

OPUS A3 Preliminary Specification	Project:	OPUS A3
	Originator:	DT
	Customer:	Internal
	Revision:	1.0
	Date:	2008-01-23

All content is subject to change without notice.

Design sample



1 Introduction

1.1 Purpose

This specification defines the functional and performance requirements for a small 32 bit console. This specification is meant to exchange all basic conditions in one general specification and to document and approve all detailing and changes during the process of development.

2 Hardware

2.1 Mechanical data

2.1.1 Material:

Front, back and encoder will be injection molded plastic, partly varnished. Material will be ABS-PC.

2.1.2 Dimensions, design and versions:

There will be two options available, stand alone and a panel device.

Stand alone mounting:

Dimensions: TBD (B x H x T), without flange-mount-element, encoder knob

Panel mounting:

Dimensions: TBD (B x H x T), without flange-mount-element, encoder knob

The orientation will be landscape.

2.1.3 Colors:

Color dark gray

2.1.4 Mounting:

According to RAM-mount RAM-202 with 4 bushings M5, DIN 16903S in rear housing.

Position: horizontal and vertical centered.

Drilling template: 38 x 30 mm.

Usable thread depth of bushing: 5,5 +/- 0,5 mm

Max. mounting torque: 5 +/- 0,5 Nm

2.1.5 Glass:

Antireflective coated glass in front of the display.

Light transmission will be 92%

2.1.6 Venting:

Goretex membrane in the flange area on the back of the housing.

Opening Diameter: 4 mm

2.1.7 Brand labelling

For customer labeling, logo area will be below the display.

2.1.8 Labelling

Label, contains Wachendorff ordering code and serial number

2.1.9 Keys:

11 keys plastic keypad:

4 keys aligned on the right side of the display with reference to the Display

4 keys aligned on the left side of the display with reference to the Display

3 keys at the lower right of the display will perform an Escape function, an

ISO working set master scroll function and a home function

Touchable click-feedback if key is pressed.

Printing: Right/Left keys without symbols. Plain border for illumination.

Printing: lower keys: fully printed, symbols without printing (will be illuminated)

Key-backlight: night design with amber colored LEDs, PWM controlled

Nominal actuation force: 6 N +/- 1,2

Key drop: 0,6 mm

Max. allowable actuation force: 20 N

Minimum lifetime: > 100.000 keystrokes without error

Layout:

blank	blank
blank	blank
blank	blank
blank	blank

“Home” ISO ESC

2.1.10 Indicator:

Front facing multi color LED-Indicator

Position: on the upper right side of the display

Design: covered by dark cap with illumination if LED is powered

Activation/colors: can be set via software to off, red, yellow, green, blue, magenta, orange

2.1.11 Rotary encoder with Push button:

1 mechanical encoder with 16 incremental pulses/rev and push button.

Position: sideways on the upper right end of the housing

One raster per pulse

Dynamic incremental input, acceleration algorithm by software

Nominal rotation force: 1,5 Ncm +/-1 Ncm

Nominal actuation force for pushbutton: 6 N +/-1,2 N (max. value 20 N)

Minimum rotation lifetime: 1 million single full rotations and return without electrical failure. Rotation force will decrease.

Minimum pushbutton lifetime: 1 million actuations without electrical failure.

2.2 Data Exchange interface:

2.2.1 USB-Slot

Provided is 1 USB 1.1 host (VCC, D-, D+, GND)

Compatibility: 2.0 compatible

Performance: full speed, 12 Mbit/s

Position: TBD

Slot will be closed by hard/rubber cover, sealed to IP6k5 in closed condition.

Covering the slot will only be possible even is no USB-periphery is mounted.

USB-Slot is not for permanent use, because of reservations in protection caused by the open door and endurance limit depending on the load of USB-periphery.

2.3 Buzzer:

Piezo – Buzzer, high sound output (Option)

2.4 Light sensor:

A Light sensor is provided.

2.5 Processor:

Technology: ARM9, 32Bit with an integrated Graphic-Controller

Type: TBD

Supplier: TBD

Performance: Appr.320 MHz

2.6 Memory:

SD-RAM: TBD

FLASH: TBD

EEPROM: TBD

2.7 Display:

Screen size: 3,5"(4:3) or 4.2" (16:9) Colour Graphic-Display,

Resolution: 320*240 (4:3) or 480*272 (16:9) pixels

2.8 Touch Screen

Type: TBD, Optional

2.9 Communication Interfaces on main connector:

2.9.1 CAN-Bus Interface:

2 x CAN - Bus Interface according to ISO/DIS 11898, CAN - specification 2.0 B active, up to 1 Mbit, EMC-optimized, with transceiver for hardware filtering, non isolated, short circuit protected against Vcc and GND

2.10 Inputs / Outputs on main connector

2.10.1 Analog/Digital Input:

2 Configurable analog/digital input, optional 4

2.10.2 Digital Output:

1, up to 3 configurable Digital output(s), TBD

2.11 Real Time Clock:

Real Time Clock buffered 2 weeks with Gold Cap
Accuracy: +/-1 sec/day

2.12 Video-Input on Video-Connector:

A Video-Input is provided, optional.

2.13 Power Supply:

Power supply on Main connector: VCC, Ignition Input, GND, CarGND
Designed for: 12 V (13,6 V nom.) and 24 V (27,2 V nom.)
Operation Voltage : 9 to 50 V without disturbances
With switched power supply, non isolated. TBD
Protected against overvoltage: up to 50V TBD
Protected against reverse polarity up to – 50 V TBD

2.14 Connectors:

2.14.1 Main Connector:

AMP or Deutsch-connector

2.14.2 Video Connector:

Escha M12 x 1 round connector, TBD

2.15 Connection schematics:

TBD

2.16 Block Diagram:

TBD

3 Software

3.1 Operating System

As operating system, the device will include an Embedded Linux, Windows CE and/or RTOS. Details have to be discussed (depending on processor details)

3.2 Board Support Package

TBD

3.3 Design of GUI

TBD, depend on operating system.

Scheduled is design with projector tool or C

3.4 Interface Protocols

TBD, scheduled are CAN Open, CAN Freestyle, J1939, GD

4 Environmental Specifications

Unless specific conditions, the general conditions are:

- Temperature 23°C +/- 5°C
- Humidity 60% +/- 15%
- Pressure 100000Pa ± 4000Pa (14.5 psi ± .58 psi)
- Supply voltage 13.5VDC ± 0.5VDC
- Ripple voltage sinus 0.2V peak, 100kHz max

Definition of DUT's functional behaviour

Function-State A:

- DUT operates during and after the test according to the specifications.

Function-State B

- DUT operates during the test, but not according to the specifications, after the test DUT resumes to normal operation according to the specifications without operator access.
- Microprocessor works without restrictions, data will be 100% retended
- Outputs will keep defined values
- CAN-Bus operates regular
- Screen which was displayed before the test remains after the test

Function-State C

- DUT doesn't operate or operates faulty during the test. After the test DUT resumes to normal operation according to the specifications without operator access.
- Microprocessor doesn't operate or operates faulty, data may be lost
- Outputs will keep defined values
- CAN-Bus doesn't operate regular
- EUT will reset after the test

Function-State D

- DUT doesn't operate or operates faulty during the test. After the test DUT resumes to normal operation according to the specifications after operator access.
- Microprocessor doesn't operate or operates faulty , data may be lost
- Outputs will keep defined values
- CAN-Bus doesn't operate regular
- DUT will operate after repowering according the specifications.

Function-State E

- DUT will be damaged during the test and stays damaged after the test.

4.1 Temperature Range

4.1.1.1 Ambient Operating :

-30°C ... +65°C

4.1.1.2 Low Storage Temperature similar to IEC 60068-2-2Bb:

Test method: -40°C @ 16 hours. Afterwards the unit is returned to ambient temperature at a rate of 0.5°C/minute. DUT will be powered on at -30°C with 13.5V.

4.1.1.3 High Storage Temperature similar to IEC 60068-2-2Bb:

Test method: 85°C @ 16 hours. Afterwards the unit is returned to ambient temperature at a rate of 0.5°C/minute. DUT will be powered on at 65°C with 13.5V.

4.1.2 Changes of temperature with specified rate of change:

Test method: 3 cycles in 24h with -40°C@3h to +65°C@3h. DUT is switches off during cold period and operating with 13,5V during warm period.

4.1.3 Temperature Shock according to ISO 15003 – 5.2.2 and IEC 60068-2-14:

Test method: DUT will be transfered (within less 1 minute) from -40°C to +85°C, will be stored for 0,5 h and vice versa for 10 cycles. DUT is switched off.

4.1.4 Damp heat (cyclic) according to ISO 15003 – 5.4 and IEC 60068-2-30

Test method: DUT stored without power applied for a cycle duration of 24h in high humidity (>90%) at temperatures between 25°C and 40°C (Test level 1), two cycles.

4.1.5 Air pressure (Altitude) acc. to ISO 15003-5.9 and IEC 60068-2-13

Test method: DUT is operating for 7.5h at lower pressure at 80 kPa (appr. 1700m attitude) and 3.5h at normal pressure. 2 cycles.

4.2 Mechanical stress

4.2.1 Vibration (sinusoidal), acc. to ISO 15003-5.6, IEC 60086-2-6, -2-47, -2-64

Test method for each of three axis:

1. Subject the DUT to a resonance search with an acceleration of 20m/s² from 10Hz to 2000Hz without power applied. Definition of resonance: twice reference
2. Test the DUT with 20m/s² at each resonance frequency for a duration of 10 min (Level 1).

4.2.2 Vibration (random) according to ISO 15003 – 5.6, IEC 60068-2-6, -2-47

Test method: DUT operating in 3 orthogonal axis, each for 8h at Level 1 in a frequency range of 10 to 350 Hz (Level 1)

4.2.3 Mechanical shock according to ISO 15003 – 5.5.2 and IEC 60068-2-27

Test method: DUT operating during sinusoidal shocks with a peak acceleration of 150m/s² and a duration of 11ms (Level 1).

Quantity: 3 shocks in each of three mutually perpendicular axis.

4.2.4 Chemical brush or spray according to ISO 15003 – 5.10

Apply once a day, for three days, the following chemicals with a brush over the exposed surface. Inspect without rinsing immediately afterwards and after 100h.

- Alcohol
- Antifreeze liquid (Ethylglycol)
- Diesel oil
- Domestic Ammonia
- Gasoline
- Hydraulic oil 10 W 40
- Liquid lime
- Motor oil
- NPK Chemical fertilizers 20 10 20
- Windscreen cleaning mixture
- Ammonium Nitrate and Ammonium Phosphate fertilizers.
- Bovine Effluent – (up to 5% propionic acid).
- Brake fluid – both mineral and vegetable types.
- Diesel fuel.
- STOU (Super Tractor Universal Oil) lubricating oil.

4.3 Protection**4.3.1 Wash according to ASAE EP455, Section 5.6.**

Test method: Wash DUT without power supplied from all sides for a duration of 10 minutes with a pump pressure of 375 kPa and a rate of flow of 8.3 L/min. from a distance of 0.1m with a water temperature of 15 °C.

4.3.2 Dust according to ISO 15003-5.8.1 and IEC 60529

Test method: 20 cycles with dust spray. The unit is to be fully operational, and no dust is to be found inside

4.4 Corrosive Atmosphere acc. ISO 15003-5.7 and IEC 60068-2-11

Test method: DUT operating for 16h in corrosive atmosphere @ 35°C and afterwards 100h in normal environment without rinsing (Level 1).

4.5 Solar radiation (ultraviolet) according to ISO 15003 – 5.11

Test method: Subject the DUT to alternating UV exposure and humidity exposure for 1500h. The UV exposure time shall be 8h at 60°C and the humidity exposure time shall be 4h with condensing humidity at 50°C

4.6 Short circuit protection according to ISO 15003 – 5.14.4:

- Test method for 12V system: short each external connection to ground for 5 min and then to 16V for 5 min
- Test method for 24V system: short each external connection to ground for 5 min and then to 36V for 5 min.

4.7 Conducted Immunity acc. to ISO 7637-2 and ISO 7637-3

- EREC 2.2.10 and ISO 7637-2 – 5.6.1: inductive load switching - pulse 1
- EREC 2.2.10 and ISO 7637-2 – 4.6.2: inductive load switching – pulse 2a/2b
- EREC 2.2.8 and ISO 7637-2 – 5.6.3: mutual coupling - pulse 3a/3b
- EREC 2.2.11 and ISO 7637-2 – 4.6.4: crancing - pulse 4
- EREC 2.2.9 and ISO 7637-2 – 5.6.5: load dump - pulse 5:

4.8 Electrostatic Discharge according to ISO 10605:

- Test method during handling: ± 8 kV electrostatic discharge between each connector pin and enclosure or ground
- Test method during operation: ± 15 kV electrostatic discharge on the areas accessible by the operator, including users interface.

4.9 EMC Emission**4.9.1 Conducted Emission according to CISPR 25-3 (class 3):**

Frequency range 150KHz – 108 MHz, divided in radio bands

4.9.2 Radiated Emission according to RL2004-104 EG, type approval:

Enhanced measuring method according to type approval E1, similar CISPR25
Both limits (wideband and narrowband) must be kept.

4.9.3 Electromagnetic susceptibility according to RL2004-104 EG, type approval:

Enhanced measuring method according to type approval E1
Frequency range 20Mhz – 2000Mhz, 30V/m (radiated), up to 800 MHz amplitude modulated and over 800MHz pulse modulated

4.9.4 “E” field - 50/60Hz according to ASAE EP455 5.16.4**4.10 Type approval: “e1”**

The specified versions of OPUS A3 should be released with the “e”-mark approval for devices which is related to the european community. The “e”-mark should be on the label

4.11 “CE”-mark:

The specified versions of OPUS A3 should be released with the “CE”-mark approval.
The “CE”-mark should be on the label.

Revision 01/2008, preliminary.

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List of abbreviations	
Abbreviation	Description
BIOS	Basic operating system software
CAN	Computer Area Network for automotive and off-highway vehicle use
EDR	Enhanced data rate
DUT	Device under test
ISO	International Standards Organization
ISOBUS	Marketing name for devices conforming to ISO 11783 communication standard
ISO-FS	File server conforming to ISO 11783 Part 13
ISO-TC	Task controller conforming to ISO 11783 Part 10
ISO-VT	Virtual terminal conforming to ISO 11783 Part 6
LED	Light emitting diode
PWM	Pulse width modulated
RAM	Random access memory
EREC	Electrical requirements and environmental conditions for electrical/electronic components
RTC	Real Time Clock

Revision Log		
Date	Originator	Description
23 JAN 2008	D.Thart	First Draft
28 JAN 2008	T.Nagel	First Draft for approval