ICD 101

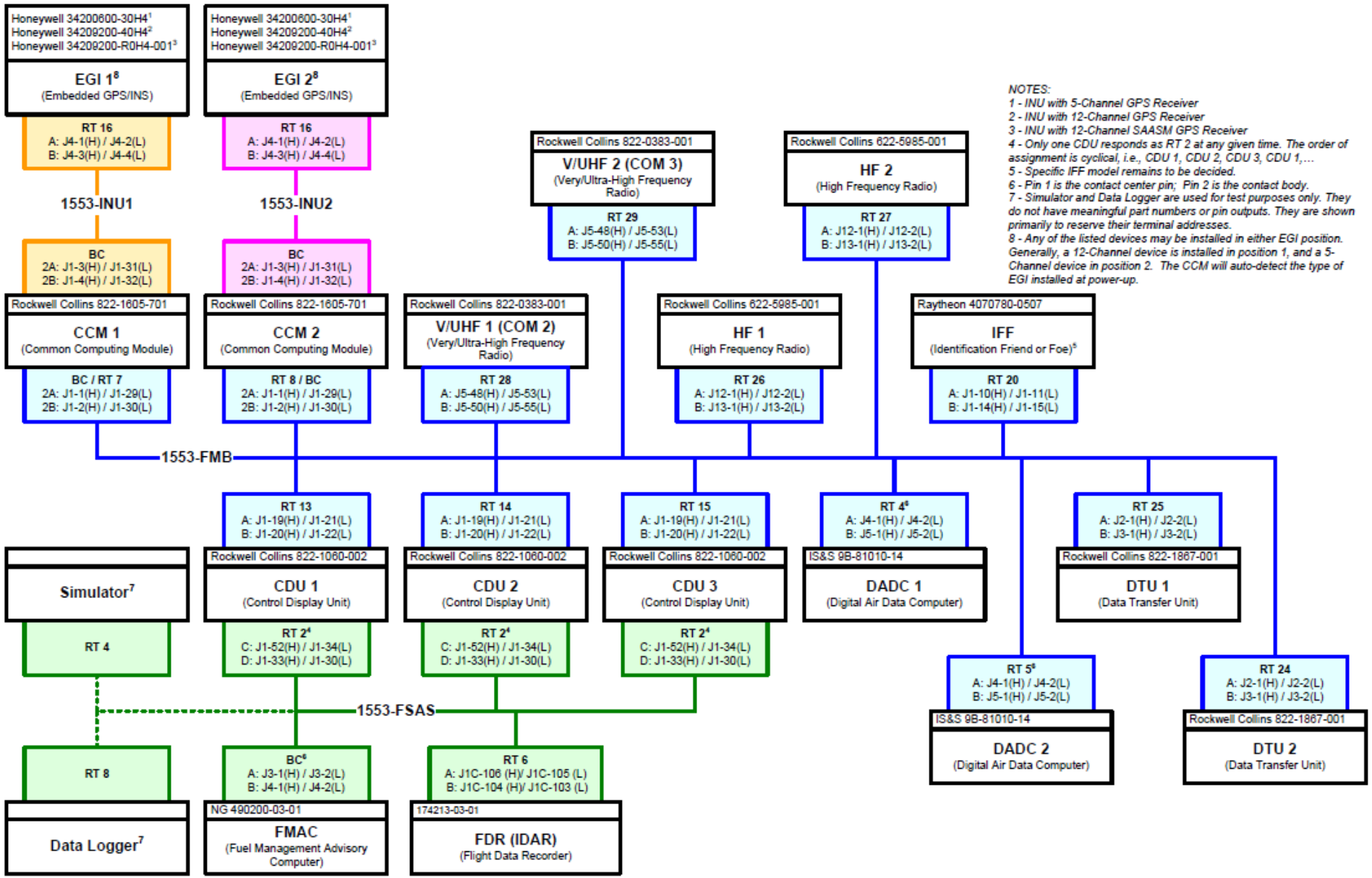
Version 3

21 January 2020

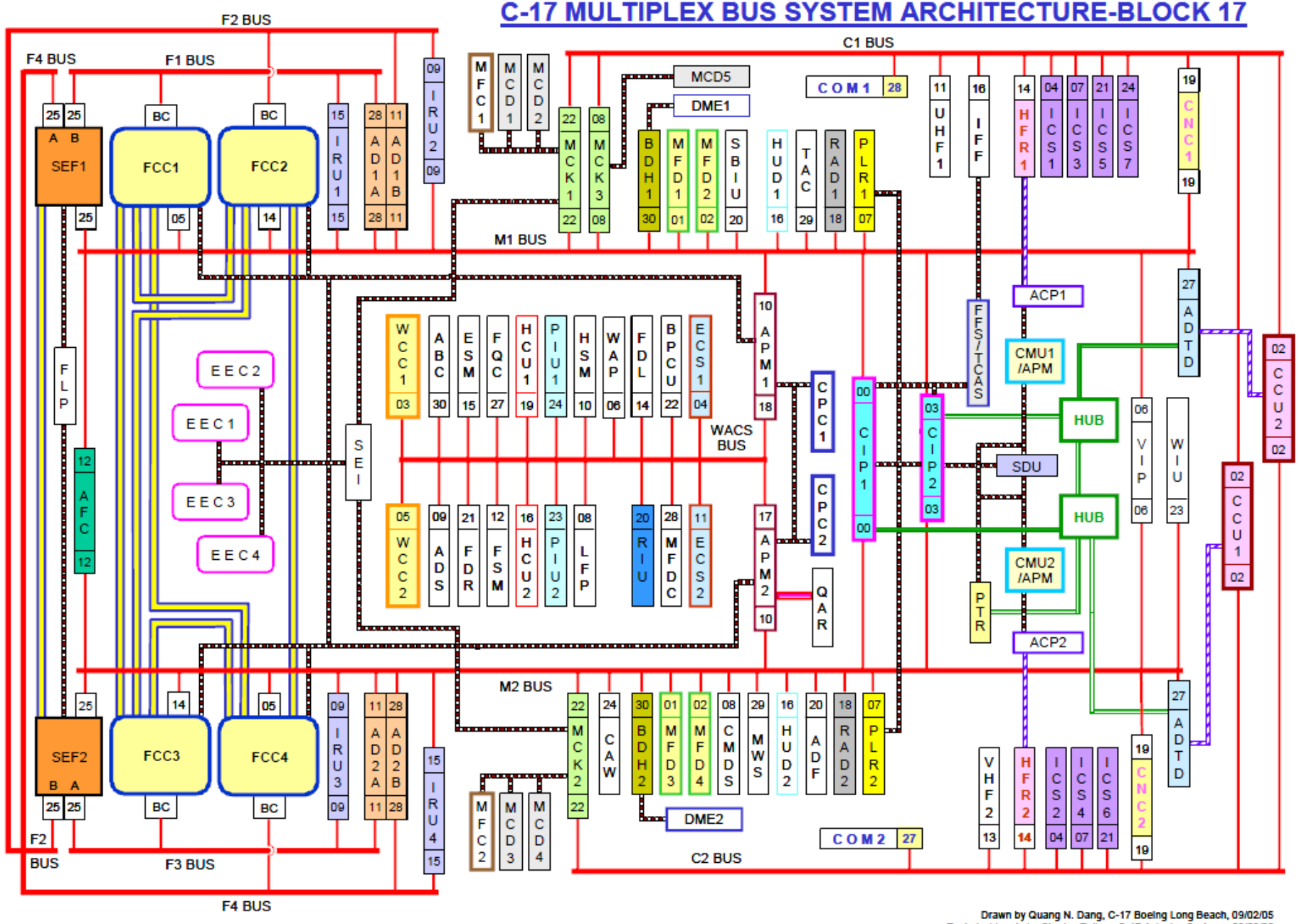
Interface Control Document

- 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



Drawn by Quang N. Dang, C-17 Boeing Long Beach, 09/02/05
Technical Inputs by Charles Tolver, C-17 Avionics Systems, 09/02/05

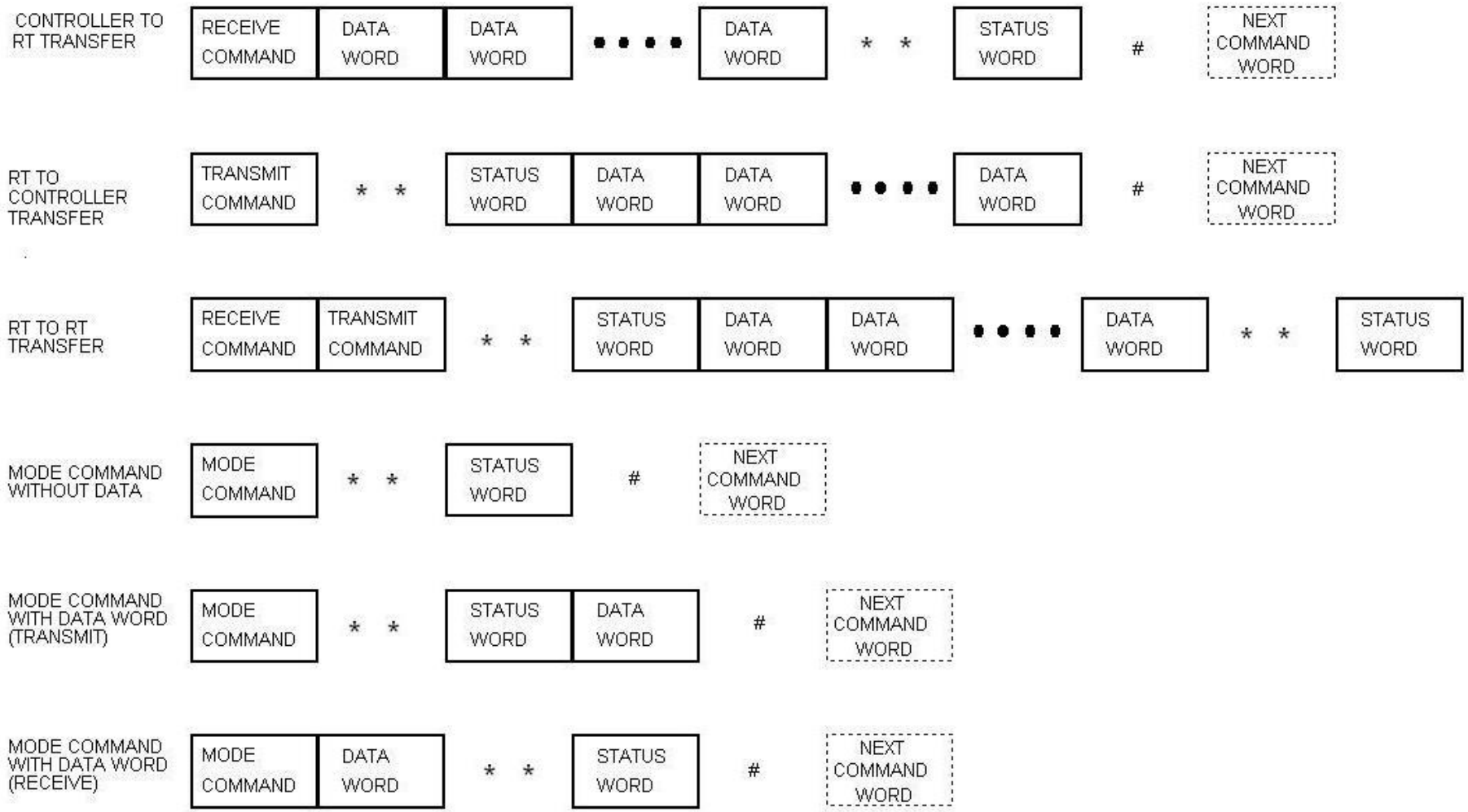
LEGEND

BC Bus Controller | 14 Remote Terminal Address | ARINC 429 | ARINC 573 | Cross Channel Data Link | Ethernet | RS-232C | MIL-STD-1553

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

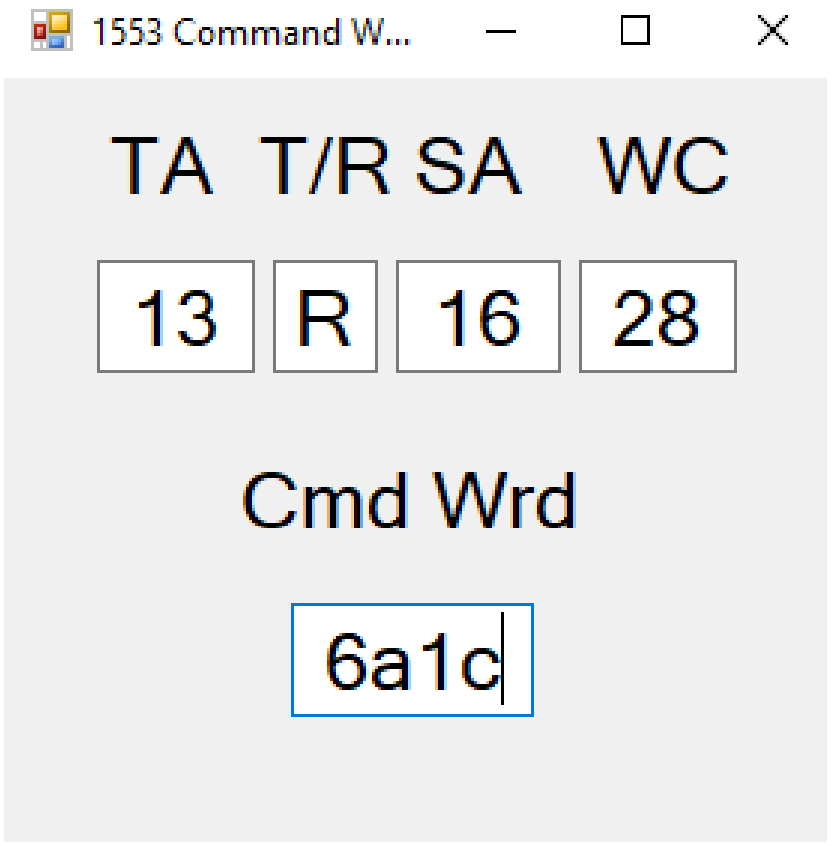
1553 Data Format



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



ICD Definitions

Comment: CCM to CDU 16R
Message: AIP Aero Parameters - Right (CR8)
Word 1: Discretes

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

ICD Definitions

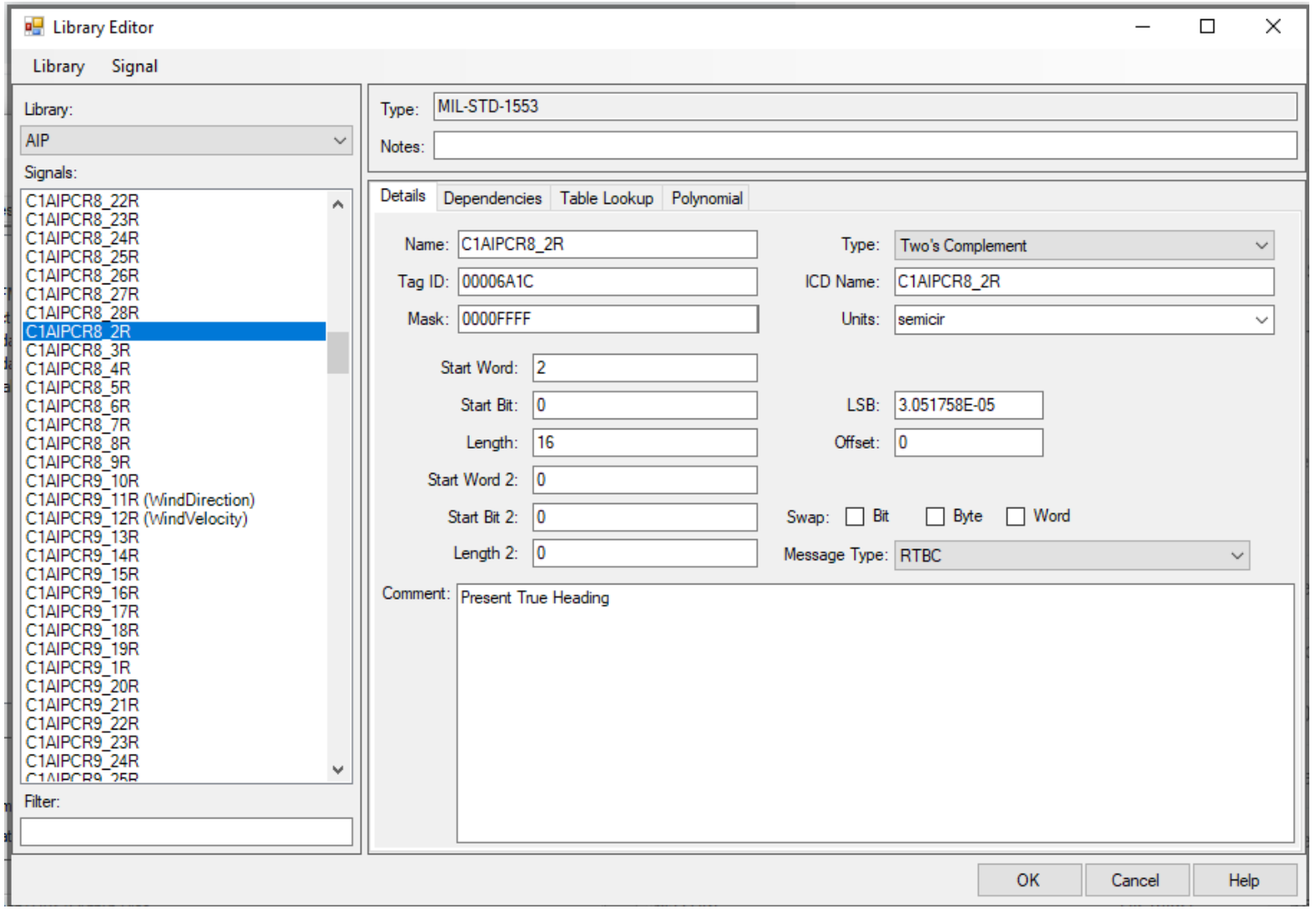
Comment: CCM to CDU 16R
Message: AIP Aero Parameters - Right (CR8)
Word 2: Present True Heading

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

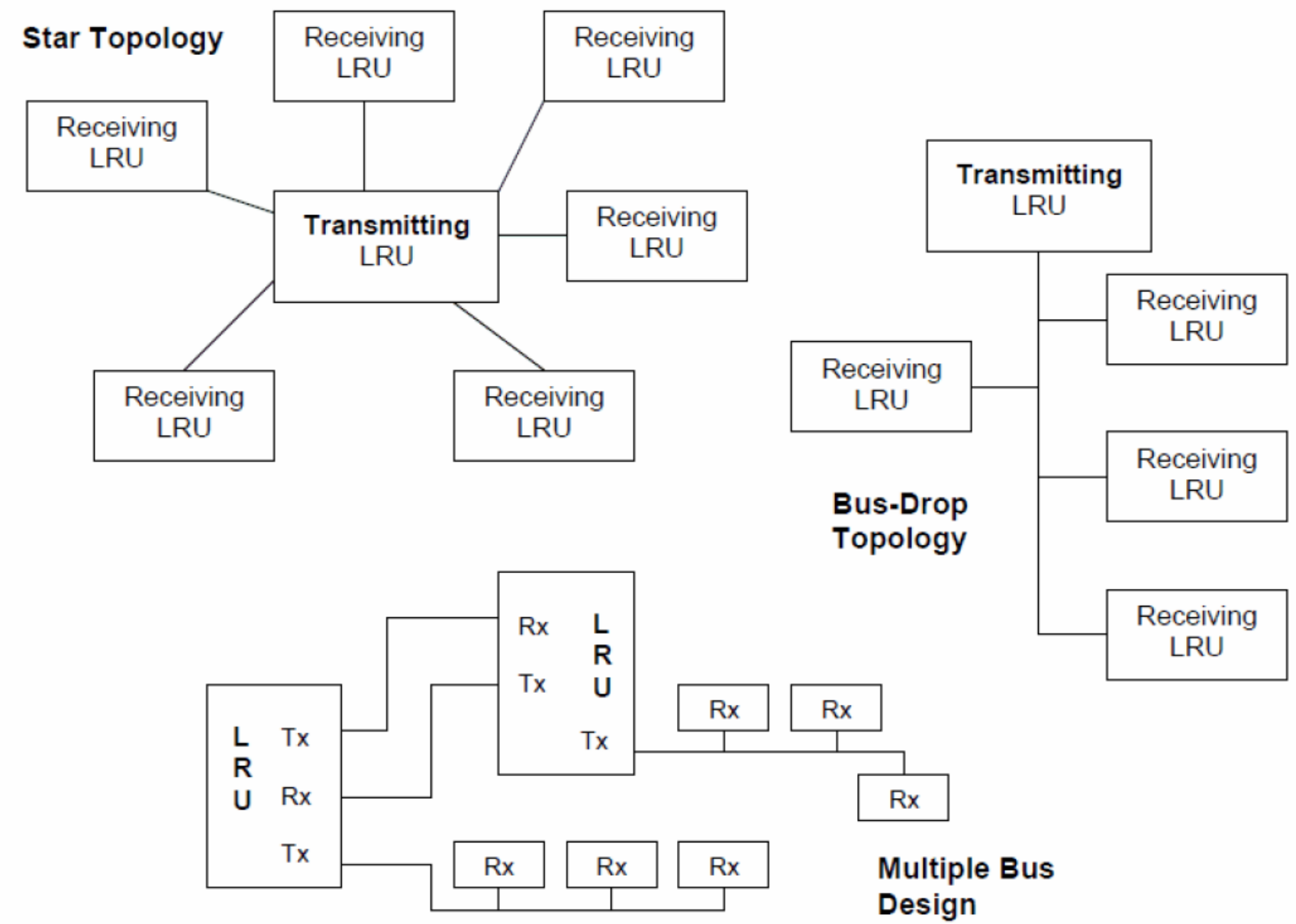
Notes:
Bits 0-15
Units: Semicircles
Format: Two's Complement

EU = 0.5 / 16384
= 0.000030517578125 * 180 semic/deg
= 0.0054931640625 deg

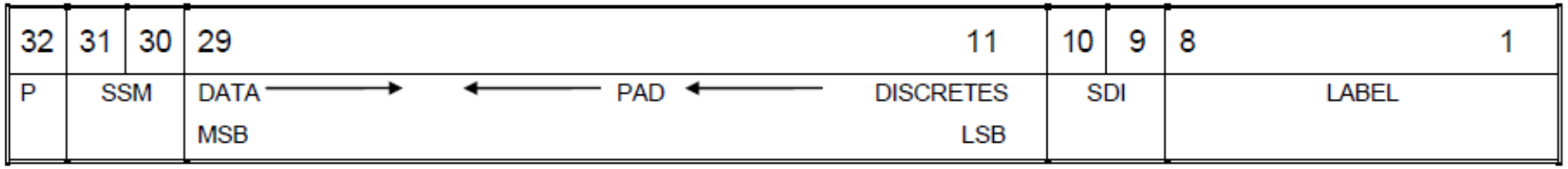
1553 Parameters



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)

ICD Definitions (429)

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

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			
	Knots			
14	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)			

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.

EU = 1024.0 / 16384
= 0.0625 Knots

429 Parameters