

ICD 101

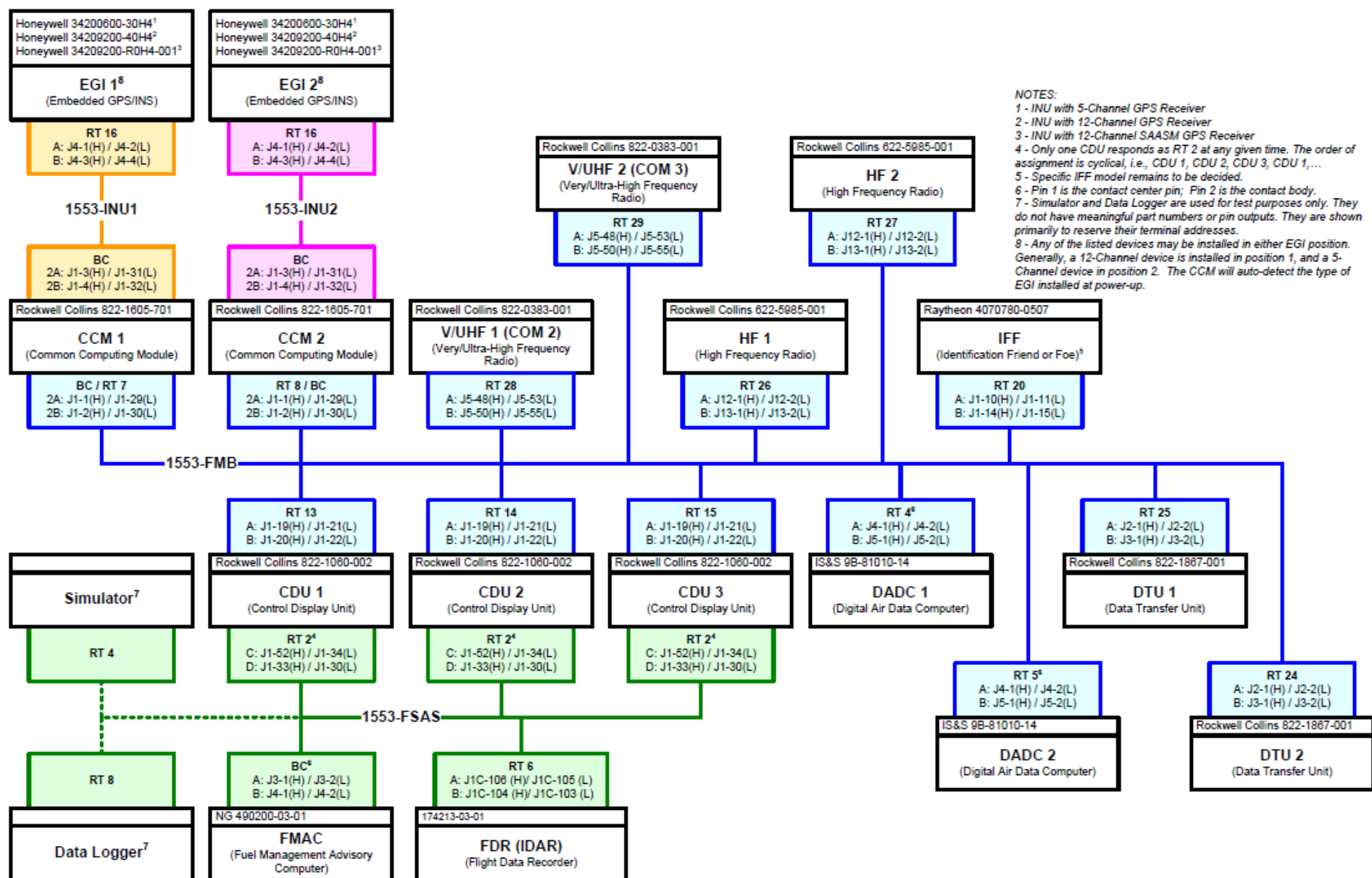
Version 3

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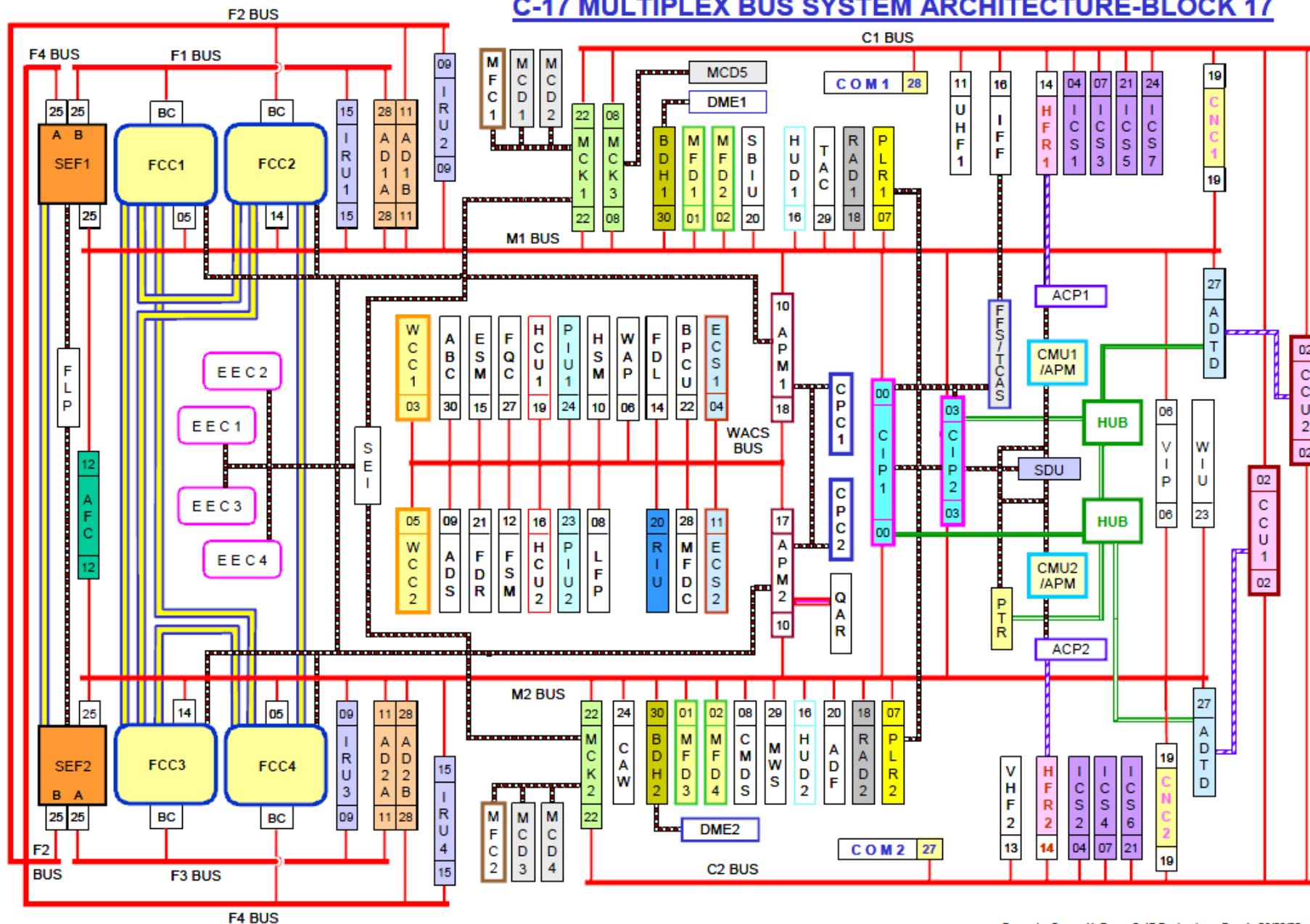
Interface Control Document

- For aircraft avionics systems it defines the data message structure and all information required to convert the raw data into engineering units.

Avionics Diagram



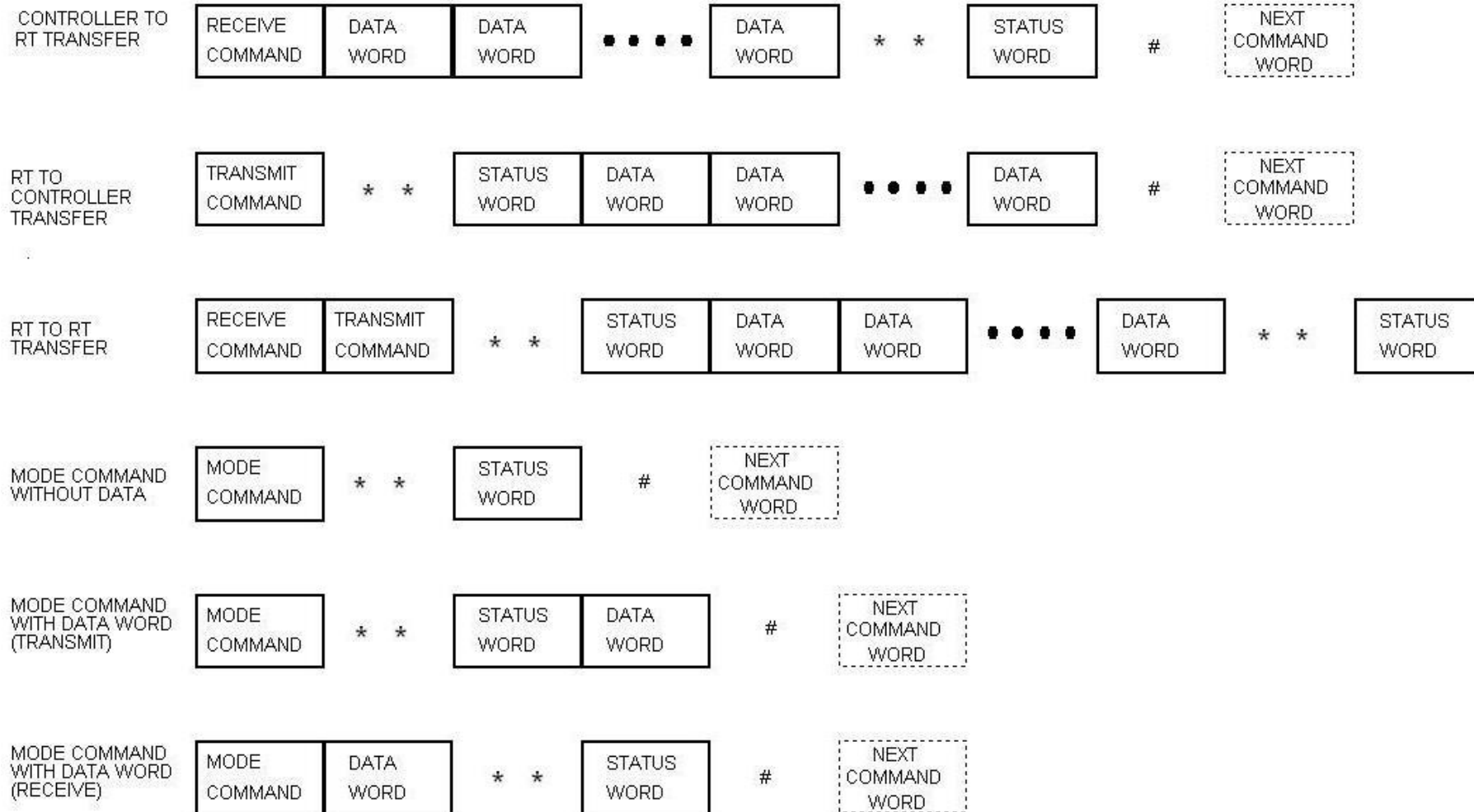
C-17 MULTIPLEX BUS SYSTEM ARCHITECTURE-BLOCK 17



MIL STD 1553

- Bus Controller – directs all communication
- Remote Terminal – a device on the bus with an address (0 – 31)
- Messages
 - BC – RT
 - RT – BC
 - RT – RT
- Mode words

1553 Data Format



1553 Command Word Structure

HEX	6				A				1				C			
Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1553	Terminal Address					T/R	Subaddress					Word Count				
Binary	0	1	1	0	1	0	1	0	0	0	0	1	1	1	0	0
1553	13					R	16					28				

Command Word Tool

1553 Command W... — □ ×

TA	T/R	SA	WC
13	R	16	28

Cmd Wrd

6a1c|

Comment: CCM to CDU 16R

Message: AIP Aero Parameters - Right (CR8)

Word 1: Discretes

ICD Definitions

Bit	Description
1	Data Source
2	Data Source
3	True Heading Valid (0=Invalid, 1=Valid)
4	TCAS Status Valid (0=Invalid, 1=Valid)
5	EGPWS Status Valid (0=Invalid, 1=Valid)
6	PEM Status Valid (0=Invalid, 1=Valid)
7	DSM Status Valid (0=Invalid, 1=Valid)
8	IOC Status Valid (0=Invalid, 1=Valid)
9	CCM Status Valid (0=Invalid, 1=Valid)
10	CDU Status Valid (0=Invalid, 1=Valid)
11	Track Angle Error Valid (0=Invalid, 1=Valid)
12	Wind Direction Valid (0=Invalid, 1=Valid)
13	Wind Velocity Valid (0=Invalid, 1=Valid)
14	Pressure Altitude Valid (0=Invalid, 1=Valid)
15	Spare
16	Spare

Notes:

Data Source (Bits 1 & 2)

00 (0) Co-pilot

01 (1) Pilot

Comment: CCM to CDU 16R
Message: AIP Aero Parameters - Right (CR8)
Word 2: Present True Heading

Comment: CCM to CDU 16R
Message: AIP Aero Parameters - Right (CR8)
Word 2: Present True Heading

Comment: CCM to CDU 16R
Message: AIP Aero Parameters - Right (CR8)
Word 2: Present True Heading

ICD Definitions

Bit	Description
1	Present True Heading 0 = Positive (Clockwise from True north), 1 = Negative
2	MSB = 0.5
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.	
.	
.	
.	
.	
.	
.	
.	
16	LSB = MSB/2 ¹⁴

Notes:
Bits 0-15
Units: Semicircles
Format: Two's Complement

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1553 Parameters

The screenshot shows the 'Library Editor' window with the 'Library' tab selected. The 'Library' dropdown is set to 'AIP'. The 'Signals' list on the left contains various parameters, with 'C1AIPCR8_2R' selected. The right pane shows the 'Details' tab for this parameter. The 'Type' is 'MIL-STD-1553'. The 'Name' is 'C1AIPCR8_2R', 'Tag ID' is '00006A1C', and 'Mask' is '0000FFFF'. The 'Type' dropdown is set to 'Two's Complement', 'ICD Name' is 'C1AIPCR8_2R', and 'Units' is 'semicir'. The 'Start Word' is 2, 'Start Bit' is 0, 'Length' is 16, 'Start Word 2' is 0, 'Start Bit 2' is 0, and 'Length 2' is 0. The 'LSB' is '3.051758E-05' and 'Offset' is 0. The 'Swap' options are 'Bit', 'Byte', and 'Word', all of which are unchecked. The 'Message Type' is 'RTBC'. The 'Comment' field contains the text 'Present True Heading'. The window has standard 'OK', 'Cancel', and 'Help' buttons at the bottom right.

Library Editor

Library Signal

Library: AIP

Signals:

- C1AIPCR8_22R
- C1AIPCR8_23R
- C1AIPCR8_24R
- C1AIPCR8_25R
- C1AIPCR8_26R
- C1AIPCR8_27R
- C1AIPCR8_28R
- C1AIPCR8_2R**
- C1AIPCR8_3R
- C1AIPCR8_4R
- C1AIPCR8_5R
- C1AIPCR8_6R
- C1AIPCR8_7R
- C1AIPCR8_8R
- C1AIPCR8_9R
- C1AIPCR9_10R
- C1AIPCR9_11R (WindDirection)
- C1AIPCR9_12R (WindVelocity)
- C1AIPCR9_13R
- C1AIPCR9_14R
- C1AIPCR9_15R
- C1AIPCR9_16R
- C1AIPCR9_17R
- C1AIPCR9_18R
- C1AIPCR9_19R
- C1AIPCR9_1R
- C1AIPCR9_20R
- C1AIPCR9_21R
- C1AIPCR9_22R
- C1AIPCR9_23R
- C1AIPCR9_24R
- C1AIPCR9_25R

Filter:

Type: MIL-STD-1553

Notes:

Details Dependencies Table Lookup Polynomial

Name: C1AIPCR8_2R

Tag ID: 00006A1C

Mask: 0000FFFF

Type: Two's Complement

ICD Name: C1AIPCR8_2R

Units: semicir

Start Word: 2

Start Bit: 0

Length: 16

Start Word 2: 0

Start Bit 2: 0

Length 2: 0

LSB: 3.051758E-05

Offset: 0

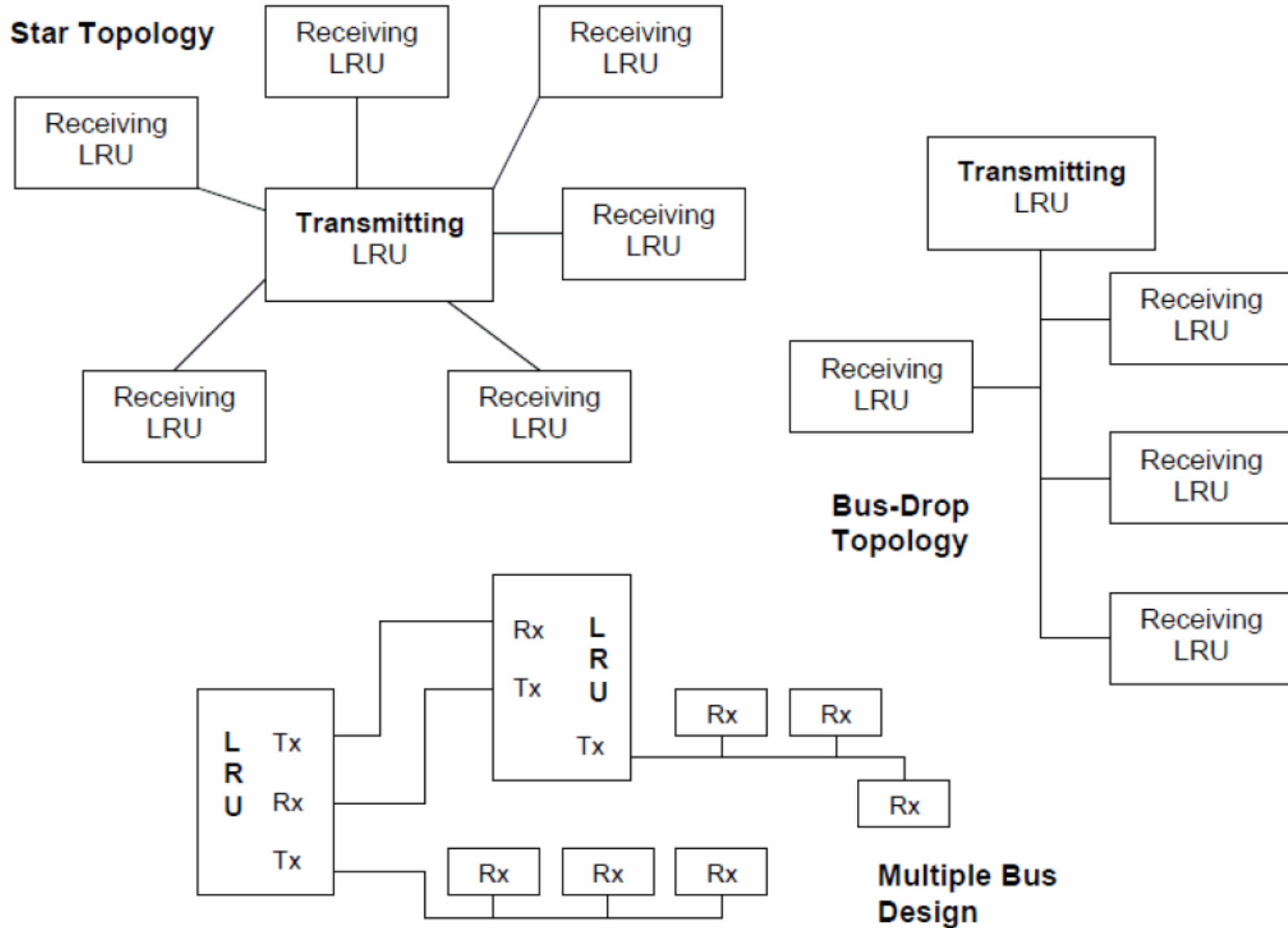
Swap: ☐ Bit ☐ Byte ☐ Word

Message Type: RTBC

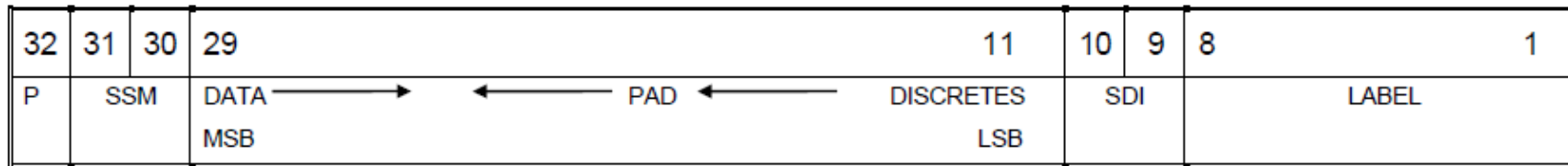
Comment: Present True Heading

OK Cancel Help

Arinc 429 Data Format



429 Message Structure



- ARINC convention numbers the bits from 1 (LSB) to 32 (MSB).
- The least significant bit of each byte except the label is transmitted first, and the label is transmitted ahead of the data in each case. The order of the bits transmitted on the ARINC bus is as follows:
8, 7, 6, 5, 4, 3, 2, 1, 9, 10, 11, 12, 13 ... 32.
- Labels are typically represented as octal numbers.
- Sign / Status Matrix defines data convention with 01 = No Computed Data (NCD)

Comment: ARINC 429 XMIT #1 FMS Data: Label 210, Airspeed (True)

ICD Definitions (429)

Bit	Description
1-8	Octal Label = 210
9-10	00 = All Call; 10 = Left Unit; 01 = Right Unit; 11 = Center Unit
11	SPARE
12	SPARE
13	SPARE
14	Knots LSB = MSB/2^14
.	
.	
.	
28	MSB = 1024.0
29	0 = Positive, 1 = Negative
	SSM
30	0 Failure 1 NCD 0 Functional 1 Normal
31	0 Warning 0 1 Test 1 Operation
32	Parity (Odd)

$$\begin{aligned} \text{EU} &= 1024.0 / 16384 \\ &= 0.0625 \text{ Knots} \end{aligned}$$

Notes:

[1] Rate:10 Hz.

[2] Word Range:0 to 2048

[3] Range:0.0 to 999.9

[4] Data invalidity is No Computed Data.

[5] True air speed is passed from Selected air data source.

429 Parameters

The screenshot shows the 'Library Editor' window with the 'Signal' tab selected. On the left, a list of signals under the 'FMS' library is shown, with 'FMS_210' selected. The right pane displays the configuration for 'FMS_210'.

Library Editor

Library: FMS

Signals:

- FMS_210
- FMS_212
- FMS_213
- FMS_214
- FMS_220
- FMS_226
- FMS_227
- FMS_230
- FMS_231
- FMS_240
- FMS_242
- FMS_243
- FMS_251
- FMS_252
- FMS_253
- FMS_254
- FMS_260
- FMS_263
- FMS_264

Filter:

Type: ARINC

Notes:

Details Dependencies

Name: FMS_210 Type: Two's Complement

Label: 210 ICD Name: AIR SPEED (TRUE)

Units: None

LSB Value: 0.0625

Start Bit: 13 Offset: 0

Length: 16

☐ Bit Swap

☐ Byte Swap

☐ WordSwap

Comment:

OK Cancel Help