	TX_P5	A 429 Transmit 4 P
Pin 57	TX_P6	A 429 Transmit 5 P
Pin 58	TX_N6	A 429 Transmit 5 N
Pin 59	TX_P7	A 429 Transmit 6 P
Pin 60	TX_N7	A 429 Transmit 6 N
Pin 61	TX_P8	A 429 Transmit 7 P
Pin 62	TX_N8	A 429 Transmit 7 N

Table 4.1-1 ARINC RX/TX D-SUB62 Connector Pin Out

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

1.3.2 D-SUB 62 Discrete and Serial Connector

This connector contains the physical connection for all Discrete and Serial ports supported by ABE.



D-Sub 62 Receptacle (Female Socket Contact locations shown)

Figure 4.2-1 Front View of Male D-SUB 62 Discrete and Serial Connector

Pin	Pin Name	Signal Name
Pin 1	X_DRV12	Discrete Output 11
Pin 2	X_DRV11	Discrete Output 10
Pin 3	X_DRV10	Discrete Output 9
Pin 4	X_DRV9	Discrete Output 8
Pin 5	X_DRV4	Discrete Output 3
Pin 6	X_DRV3	Discrete Output 2
Pin 7	X_DRV2	Discrete Output 1
Pin 8	X_DRV1	Discrete Output 0
Pin 9	GND	Ground
Pin 10	NC	NC
Pin 11	NC	NC
Pin 12	NC	NC
Pin 13	NC	NC
Pin 14	X_A/Y8	Serial 7 (485 P - 422 TX P - 232 TX)
Pin 15	X_B/Z8	Serial 7 (485 N - 422 TX N - 232 TX)
Pin 16	X_B8	Serial 7 (422 RX N - 232 RX)
Pin 17	X_A8	Serial 7 (422 RX P - 232 RX)
Pin 18	X_A/Y7	Serial 6 (485 P - 422 TX P - 232 TX)
Pin 19	X_B/Z7	Serial 6 (485 N - 422 TX N - 232 TX)
Pin 20	X_B7	Serial 6 (422 RX N - 232 RX)
Pin 21	X_A7	Serial 6 (422 RX P - 232 RX)
Pin 22	X_SNS12	Discrete Input 11
Pin 23	X_SNS11	Discrete Input 10
Pin 24	X_SNS10	Discrete Input 9
Pin 25	X_SNS9	Discrete Input 8
Pin 26	X_SNS4	Discrete Input 3

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.

Pin 27	X_SNS3	Discrete Input 2
Pin 28	X_SNS2	Discrete Input 1
Pin 29	X_SNS1	Discrete Input 0
Pin 30	GND	Ground
Pin 31	X_A/Y6	Serial 5 (485 P - 422 TX P - 232 TX)
Pin 32	X_B/Z6	Serial 5 (485 N - 422 TX N - 232 TX)
Pin 33	X_B6	Serial 5 (422 RX N - 232 RX)
Pin 34	X_A6	Serial 5 (422 RX P - 232 RX)
Pin 35	X_A/Y5	Serial 4 (485 P - 422 TX P - 232 TX)
Pin 36	X_B/Z5	Serial 4 (485 N - 422 TX N - 232 TX)
Pin 37	X_B5	Serial 4 (422 RX N - 232 RX)
Pin 38	X_A5	Serial 4 (422 RX P - 232 RX)
Pin 39	X_A/Y4	Serial 3 (485 P - 422 TX P - 232 TX)
Pin 40	X_B/Z4	Serial 3 (485 N - 422 TX N - 232 TX)
Pin 41	X_B4	Serial 3 (422 RX N - 232 RX)
Pin 42	X_A4	Serial 3 (422 RX P - 232 RX)
Pin 43	X_SNS8	Discrete Input 7
Pin 44	X_SNS7	Discrete Input 6
Pin 45	X_SNS6	Discrete Input 5
Pin 46	X_SNS5	Discrete Input 4
Pin 47	X_DRV8	Discrete Output 7
Pin 48	X_DRV7	Discrete Output 6
Pin 49	X_DRV6	Discrete Output 5
Pin 50	X_DRV5	Discrete Output 4
Pin 51	X_A/Y3	Serial 2 (485 P - 422 TX P - 232 TX)
Pin 52	X_B/Z3	Serial 2 (485 N - 422 TX N - 232 TX)
Pin 53	X_B3	Serial 2 (422 RX N - 232 RX)
Pin 54	X_A3	Serial 2 (422 RX P - 232 RX)
Pin 55	X_A/Y2	Serial 1 (485 P - 422 TX P - 232 TX)
Pin 56	X_B/Z2	Serial 1 (485 N - 422 TX N - 232 TX)
Pin 57	X_B2	Serial 1 (422 RX N - 232 RX)
Pin 58	X_A2	Serial 1 (422 RX P - 232 RX)
Pin 59	X_A/Y1	Serial 0 (485 P - 422 TX P - 232 TX)
Pin 60	X_B/Z1	Serial 0 (485 N - 422 TX N - 232 TX)
Pin 61	X_B1	Serial 0 (422 RX N - 232 RX)
Pin 62	X_A1	Serial 0 (422 RX P - 232 RX)

Table 4.2-1 ARINC RX/TX D-SUB62 Connector Pin Out

Use or disclosure of the information in this document is subject to the restrictions on the title page of this document.