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Appendices

Project designation

R5 RIC

Document title

R5 RIC Hardware Interface Specification

Distribution



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B3 2017-06-25**Saab TransponderTech AB****DOCUMENT VALIDATION**

	Name	Dept. Code/ Function	Date/ Signature
Prepared	Marcus Malm	PT-MM	2016-08-07
Reviewed			
Approved	Christian Andersson	PT-CA	

DOCUMENT CHANGE RECORD

Issue	Change order	Date	Pages affected	Motive for and information on the change
P1A		2012-02-14	All	New document
A1		2013-03-14		Released revision
A2		2013-09-13		Update analogue IO description. Updated input voltage range.
A3		2014-03-03		Added dual input information.
A4		2015-04-01		Added dual input information.
B1		2016-09-06		Updated measurements and weight. Added digitized video in. Updated serial and digital connectors.
B2		2016-12-06		Minor editing.
P1B3		2017-06-25		Minor editing.



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1 Overview

The Radar Interface Computer (RIC) is intended to be used as an interface between the radar and a radar extractor. The interface computer receives digital or analogue video and sync signals from the radar and converts it to a digitized data stream on Gbit Ethernet for plot/track extraction.

The radar interface computer is developed with all input interfaces configurable to enable the possibility to connect to different types of radars.

The interface computer samples the analogue radar video with 100 Msps with a high speed 16 bit ADC and the data is filtered, processed digitized then sent over Ethernet with speeds up to 1 Gbit/s. The interface card is configurable from either serial port or via a 10/100/1000 Mbit Ethernet port. There is an optional version with dual video inputs for radars with I/Q video.

The size and weight of the radar interface card is:

- Length 190 mm
- Width 227 mm
- Height 77 mm
- Weight
 - 2450 g without options
 - 2550 g with syncro option



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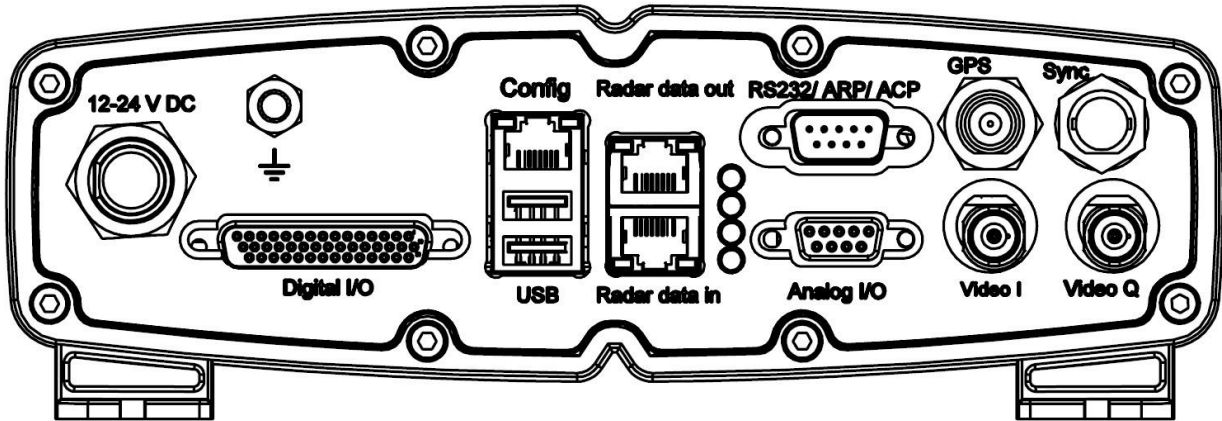
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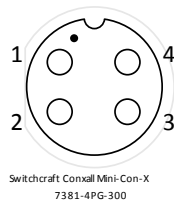
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2 Connectors



2.1 Power input

The power connector is a round 4-way connector with following pin-out.



Pin	Function	Description
1	12-24V DC	Positive voltage.
2	GND	Negative voltage.
3	Reserved	Leave floating.
4	Reserved	Leave floating.

2.2 Ground

M6 screw with two M6 nuts to connect cable lug. From this connector, a ground cable of minimum 2.5 mm² should be connected to the radar site ground. Grounding of the R5 RIC is essential to protect the equipment from overvoltage.

2.3 RS232/ARP/ACP

The connector is a male DSUB-9 connector.

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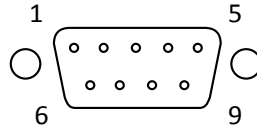
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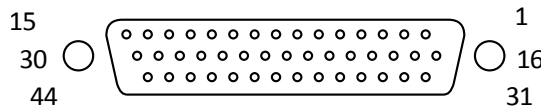


The pins have following functions.

Pin	Function	Description
1	ACP+	Configurable Azimuth Counter Pulse input. Can be configured to be either differential or single ended, the termination can be configured to be 75 Ω, 120 Ω, no termination or high voltage.
2	ACP-	
3	ARP+	Configurable Azimuth Reset Pulse input. Can be configured to be either differential or single ended, the termination can be configured to be 75 Ω, 120 Ω, no termination or high voltage.
4	ARP-	
5	GND	Ground
6	RS232 RX	RS232 serial 1 receive and transmit pins. This can be used to configure the unit through a RS232 serial connection.
7	RS232 TX	
8	RS232 RX	RS232 serial 2 receive and transmit pins. This can be used for communication between the unit and the radar.
9	RS232 TX	

2.4 Digital I/O

The connector is a female 44-pin DSUB-HD.



The pins have following functions.

Pin	Function	Description
1	DVD1P	Digital video data bit 1, differential pair.
2	DVD1N	
3	DVD4P	Digital video data bit 4, differential pair.
4	DVD4N	
5	DVD7P	Digital video data bit 7, differential pair.
6	DVD7N	



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7	DVS0P	Digital video status bit 0, differential pair.
8	DVS0N	
9	DVS1P	Digital video status bit 1, differential pair.
10	DVS1N	
11	IO9	Digital I/O bit 9.
12	IO11	Digital I/O bit 11.
13	IO14	Digital I/O bit 14.
14	IO5	Digital I/O bit 5.
15	IO7	Digital I/O bit 7.
16	DVD0P	Digital video data bit 0, differential pair.
17	DVD0N	
18	DVD3P	Digital video data bit 3, differential pair.
19	DVD3N	
20	DVD6P	Digital video data bit 6, differential pair.
21	DVD6N	
22	DVEP	Digital video enable, differential pair.
23	DVEN	
24	IO1	Digital I/O bit 1.
25	IO3	Digital I/O bit 3.
26	IO8	Digital I/O bit 8.
27	IO10	Digital I/O bit 10.
28	IO13	Digital I/O bit 13.
29	IO15	Digital I/O bit 15.
30	IO6	Digital I/O bit 6.
31	IO12	Digital I/O bit 12.
32	DVD2P	Digital video data bit 2, differential pair.
33	DVD2N	
34	DVD5P	Digital video data bit 5, differential pair.
35	DVD5N	
36	DVCP	Digital video clock, differential pair.
37	DVCN	
38	IO0	Digital I/O bit 0.
39	IO2	Digital I/O bit 2.
40	IO4	Digital I/O bit 4.

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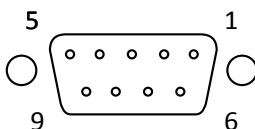
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41	GND	Ground
42	GND	Ground
43	GND	Ground
44	GND	Ground

2.5 Analog I/O

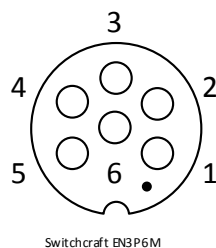
The connector is a female 9-pin DSUB.



The pins have following functions.

Pin	Function	Description
1	ADC2	Analogue input channel 2. 0-5 V
2	ADC4	Analogue input channel 4. 0-15 V
3	DAC3	Analogue output channel 3. 0-15 V
4	DAC4	Analogue output channel 4. 0-5 V
5	GND	Ground.
6	ADC1	Analogue input channel 1. 0-5 V
7	ADC3	Analogue input channel 3. 0-15 V
8	DAC1	Analogue output channel 1. 0-15 V
9	DAC2	Analogue output channel 2. 0-5 V

2.6 Syncro interface (Available as option)



Syncro connector as seen from the rear.



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The syncro interface use the Switchcraft EN3P6M connector, this connector is found on the back of R5 RIC with the syncro option. Following table describes the pin out of the connector.

Pin	Function	Description
1	S1	Syncro signals
2	S2	
3	S3	
4	RH	Syncro reference
5	RL	
6	Reserved	



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3 Electrical Characteristics

3.1 Dual analogue radar input

- 2 Coaxial BNC (Video I and Video Q)
- Two channel simultaneously sampling 100 Msps per channel
- Bandwidth 35 MHz
- DC coupled
- 1V or 5V peak to peak selectable input voltage
- Voltage protected input by transient voltage suppressing diode
- 50 Ω , 75 Ω or no termination
- Differential/single ended
- Analogue gain control
- Analogue DC offset control

3.2 Sync signal input

- Coaxial BNC (Sync)
- Maximum input 10 V in low voltage mode
- Maximum input 25 V in high voltage mode
- Voltage protected input by transient voltage suppressing diode
- 120 Ω , 75 Ω , no termination or high voltage
- Differential/single ended
- Threshold
 - Differential, 200 mV threshold, 35 mV hysteresis
 - Single ended, 1.5 V
- Minimum 0.1 μ s pulse width
- Maximum 500 kHz frequency
- Glitch-filtered input

3.3 GPS input

- Coaxial TNC (GPS)

3.4 ACP and ARP input

- 9 pol D-Sub (RS232/ARP/ACP)
- Pulses per revolution 4096 or 8192 ACP's
- Antenna rotation rate 5 to 66 RPM (6-60 RPM nominal speed)
- Maximum input voltage 6 V (RS-422)
- Voltage protected input by transient voltage suppressing diode
- 120 Ω , 75 Ω , no termination or high voltage
- Differential/single ended



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- Threshold
 - Differential, 200 mV threshold, 35 mV hysteresis
 - Single ended, 1.5 V
- Minimum 0.1 μ s pulse width
- Maximum 1 MHz frequency
- Glitch-filtered input

3.5 Syncro input (Available as option)

3.5.1 Reference input

- 10-130 V_{rms} 50-1200 Hz into 400 k Ω

3.5.2 Syncro input

- Solid State
- 90 V_{rms} 50-1200 Hz into 800 k Ω
- \pm 8.5 minutes accuracy
- 16384 azimuth steps per revolution

3.6 Digital I/O

- 16 programmable digital input/output
- Maximum input voltage 5 V
- Maximum output voltage 5 V
- Output high current 10 mA
- Input high threshold 3.5 V

3.7 Analog I/O

- DSUB-9 male (Analog I/O)
- 4 analogue input channels
 - 2 channels capable of reading 0-5 V
 - Input impedance >10 k Ω
 - 2 channels capable of reading 0-15 V
 - Input impedance 3 k Ω
 - 12-bit resolution
 - Up to 2 ksps
- 4 analogue output channels
 - 2 channels capable of providing 0-5 V
 - 2 channels capable of providing 0-15 V
 - 12-bit resolution
 - Up to 2 ksps



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3.8 Digital Video input

- 44 pol HD-sub (Digital I/O)
- 8-bit differential video data
- 1-bit differential video clock
- 1-bit differential data enable
- 2-bit differential status
- LVDS

3.9 Digital video out

- RJ45 (Radar data out)
- 1000 Mbit Ethernet RJ45 (UDP/IP broadcast)
- 10 kHz to 100 MHz configurable sampling rate
- Configurable 8 or 16 bit video resolution

3.10 Digital video in

- RJ45 (Radar data in)
- 1000 Mbit Ethernet RJ45 (UDP/IP broadcast)
- Terma Scanter Network Video data in accordance to SCANTER Network Video Protocol (304124-SI Rev. H)
 - 4096 sweeps per scan
 - Up to 8192 cells per sweep
 - Each cell represented as 8 bit uncompressed data

3.11 RS232

- 9 pol D-sub (RS232/ARP/ACP)
- Two serial interfaces
- Maximum data rate of 250 kbps

3.12 Configuration and status

- RJ45 (Config)
- 10/100 Mbit Ethernet RJ45
- TCP/IP configuration
- Web interface

3.13 USB

- Two USB A sockets, 5V 1.0 A.
- USB 2.0 interface – USB support not yet implemented in software



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3.14 LED indicators

-  Operation=Red heartbeat
-  ARP/ACP, ARP=Red flash, ACP=Green blink, None=Red
-  Sync=Green blink, No Sync=Red
-  Video=Green, No Video=Red

3.15 Power supply

- Fused DC input, 12-24 V
- Over voltage protected
- Polarity protected
- Power consumption 10-20 W