SYS-File:	70487200v330.SYS
SYS-File Family:	70487201
Hardware:	DM700B (11277810, 11277811)
Build Number:	24.03r01

General

BIOS Functionality

The functionality is defined around the pin. If no Variable Type is specified the Variable Name contains elements, defined later. The pins are defined as C(ConnectorNumber)p(PinNumber).

Example:

The pin C1p05 has variable:
C1p05.Voltage.

BIOS Default Settings

The default value of variables is 0 or false if otherwise is not specified.

Contents

BIOS Variables

Monitoring

Power Supply

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p02	-		Range = 0 ... 36 V	Supply voltage
Elements				
.Voltage	U16	Read	Analog in scaled [mV]	

Ambient Illuminance

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
Ambient	-			
Elements				
.Light	U32	Read	Illuminance on the front of the display. Experimentation is required to determine the expected range for the application..	This measurement is only accurate when light shines directly onto the display front sensor. It is only usable for the implementation of a binary night/direct sun-light detector.

Sensor Power Measurement

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p08	-		Range = 0 ... 5 V	
Elements				
.Voltage	U16	Read	Analog in scaled [mV]	
.DigOut	BOOL	Write	**TRUE =** Turn on sensor power	

Digital Analog Input

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p05	-		Range = 0 ... 5.25 V	
Elements				
.Voltage	U16	Read	Analog in scaled [mV]	
.DigThresLow	U16	Write	Digital Input threshold Low [mV] If activated with 5V Supply then this will define when DigIn goes from True to False. If activated with GND then this will define when DigIn goes from False to True. Possible value range is from 0 to 5250. If value is out of range then the threshold is not set correctly and input state value will not change.	**Note 1** Default value 2000
.DigThresHigh	U16	Write	Digital Input threshold High [mV] If activated with 5V Supply then this will define when DigIn goes from False to True. If activated with GND then this will define when DigIn goes from True to False. Possible value range is from 0 to 5250. If value is out of range then the threshold is not set correctly and input state value will not change.	**Note 1** Default value 3000
.DigIn	BOOL	Read	Digital in **TRUE =** Active	

Digital Input

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p09	-			
Elements				
.DigIn	BOOL	Read		

Multifunction Inputs -Dig/Ana/Freq/Resis/Curr

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p10	-			
C1p11	-			
Elements				
.Voltage	U16	Read	Analog in scaled [mV]	Only valid when InputMode = 0, 3 or 4
.DigIn	BOOL	Read	Digital in **TRUE =** Active	Only valid when InputMode = 0, 3 or 4.
.Current	U16	Read	Current in scaled [µA] [µA]= 0xFFFFFFFF if this signal not valid	0-25300 µA
.Freq	U16	Read	Frequency in scaled [Hz]	0-10kHz
.Per	U32	Read	Period in scaled [0.1µs]	
.Count	U16	Read	Number of measured counts the previous processing loop	
.Duty	U16	Read	Positive duty cycle in scaled [0.01%]	
.QuadCount	S16	Read	Number of measured counts the previous processing loop. The Sign defines direction.	Only valid for first input when Input-Mode = 3
.Phase	S32	Read	Phase shift [0.1µs], sign defines direction.	Only valid for first input when Input-Mode = 4
.Bias	U8	Write	**0 =** No Pull Down, No Pull Up Digital input activated when input voltage is higher than DigThresHigh **1 =** Pull Up to 5 Volt Digital input activated when input voltage is lower than DigThresLow **2 =** Pull Down to GND Digital input activated when input voltage is higher than DigThresHigh **3 =** Pull Down to GND and Pull Up to 5 Volt Digital input activated when input voltage is higher than DigThresHigh If value is out of range then config error Bit1 of Status value is set.	**Note 1**
.Range	U8	Write	Range Configuration **0 =** 0-5.25V range **1 =** 0-35.3V range **2 =** 0-0.3675V range **3 =** 0-2.465V range (lower resolution) If value is out of range then config error Bit2 of Status value is set.	**Note 1**

... continued on next page

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.DigThresLow	U16	Write	Digital Input threshold Low [mV] This will define when DigIn goes from TRUE to FALSE when Bias= 0, 2 or 3. This will define when DigIn goes from FALSE to TRUE when Bias= 1. Default value 2000. Value range depends on input range configuration. If 0-5.25V range is selected then possible value interval is from 0 to 5250. If 0-35.3V range is selected then possible value interval is from 0 to 35300. If 0-0.3675V range is selected then possible value interval is from 0 to 368. If 0-2.465V range is selected then possible value interval is from 0 to 2465. If value is out of range then the threshold is not set and input state value is without change.	**Note 1**
.DigThresHigh	U16	Write	Digital Input threshold High [mV] This will define when DigIn goes from FALSE to TRUE when Bias = 0, 2 or 3. This will define when DigIn goes from TRUE to FALSE when Bias = 1. Default value 3000 Value range depends on input range configuration. If 0-5.25V range is selected then possible value interval is from 0 to 5250. If 0-35.3V range is selected then possible value interval is from 0 to 35300. If 0-0.3675V range is selected then possible value interval is from 0 to 368. If 0-2.465V range is selected then possible value interval is from 0 to 2465. If value is out of range then the threshold is not set and input state value is without change.	**Note 1**
.InputMode	U16	Write	Config **0 =** No additional measure mode **1 =** Resistance mode **2 =** Current mode **3 =** Quad encoder enabled, result in .QuadCount **4 =** Phase shift enabled, result in .Phase If value is out of range then config error Bit3 of Status value is set.	Note: Bias and Range must be set to 0 when InputMode = 1 or 2. InputMode = 3 or 4 is only valid for first pin listed. **Note 1**

... continued on next page

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.Status	U16	Read	Error status **0 =** OK **Bit0** - Reserved **Bit1** - Config Error Bias **Bit2** - Config Error Range **Bit3** - Config Error Input-Mode **Bit4** - Over-current Error in .InputMode = 2 **Bit5 ... Bit15** - Reserved	
.Resistance	U16	Read	Analog in scaled [Ω] Is set to 65535 when Bias ≠ 0 or Range ≠ 0 or InputMode ≠ 1. Is set to 65535 for much higher resistance (open circuit).	0-10000Ω

Digital Output

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
C1p12	-			
Elements				
.DigFeedBack	BOOL	Read	Digital Feedback; feedback from the output drive **TRUE =** Digital output is avtivated or pin is open **FALSE =** Digital output is not activated while load is connected between pin and positive voltage	
.DigOut	BOOL	Write	Digital Out **TRUE =** Activated (switched to GND) **FALSE =** Not activated (disconnected from GND)	

Service Tool Access

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
ServiceTool	-			
Elements				
.DisableRead	BOOL	Write	**TRUE =** The Service Tool has no read access to the unit.	
.DisableWrite	BOOL	Write	**TRUE =** The Service Tool has no write access to the unit.	
.DisableDownload	BOOL	Write	**TRUE =** The Service Tool has no access to download any file to the unit.	
.Connect	BOOL	Read	**TRUE =** The unit has received a Service Tool Command during the last execution loop.	
.MasterPassword	-			
Elements				
. .Write	U32	Read	This value can be written to by the Service Tool even if .DisableWrite is TRUE. It can also be read by the Service Tool even if .DisableRead is TRUE.	
. .Read	U32	Write	This value can be read by the Service Tool even if .DisableRead is TRUE.	

ECU Information

The packed infoblock contains data about the controller, application and embedded operating system of a hardware unit. Each field consists of a number of bytes which are packed in arrays of U16 in little endian byte order.

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
ECUInfoPacked	-			
Elements				
.AppCmplTime	ARRAY[4] U16	Read	Application compilation time stamp in the format yy yy mm dd hh mm ss cc, where each of the four elements is a hexadecimal number representing four digits. Consider the following example: If an application is compiled December 2nd 2009 at 16:54:49.22 this is presented as {0x0920, 0x0212, 0x5416, 0x2249}.	cc = 1/100 s
.PNr2	ARRAY[3] U16	Read	Part number 2. As an example, consider the part number 025125980137. Its hexadecimal representation is 0x05D9A007E9 and this number is presented as {0x07E9, 0xD9A0, 0xXX05}, where XX is undefined and should be masked away.	
.SerNr0	ARRAY[3] U16	Read	40 bit serial number. It has the same format as PNr2.	
.BDate	ARRAY[4] U16	Read	Production time stamp in the same format as AppCmplTime.	
.PNr0	ARRAY[6] U16	Read	Part number 0. It consists of a right justified ASCII string padded with space characters; e.g. a part number equal to 1002096 is presented as {0x2020, 0x2020, 0x3120, 0x3030, 0x3032, 0x3639}.	
.PRev0	ARRAY[2] U16	Read	The revision level of part number 0. It consists of four ASCII characters. For example, a revision level equal to ProG is presented as {0x7250, 0x476F}.	
.PNr1	ARRAY[6] U16	Read	Part number 1. It has the same format as PNr0.	
.PRev1	ARRAY[2] U16	Read	The revision level of part number 1. It has the same format as PRev0.	
.AppId	ARRAY[26] U16	Read	Application identity. It consists of a null terminated ASCII string. As an example, Untitled is presented as {0x6E55, 0x6974, 0x6C74, 0x6465, 0x0000}.	
.AppType	ARRAY[16] U16	Read	Application type. It has the same format as AppId.	

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.AppVer	ARRAY[11] U16	Read	Application version. It has the same format as AppId.	
.BootVer0	U16	Read	Bootloader version. It is a 16 bit number.	

Clock Ticks

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
CK1S	BOOL	Read	TRUE during one processing loop every second	
CK60S	BOOL	Read	TRUE during one processing loop every minute	

OS Measurements

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
OS	-			
Elements				
.Start	BOOL	Read	TRUE during the first processing loop.	
.ExecTime	U16	Read	Actual time of the previous processing loop [ms]	Note: The value of this variable is undefined the first processing loop.
.ExecTimeOut	U16	Write	Requested processing loop time [ms] 10 ... 250. If value is lower than 10 then it is set to 10 or if it is higher than 250 than it is set to 250.	**Note 1** See "Main and Background Tasks"
.ExecTimeWork	U16	Read	Actual work time during processing loop [ms]	
.ExecTimeAppl	U16	Read	Actual time in application [ms]	
.ExecTimeGraph	U16	Read	Actual time updating in graphics routines [ms]	
.ETime	U32	Read	Time since power on [10ms]	
.LoopCnt	U32	Read	Counter, increments by 1 every processing loop.	
.CPU[0]	-			
Elements				
. .Core[0…1]	-			
Elements				
. . .Type	STRING[64]	Read	Core type information string.	
. . .System	U8	Read	System usage of CPU core time in percentage.	
. . .User	U8	Read	User usage of CPU core time in percentage.	
. . .Freq	U32	Read	Actual Frequency of CPU core. [Hz]	
. .Temp	S16	Read	Actual CPU temperature. [°C]	
.RAM	-			
Elements				
. .Total	U32	Read	Total memory in kilobytes.	
. .Used	U32	Read	Memory usage in kilobytes.	
. .Free	U32	Read	Free memory in kilobytes.	
.Flash	-			
Elements				
. .Total	U32	Read	Total memory in kilobytes.	
. .Used	U32	Read	Memory usage in kilobytes.	
. .Free	U32	Read	Free memory in kilobytes.	

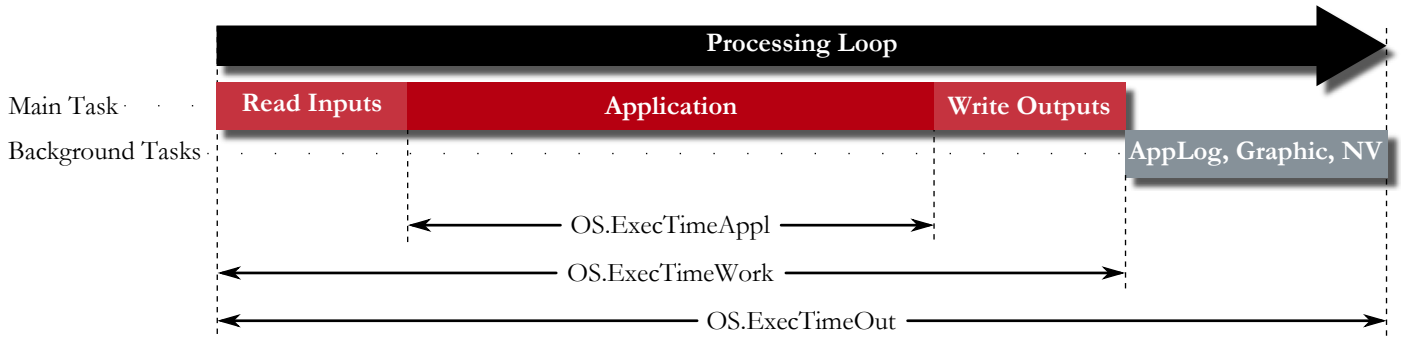
... continued on next page

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.Reboot	BOOL	Write	**TRUE =** Reboot the unit **FALSE =** don't reboot Default Value: FALSE	A reboot will abort all pending CAN, application log, and non-volatile memory transactions.

Main and Background Tasks

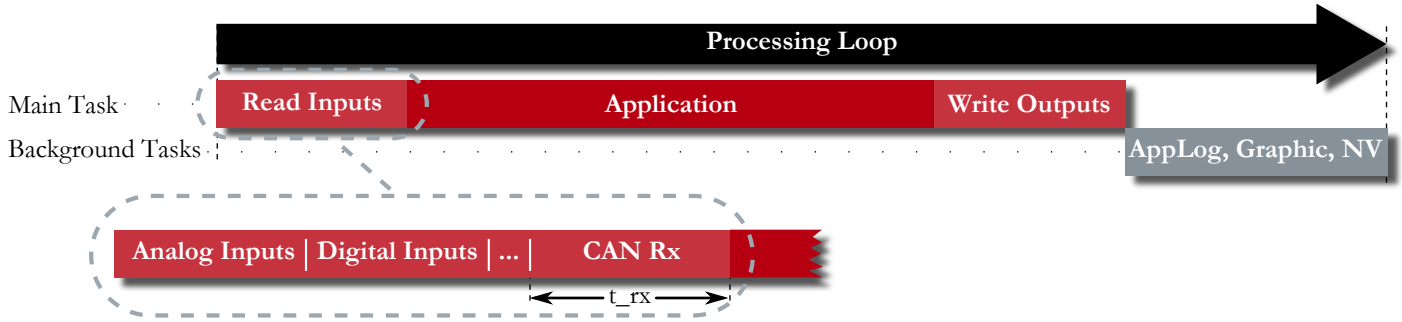
It is often the case that an application must respond to events within a short time frame. The application is therefore executed in a prioritized main task. The system starts background tasks that handle things that take a long time to finalize, e.g., non-volatile memory writes. They are executed in the gap between the main task end of one processing loop to the start of the next one. They may be stopped and resumed over several processing loops until their work is done.

The setting of OS.ExecTimeOut must be selected wisely to strike the right balance between the responsiveness of the application and how long time it will take for the background tasks to complete.



Impact of CAN Traffic

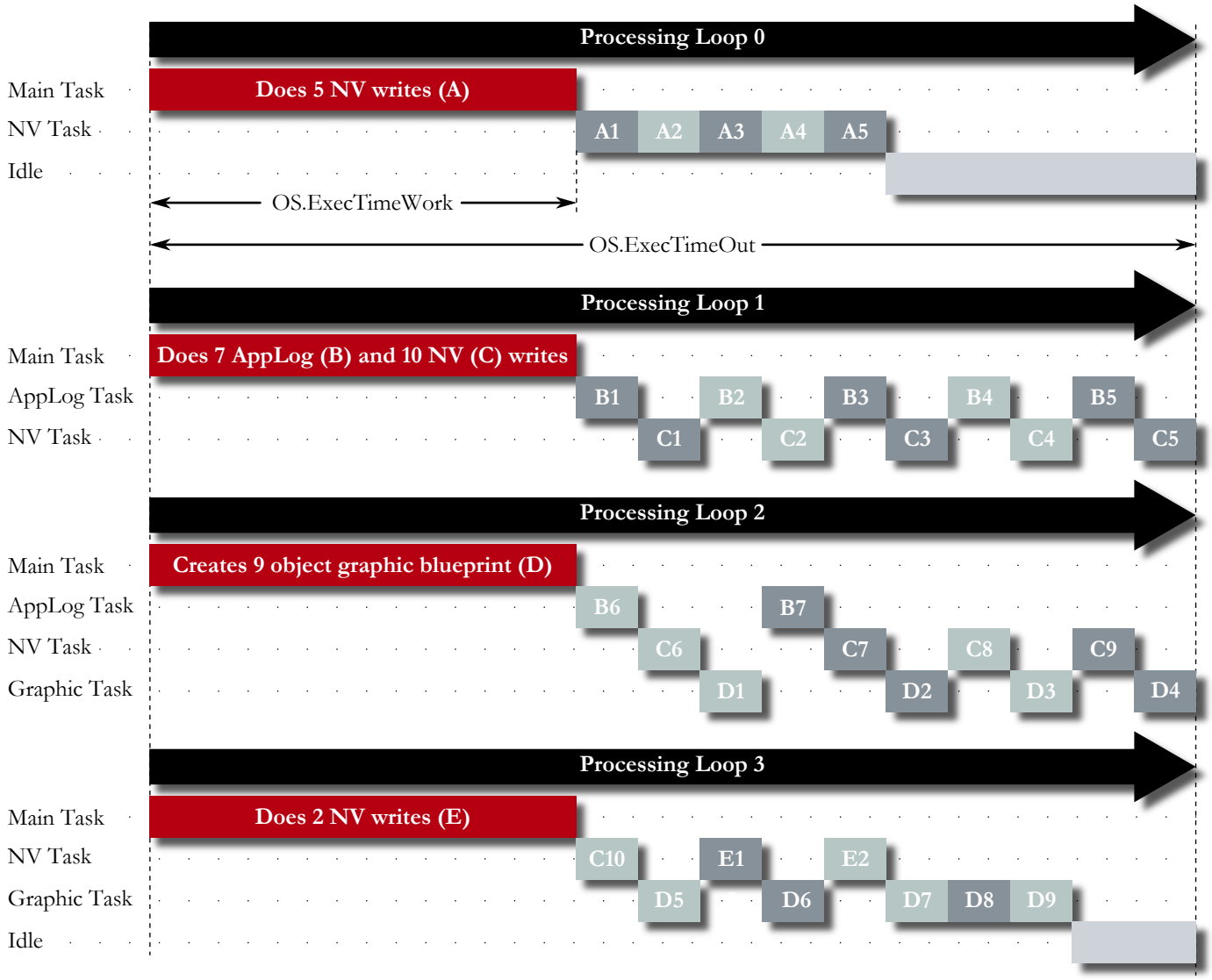
The time spent in each sub-segment of the read and write segments of the processing loop cycle is typically constant or close to it. There is one outstanding exception, the handling of received CAN messages. It is proportional to the number of received CAN messages during the processing loop multiplied by the number of receive CAN components used in the application.



Task Scheduling

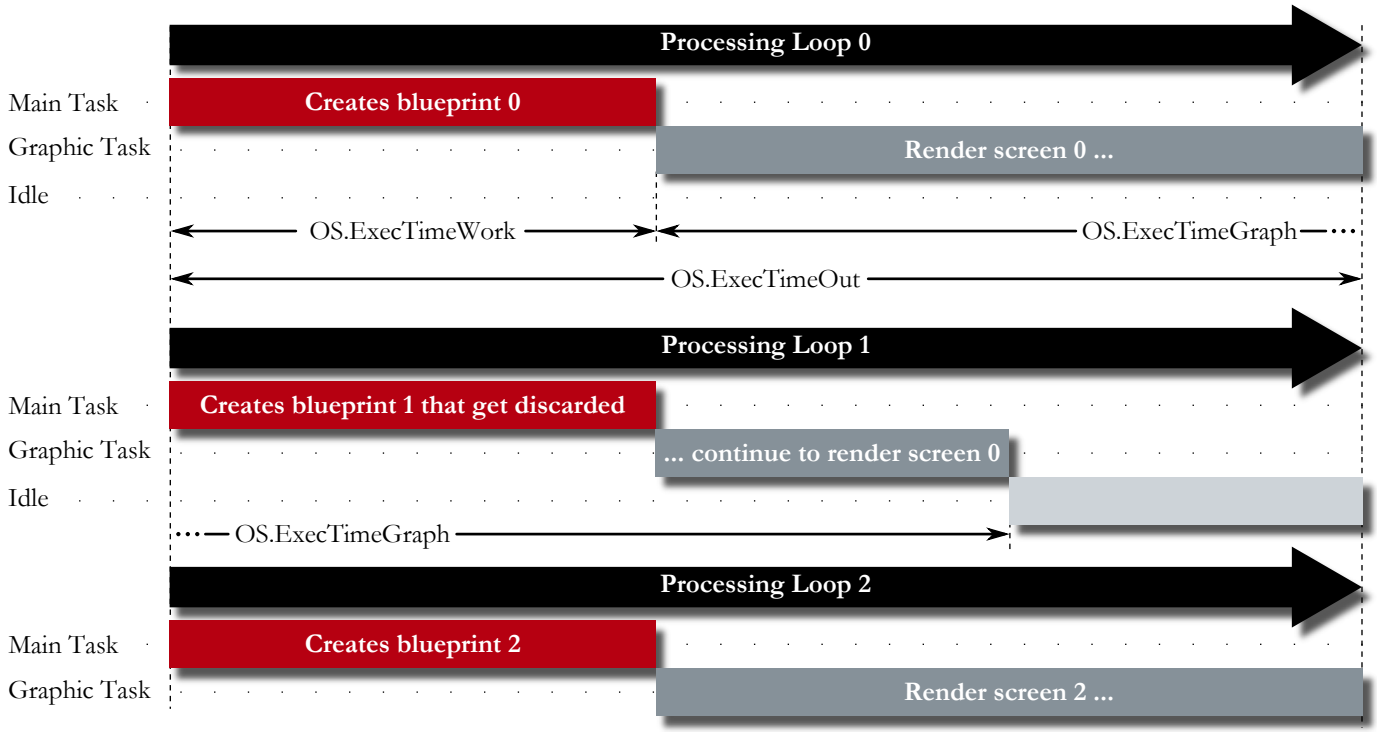
Multiple active background tasks takes turn running according to a round-robin scheme. This ensures that a steady progress is maintained for each task at all times.

The diagram that follows provides a principal example of how this works.



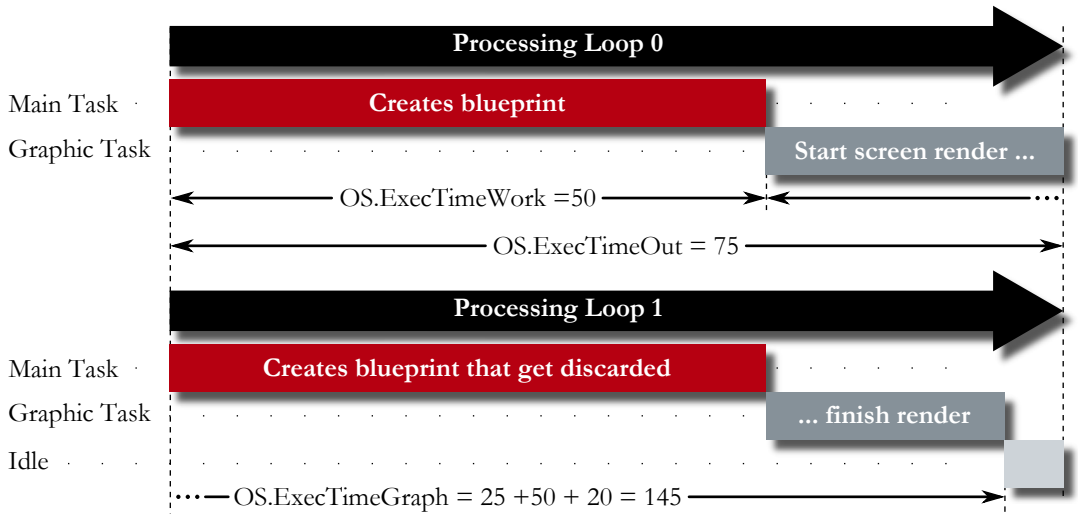
Graphic Rendering

Rendering graphics takes a long time when put in relation to the timing requirements of the typical application. It is therefore done by a background task. The application creates something that is comparable to a blueprint. It is handed over to the background task that starts constructing the screen it describes. The application continues creating blueprints each processing loop. They get discarded while the graphic background task already is at work.

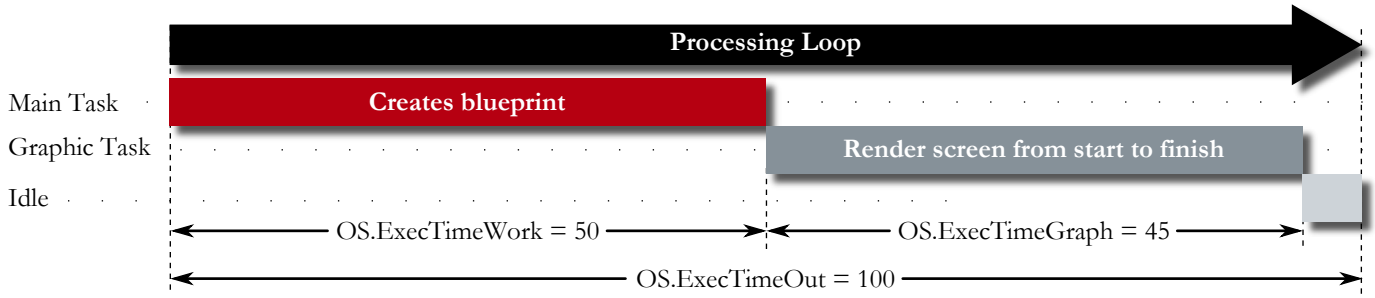


Screen update rate

It is sometime worthwhile to increase the processing loop time to get a higher screen update rate. See the example that follows where the main task requires 50 ms processing time and the graphic background task 45 ms.



A 75 ms processing loop time does not give enough time for the graphic background task to complete the rendering at once. Two processing loops are needed. The screen is updated each 150 ms.



A 100 ms processing loop time provides enough time for the rendering to be completed in one processing loop. The screen is updated each 100 ms.

LEDs

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
LED	-		Device contains separate LEDs with different colors. If device contains RGB LEDs then values set by these parameters have priority over RGB LEDs values.	
Elements				
.RedBrightness	BOOL	Write	**FALSE =** Minimum/Off brightness **TRUE =** Maximum brightness	
.GreenBrightness	BOOL	Write	**FALSE =** Minimum/Off brightness **TRUE =** Maximum brightness	

Real Time Clock

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
RTC	-			Maximum time is 03:14:08 on 19 January 2038.
Elements				
.Year	U16	Bi-Directional	2000 ... 2038 Real time clock year	
.Month	U8	Bi-Directional	1 ... 12 Real time clock month	
.Day	U8	Bi-Directional	1 ... 28/29/30/31 Real time clock Day	
.DayOfWeek	U8	Read	0 ... 6 Real time clock week day 0 = Monday	Set automatically when the date is changed.
.Hour	U8	Bi-Directional	0 ... 23 Real time clock hours	
.Minute	U8	Bi-Directional	0 ... 59 Real time clock minute	
.Second	U8	Bi-Directional	0 ... 59 Real time clock minute	
.Stop	BOOL	Write	**TRUE =** Don't update OS-Variables **FALSE =** Read time from real time clock	
.Set	BOOL	Write	**TRUE =** Write Date and Time to real time clock if RTC.Status Bit0 is FALSE. The time will be overwritten if RTC.Auto = **TRUE** and time source provides time.	
.Auto	BOOL	Write	**TRUE =** RTC is automatically updated with network time from NTP service.	TimeZoneOffset must be correctly set to show local time.
.TimeZoneOffset	S16	Write	Minutes to be added to UTC time received from NTP service. Internally RTC is running with UTC time, but reported and set time by this RTC api is always in offsetted time. e.g.: Berlin +1:00h = 60, Buenos Aires -3:00 = -180, Australia/Darwin 9:30 = 570	
.Status	U16	Read	**Bit0** - Config Error **Bit1 ... Bit15** - Reserved	
.NTP	-			
Elements				
. .Client	-			
Elements				

... continued on next page

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. . .Hostname1	STRING[64]	Write	The first hostname of ntp pool. It can be either resolvable domain name or IP address. This one is used in case of single shot manual synchronization.	

Non-volatile Memory

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
NVMem	-			
Elements				
.Status	U16	Read	Status of Non Volatile memory after reset. The status code is bit coded. **Bit0 -** The NVMem was restored to a previous state. This may happen when a store operation was aborted. For example due to power off. **Bit1 -** The NV Memory checksums are not correct. This may for instance occur the first boot up after a new application is downloaded, if the NV Memory usage is changed. **Bit2 -** The reset routine could not access the NV memory. For instance due to a hardware problem. **Bit3 ... 15** Reserved	

Display

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
Display	-			
Elements				
.Backlight	U8	Write	**0 =** Off **1 =** Minimum brightness **100 =** Maximum brightness The brightness of the LCD backlight is automatically limited by the software to ensure the unit is not damaged if temperature exceeds the maximum allowable value. If value is out of range then it will use previously set correct value.	
.Status	U16	Read	**Bit0** - Backlight is non-functional **Bit1 ... Bit15** - Reserved	
.Port	PORT	Read	A handle for the graphical 800x480 display, used as an input to the screen editor to select which graphical port to use.	Only for use in the PLUS+1 GUIDE Screen Editor.

Screenshot

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
Screenshot	-			
Elements				
.Directory	STRING[4096]	Write	Directory where captured screen image shall be stored. If empty, then **"/media/p1user/"** is used.	
.Name	STRING[256]	Write	Name of created image with automatically appended **.png** suffix. If empty, then **screenshotYYYYmmDD_HH-MM-SS** name is used, where YYYYmmDD_HH-MM-SS is the system time.	
.Shot	BOOL	Write	Capture image from screen at rising edge of signal.	
.Status	S8	Read	Status of creating screenshot. **0 =** ready **1 =** in progress **<0 =** error	

Diagnostic Identity

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
ID	-			
Elements				
.Net[0…2]	-			
Elements				
. .Addr	U8	Write	The net numbers Default settings: ID.Net[0].Addr = 0 for CAN[0] ID.Net[1].Addr = 1 for CAN[1] ID.Net[2].Addr = 2 for Interlink (USB)	**Note 1**
.Node	-			
Elements				
. .ServerAddr	U8	Write	The node number of this unit Default setting: 238	**Note 1**
. .ClientAddr	U8	Read	The node number of the service tool (PC)	

Example:
You have set ID.Node.ServerAddr to 3 in your application and are using the default settings for ID.Net[n].Addr. If you connect your Service Tool to CAN[0] then you will read the identity 0,3 in the Service Tool. If you instead connect your Service Tool to CAN[1] you will read the identity 1,3 in the Service Tool.

CAN Interfaces

CAN[0] is connected to the following pins:
C1p03 normal CAN bus - high
C1p04 normal CAN bus - low

CAN[1] is connected to the following pins:
C1p06 CAN bus - high
C1p07 CAN bus - low

Note: All CAN ports can be used for diagnostics and for download.

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
CAN[0…1]	-			
Elements				
.Port	PORT	Read	A handler for the CAN port n, used as an input to a CAN symbol to select which CAN port to use.	
.Baudrate	U32	Write	Bus baud rate Supported Baud rates: **50000 =** 50 kBd **100000 =** 100 kBd **125000 =** 125 kBd **250000 =** 250 kBd **500000 =** 500 kBd **1000000 =** 1 MBd Default setting: 250 kBd	An invalid value results in a fallback to the default baud rate. **Note 1**
.BusOff	BOOL	Read	**TRUE =** The CAN-controller is in Bus Off mode	
.Reset	BOOL	Write	**TRUE =** Resets the CAN controller and recovers from Bus Off mode.	
.Overflow	BOOL	Read	**TRUE =** The internal CAN message queue was full during the last execution loop. A message may have been lost.	
.ErrorPassive	BOOL	Read	**TRUE =** The CAN-controller is in error passive mode	

Color

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
Color	-			
Elements				
.Transparent	COLOR	Read	The color to use when opening a transparent window.	

A color can also be specified by using components of the COLOR datatype.

How to Define a Color Constant

0xRRGGBB00
The row above is a hexadecimal value with the RR, GG and BB pairs each represent an 8 bit hexadecimal number (00...FF). The RR, GG and BB pairs control the red, green respective blue color component on color displays.

Example: 0xFFFF0000 = Yellow

Application Log

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
AppLog	-		When on applog file **SaveToFile** is asserted, then it is exported, based on avaliability of USB drive. When USB is attached then file is exported to it, otherwise to DirAPI.MediaStorageDir.	
Elements				
.EraseOnDownload	BOOL	Write	**TRUE =** All application logs erased on new application download. **FALSE =** Application logs are left untouched on new application download. Default Value: TRUE It is highly recommended to set to TRUE, because PLUS+1 GUIDE is not guaranteeing the same order of memory blocks inside applog after some changes, which can cause unpredicted behaviour.	May only be set on initialization. **Note 1**

NetworkCommon

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
NetworkCommon	-			
Elements				
.Static	-			
Elements				
. .IPv4	-			
Elements				
. . .DNS1	ARRAY[4] U8	Write	IP of primary IPv4 DNS server, (0,0,0,0) means not set.	**Note 2**
. . .DNS2	ARRAY[4] U8	Write	IP of secondary IPv4 DNS server, (0,0,0,0) means not set.	**Note 2**
. .IPv6	-			
Elements				
. . .DNS1	ARRAY[8] U16	Write	IP of primary IPv6 DNS server, ::0 (all zeros) means not set.	**Note 2**
. . .DNS2	ARRAY[8] U16	Write	IP of secondary IPv6 DNS server, ::0 (all zeros) means not set.	**Note 2**
.Connection	-			
Elements				
. .IPv4	-			
Elements				
. . .DNS1	ARRAY[4] U8	Read	Actual IP of primary IPv4 DNS server, (0,0,0,0) means not available.	
. . .DNS2	ARRAY[4] U8	Read	Actual IP of secondary IPv4 DNS server, (0,0,0,0) means not available.	
. .IPv6	-			
Elements				
. . .DNS1	ARRAY[8] U16	Read	Actual IP of primary IPv6 DNS server, ::0 (all zeros) means not available.	
. . .DNS2	ARRAY[8] U16	Read	Actual IP of secondary IPv6 DNS server, ::0 (all zeros) means not available.	

USB Ethernet

This group contains variables that configures USB ethernet interface.
To disconnect USB ethernet interface set Enable to FALSE.

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
USBEthernet	-			
Elements				
.Enable	BOOL	Write	**FALSE =** down **TRUE =** up	**Note 1** **Note 2**
.DHCP	U8	Write	Enable DHCP client to acquire addresses; if Bit0 is not set, DHCP client is disabled and static settings are taken **Bit0** - Enable DHCP client and acquire IPv4 address and Network Mask **Bit1** - Acquire IPv4 gateway address if DHCP client is enabled **Bit2** - Acquire DNS server addresses if DHCP client is enabled **Bit3** - Allocate link-local (auto-IPv4) address **Bit4 ... Bit7** - Reserved	If **Bit0** is FALSE, DHCP client is disabled and **Static** settings are taken. **Note 1** **Note 2**
.Static	-			
Elements				
. .IP	ARRAY[4] U8	Write	Static IPv4 address; take in account only if DHCP client is disabled	**Note 2**
. .NetMask	ARRAY[4] U8	Write	Static IPv4 network mask; take in account only if DHCP client is disabled	**Note 2**
. .Gateway	ARRAY[4] U8	Write	Static IPv4 gateway address; take in account only if DHCP client is disabled or Bit1 of DHCP is FALSE	**Note 2**
. .GWMetric	U16	Write	Static IPv4 gateway metric; take in account only if DHCP client is disabled or Bit1 of DHCP is FALSE. Lower the value is then higher priority it has over other gateways. Range from 0 to 65535.	**Note 1** **Note 2**
.AutoIP	ARRAY[4] U8	Read	Actual value of Auto-IPv4 address or (0,0,0,0)	
.Connection	-			
Elements				
. .IP	ARRAY[4] U8	Read	Actual value of IPv4 address or (0,0,0,0)	
. .NetMask	ARRAY[4] U8	Read	Actual value of IPv4 network mask or (0,0,0,0)	
. .Gateway	ARRAY[4] U8	Read	Actual value of IPv4 gateway or (0,0,0,0)	
. .GWMetric	U16	Read	Actual value of IPv4 gateway metric or 0. Lower the value is then higher priority it has over other gateways. Range from 0 to 65535.	
.ConnectionIPv6	-			
Elements				

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .IPLinkLocal	ARRAY[8] U16	Read	Actual value of IPv6 Link-Local address or (0,0,0,0,0,0,0,0)	
. .Gateway	ARRAY[8] U16	Read	Actual value of IPv6 gateway address or (0,0,0,0,0,0,0,0)	
. .GWMetric	U16	Read	Actual value of IPv6 gateway metric or 0. Lower the value is then higher priority it has over other gateways. Range from 0 to 65535.	
.Mode	U8	Read	Enumerated mode number **0 =** not connected **1 =** connected	
.Status	U16	Read	Status bits **Bit0** - Get IP error **Bit1** - Get gateway error **Bit2** - Reserved **Bit3** - Set IP error **Bit4** - Set gateway error **Bit5** - Acquiring IP settings from DHCP **Bit6** - DHCP client is running **Bit7** - DHCP server is running **Bit8 ... 13** - Reserved **Bit14** - Interface not present **Bit15** - Fatal network configuration error	
.DHCPService	-			
Elements				
. .Enable	BOOL	Write	**TRUE =** Enable DHCP server **FALSE =** Disable DHCP server	**Note 1** **Note 2**
. .LeaseTime	U16	Write	Value of lease time in seconds	**Note 1** **Note 2**
. .RangeFrom	ARRAY[4] U8	Write	Starting IPv4 address of DHCP server address pool	**Note 2**
. .RangeTo	ARRAY[4] U8	Write	Last IPv4 address of DHCP server address pool	**Note 2**
.MAC	ARRAY[6] U8	Read	MAC address of the interface.	

PLUS+1 InterLink

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
InterLink	-			
Elements				
.Version	-		InterLink version	
Elements				
. .Major	U8	Read	Major version 1..255	
. .Minor	U8	Read	Minor version 0..99	
. .Patchlevel	U8	Read	Patch level 0..99	
.GatewayDeviceName	STRING[64]	Write	Gateway device name Default: "InterLink gateway"	Human readable ID of a device **Note 1**
.FuncEnabling	U32	Write	Bit array enabling parts of InterLink's functionality **Bit0** - Routing between DoIP and DoCAN **Bit1** - CAN Tunnel transmit **Bit2** - CAN Tunnel receive **Bit3** - J1939 Data Link transmit **Bit4** - J1939 Data Link receive **Bit5** - CAN Logging **Bit6 ... Bit31** - Reserved Default: 0x3F (all functionalities enabled)	**Note 1**
.SafeMode	-		Safety mode setting for IP network interfaces Values: **0 =** Normal - all the diagnostic service requests are allowed (default) **1 =** Read-only - the non-safe service requests are blocked, the safe service requests allowed **2 =** Listen-only - all service requests blocked **3 =** No-access - all service requests and responses blocked **> 3** Values are ignored, not changing Safety mode.	Applies to KWP2000 and UDS Lite diagnostic services requested over DoIP. Non-safe service requests: ECU reset, Start programming session, Write data (except history records)
Elements				
. .USBEthernet	U8	Write	USB Ethernet interface - mode for all nodes USB device port	**Note 1**
. .All	U8	Write	All interfaces - mode for all nodes Includes Proxy	**Note 1**
.DoIPGID	ARRAY[6] U8	Write	DoIP Group Identification Used to identify a group of DoIP entities	**Note 2**
.DoIPPassword	STRING[64]	Write	DoIP "machine" password Authentication of DoIP clients	**Note 1** **Note 2**
.EID	ARRAY[6] U8	Read	DoIP Entity Identifier	

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.ActiveDoIPProtocols	U32	Read	Bit array of currently active DoIP protocols **Bit0** - UDS Lite **Bit1** - KWP2000 / PLUS+1 **Bit2** - CAN Tunnel **Bit3** - DoCAN Transport **Bit4** - J1939 Data Link **Bit5 ... Bit31** - Reserved	
.CertificateStatus	S16	Read	Validity status of device security certificate **0 =** OK **-1 =** Certificate is not valid **-32768 =** Unknown status	Certificate status can be invalid on devices without realtime clock source e.g. RTC
.SystemCounter[0…2]	-			
Elements				
. .Operation	U8	Write	**0** = Idle (no operation active) **1** = Reset the counter **2** = Update the counter value. FW sets the value back to 0 after operation is finished. If value is out of range then FW sets value back to 0 without any effect.	Not all counters are supported in all products **Note 1**
. .Value	U32	Read	Value of the counter **SystemCounter[0]** = InterLink main life counter (increased every 100 ms) **SystemCounter[1]** = Number of J1939 Stack main loop iterations **SystemCounter[2]** = Number of failed memory allocation attempts (due to depleted dynamic memory pool)	
.DataCounter[0…12]	-			
Elements				
. .Operation	U8	Write	**0** = Idle (no operation active) **1** = Reset the counter **2** = Update the counter value. FW sets the value back to 0 after operation is finished. If value is out of range then FW sets value back to 0 without any effect.	Not all counters are supported in all products **Note 1**

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .TxCount	U32	Read	Number of transmitted elements **DataCounter[0]** = frames over CAN interfaces **DataCounter[1]** = bytes over TCP interfaces **DataCounter[2]** = bytes over Proxy (cloud) connection **DataCounter[3]** = DoIP messages over TCP interfaces **DataCounter[4]** = DoIP messages over Proxy (cloud) connection **DataCounter[5]** = messages dispatched by diagnostic message router to / from upper layers **DataCounter[6]** = messages dispatched by diagnostic message router to / from DoCAN module **DataCounter[7]** = messages dispatched by diagnostic message router to / from DoIP connections **DataCounter[8]** = CAN Tunnel frames over CAN interfaces (or local echo loopback) **DataCounter[9]** = J1939 Data Link messages over CAN interfaces (or local echo loopback) **DataCounter[10]** = CAN frames over M2M bridge(s) **DataCounter[11]** = bytes over UDP interfaces **DataCounter[12]** = datagrams over UDP interfaces	
. .RxCount	U32	Read	Number of received elements. See **TxCount** for meaning.	

Touch Screen

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
TouchScreen	-			
Elements				
.Status	S16	Read	Touch screen driver status. **0 =** Touch screen OK **-1 =** Can not find touch device **-2 =** Fail to open touch device **-3 =** Fail to setup touch device **-4 =** Touch configuration error	
.Stream[0…1]	-		Touch Stream. Two stream are currently supported.	
Elements				
. .State	U16	Read	Current state of touch operation. if **Config.TouchMode = 0** : **0 =** Idle **1 =** Down **2 =** Up **3 =** Move if **Config.TouchMode = 1** : **0 =** Idle State (No Touch) **1 =** Touch Active **2 =** Touch Release (Active for one loop only) **3 =** Double Click (Active for one loop only) **4 =** Long Press (Active for one loop only) **5 =** Swipe Left (Active for one loop only) **6 =** Swipe Right (Active for one loop only) **7 =** Swipe Up (Active for one loop only) **8 =** Swipe Down (Active for one loop only)	**Note 3**
. .X	U16	Read	X position on the screen. Zero when idle.	**Note 3**
. .Y	U16	Read	Y position on the screen. Zero when idle.	**Note 3**
.Gesture	-			
Elements				
. .Type	U16	Read	Gesture Type **0 =** None **1 =** Single Tap (Active for one loop only) **2 =** Double Tap (Active for one loop only) **3 =** Long Tap (Active for one loop only) **4 =** Swipe Left (Active for one loop only) **5 =** Swipe Right (Active for one loop only) **6 =** Swipe Up (Active for one loop only) **7 =** Swipe Down (Active for one loop only) **8 =** Single Pan **9 =** Multi Pan/Scale/Rotate	**Note 3**
. .X	U16	Read	Initial X position on the screen. Zero when idle.	**Note 3**

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .Y	U16	Read	Initial Y position on the screen. Zero when idle.	**Note 3**
. .DeltaX	S16	Read	Difference between actual and initial X position on the screen in pixels. Zero when idle.	**Note 3**
. .DeltaY	S16	Read	Difference between actual and initial Y position on the screen in pixels. Zero when idle.	**Note 3**
. .ScaleFactor	S32	Read	Scale factor, fixed point DDD.DDDDDD 6 decimal digits. Valid only when .Type = 9, otherwise zero.	
. .RotationAngle	S32	Read	Rotation angle, fixed point DDD.DDDDDD 6 decimal digits. Valid only when .Type = 9, otherwise zero.	
. .Velocity	U16	Read	Velocity in pixels/s of the first finger. Valid only when .Type = 4-9, otherwise zero.	
.Config	-			
Elements				
. .TouchMode	U16	Write	**0 =** Raw touch events. (Active for one loop only) **1 =** DP7xx compatibility mode. (Default) If value is out of range then it will use previously set correct value.	
. .TouchDetection	U16	Write	This is used to reset gesture event timeouts. (ms) Default value is 50ms Minimum value is 10ms	
. .SingleTapDuration	U16	Write	Minimum press duration to determine a single tap. (ms) Default value is TouchDetection (50ms) Minimum value is 10ms	
. .DoubleTapTimeout	U16	Write	Maximum timeout to count gesture as a double tap. (ms) Single Tap is always reported in advance. Default value is 8 times TouchDetection (400ms) Minimum value is 30ms	
. .LongTouchDuration	U16	Write	Minimum press duration to determine a long touch. (ms) Default value is 18 times TouchDetection (900ms) Minimum value is 40ms	
. .SwipeX	U16	Write	Number of pixels a swipe must pass to count as a X swipe. Default Value is 75 pixels Minimum value is 5 pixels	**Note 3**
. .SwipeY	U16	Write	Number of pixels a swipe must pass to count as a Y swipe. Default Value is 75 Minimum value is 5 pixels	**Note 3**

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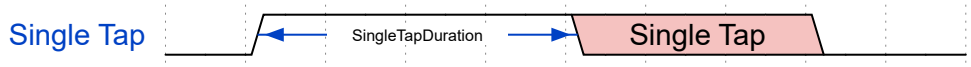
BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .SwipeTimeout	U16	Write	Maximum timeout to count gesture as a swipe. (ms) Default value is 6 times TouchDetection (300ms) Minimum value is 10ms	
. .PanX	U16	Write	Number of pixels to move to count gesture as a X pan. Default Value is 20 pixels Minimum value is 5 pixels	**Note 3**
. .PanY	U16	Write	Number of pixels to move to count gesture as a Y pan. Default Value is 20 pixels Minimum value is 5 pixels	**Note 3**
. .PanDetection	U16	Write	Minimum duration to determine gesture as a pan. (ms) Default value is 6 times TouchDetection (300ms) Minimum value is 10ms	

Touch Screen Operation

All touch event State transition in TouchMode equal to 1 is following sequence: Idle, Active, Release and Gesture (State 3 to 8). It means, the touch State is continuously reported as being Active if finger is in contact with touch screen surface and a Gesture detected during touch being in Active state is reported immediately after Release event. This should simplify PLUS+1 GUIDE graphical code implementation not necessary to filter out Gesture events.

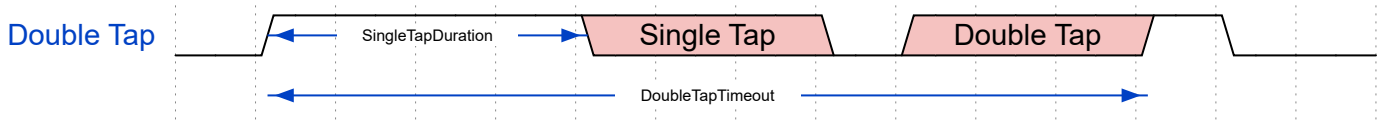
Single Tap

Single tap event is reported after SingleTapDuration timeout elapses (see the red area in the waveform diagram) and finger has not moved more than PanX or PanY respectively.



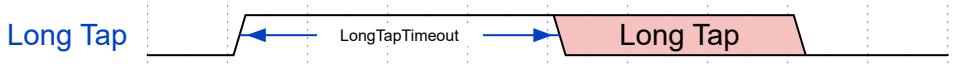
Double Tap

Double tap event is reported if another single tap event is registered within DoubleTapTimeout period and finger has not moved more than PanX or PanY respectively. Setting DoubleTapTimeout too short can make it impossible to generate a Double Tap event. Keep in mind that Single Tap is always reported in advance.



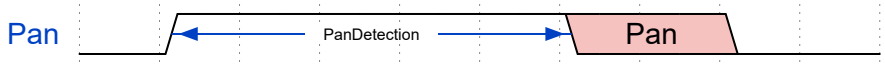
Long Tap

Long tap event is reported immediately after touch Release event if LongTapTimeout has elapsed and finger has not moved more than PanX or PanY respectively.



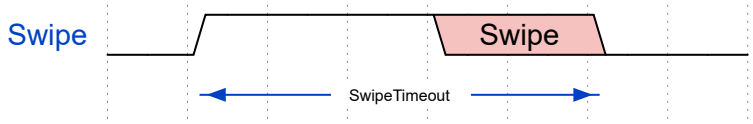
Pan

Pan event is reported if touch lasts more than PanDetection time and finger has moved more than PanX or PanY respectively. It is recommended to set PanDetection to be equal or bigger than SwipeTimeout to avoid misinterpretation of Pan gesture as being Swipe.



Swipe

A Swipe event is reported if touch is released within SwipeTimeout and finger has moved more than SwipeX or SwipeY respectively. It is recommended to set SwipeTimeout to be less or equal to PanDetection to avoid misinterpretation of Swipe gesture as being Pan.



PowerHold API

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
PowerHoldService	-			
Elements				
.PwrDown	BOOL	Write	**TRUE =** Enter Low Power Mode **FALSE =** don't change the power mode Default Value: FALSE	
.PwrDownStatus	BOOL	Read	**TRUE =** Low Power Mode is requested **FALSE =** Low Power Mode was not requested Default Value: FALSE	The application can exit immediately, so TRUE will never be visible.

Media Player

This group contains variables that handle the media player. MP4 file format is only supported for video playback.

Supported video codec is H264 with high, main or baseline profile up to level 4.1 for smooth video playback. If video media file is encoded with higher level than 4.1 then it should be transcoded to level 4.1. For this purpose the ffmpeg video format converter can be used like in example bellow:
ffmpeg -i video_with_not_supported_level.mp4 -c:v libx264 -profile:v high -level:v 4.1 -c:a copy transcoded_video_to_level_4.1.mp4

Supported video formats:

Video Format	Frame Rate	Max. Bitrate [Mbps]	Notes
HD 1280x720p	25	10	
HD 1280x720p	30	10	
HD 1280x720p	60	10	frame rate is not supported for smooth video playback
Full HD 1920x1080p	25	10	
Full HD 1920x1080p	30	10	possible only without graphics elements on screen, but frame rate can be reduced
Full HD 1920x1080p	60	10	frame rate is not supported for smooth video playback

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
MediaPlayer[0…3]	-			
Elements				
.URI	STRING[256]	Write	Media file Uniform Resource Identifier	
.GenericViewPortUID	U32	Write	Define generic view port UID for media player video output	
.Controls	-			
Elements				
. .Play	BOOL	Write	**TRUE =** Play media file **FALSE =** Pause media file	
. .Seek	S32	Write	Define position in media file in milliseconds. Position in media is changed immediately when value of Seek is changed to different value during playing of media. If Seek > -1 then media start playing on predefined Seek position. If Seek = -1 then media continues playing on position where it has been paused.	
. .Loop	BOOL	Write	**TRUE =** Play media file in loop **FALSE =** Play media file only once When looping is enabled the media always starts playing from 0 position regardless of seek value.	
. .Zoom	U16	Write	Not supported yet	
.Info	-			

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
Elements				
. .Status	S16	Read	**0 =** media file playing paused **1 =** playing media file **2 =** playing is done **3 =** loading media file **<0 =** error	
. .Position	U32	Read	Read current position in media file in milliseconds. Position step is 200ms. Value of position is rounded.	
.Meta	-			
Elements				
. .Duration	U32	Read	Duration of media file in milliseconds.	
. .Width	U16	Read	Width of picture of media file	
. .Height	U16	Read	Height of picture of media file	

DirAPI

DirAPI performs basic filesystem operations in an asynchronous way, i.e. copying, deleting, reading a files or a directory and volume unmounting is done in the background, not affecting the main application execution rate. The **OperationStatus** parameter signalizes whether an operation is pending or has completed. Changing just the **RequestedFileIndex** has immediate effect, it doesn't require checking **OperationStatus**, presuming the directory has already been read correctly. For FAT32 formatted drives IBM-PC characters or basically ASCII codepage 437 is used for short filenames and character set ISO8859-1 Latin1 is used for long filenames.

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
DirAPI	-			
Elements				
.Directory	STRING[4096]	Write	Path to a folder to work with. Allowed folders are only **"/home/p1user/media/"**, **"/media/"** and its subdirectories	
.AppMediaDir	STRING[256]	Read	Path to application read only directory. **"/home/p1user/media/"**	
.MediaMainDir	STRING[256]	Read	Path to read/write directory. Attached USB sticks appear here. **"/media/"**	
.MediaStorageDir	STRING[256]	Read	Path to internal storage media read/write directory. **"/media/p1user/"**	
.ForceRefresh	BOOL	Write	If signal changed from FALSE to TRUE the directory shall be re-read even if the path isn't changed. Otherwise the directory shall be re-read only if the path or content params are changed.	
.RequestedFileIndex	U16	Write	The index of the item found in the directory to fill the first FileRequested structure. The value should be smaller than FoundFilesCount. If value is out of range then FileRequested.Valid is set to FALSE.	
.FoundFilesCount	U16	Read	The count of items read from the directory that satisfy search criteria specified in ContentParams.	
.ContentParams	-			
Elements				
. .SortContent	BOOL	Write	**TRUE =** The directory listing will be sorted internally, so that the items read will be sorted alphabetically by name while incrementing RequestedFileIndex. **FALSE =** The directory listing keeps the order of items stored on the disk.	
. .WantDirs	BOOL	Write	**TRUE =** The directory listing will contain subdirectories found in the Directory path. **FALSE =** The directory listing will not contain directories. Default value = TRUE	

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .WantRegularFiles	BOOL	Write	**TRUE =** The directory listing will contain regular files. **FALSE =** The directory listing will not contain regular files. Default value = TRUE	
. .WantOtherFiles	BOOL	Write	**TRUE =** The directory listing will contain special files. **FALSE =** The directory listing will not contain special files. Default value = TRUE	
. .Mask	STRING[64]	Write	The regular expression string. If not empty, the listing item names will be checked by the expression and only the satisfying ones will be included in the listing. Empty by default, i.e. not active.	
.FileRequested[0…31]	-			
Elements				
. .Valid	BOOL	Read	**TRUE =** The structure is filled by the valid data. **FALSE =** The directory listing failed or an invalid index was used to request file info.	
. .FileName	STRING[256]	Read	The file name corresponding to the RequestedFileIndex in the current directory listing.	
. .Size	U32	Read	The file size of the requested file.	
. .IsRegularFile	BOOL	Read	**TRUE =** The item is a reguler file. **FALSE =** The item is not a regular file. It may be a directory or a special file.	
. .IsDirectory	BOOL	Read	**TRUE =** The item is a directory. **FALSE =** The item is not a directory. It may be a regular or a special file.	
. .IsOtherFile	BOOL	Read	**TRUE =** The item is a special file. **FALSE =** The item is not a special file. It may be a directory or a regular file.	
.ReadFile	BOOL	Write	If changed from FALSE to TRUE, the selected file is readout to ReadFileContent array from ReadFileIndex.	
.ReadFileName	STRING[256]	Write	The name of a file located in the current directory to read.	
.ReadFileIndex	U32	Write	Byte position in the file to read out. If changed and ReadFile remains in 1, new read operation will start.	
.ReadFileContent	ARRAY[4096] U8	Read	Content of requested file starting on the ReadFileIndex.	
.DeleteFile	BOOL	Write	The delete operation starts with the rising edge of the signal and is sent to the background thread to complete. The result of the operation initialization will be copied to **OperationStatus**.	

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BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
.DeleteFileName	STRING[256]	Write	The name of a file or a directory located in the current directory to delete.	
.CopyFile	BOOL	Write	The copy operation is started on rising edge of the signal and is sent to the background thread for completion. The result of the operation initialization will be copied to **OperationStatus**.	
.CopyFileName	STRING[256]	Write	The name of a file located in the current directory to copying	
.CopyFileDestDir	STRING[4096]	Write	The destination directory of copy operation	
.Unmount	BOOL	Write	Unmount attached USB stick for safe removeing. Select USB by setting Directory to **E.g. /media/sda1** and pulse this signal.	
.OperationStatus	U16	Read	Enumerated status of the last executed operation. Values are similar as c errno. **0 =** success **1 =** operation not permited **2 =** No such file or directory **3 =** Not accessible directory **13 =** Permission denied **16 =** Operation is being processed in the background, will be completed later **22 =** Invalid argument **127 =** Failed to create a child process	
.AsyncOperationsStartedCount	U32	Read	The count of initiated background operations (copy, delete, unmount, reading a file or directory). Every time an asynchronous background processing is started, this value increments. If an asynchronous operation (copy or delete) fails during its initialization, the error is set to **OperationStatus**. If the asynchronous operation is initialized correctly, the value 16 is set to the **OperationStatus** to signalize pending operation.	
.AsyncOperationsCompletedCount	U32	Read	The count of finished background operations (copy, delete, unmount, reading a file or directory). Every time an asynchronous background processing finishes, this value increments.	

Image Viewer

This group contains variables that handle the image viewer. Supported image formats: JPEG, PNG, GIF, TIF. Maximu size of image is width = 2000px, height = 2000px. Bigger image returns status error due to not enough memory for loading.

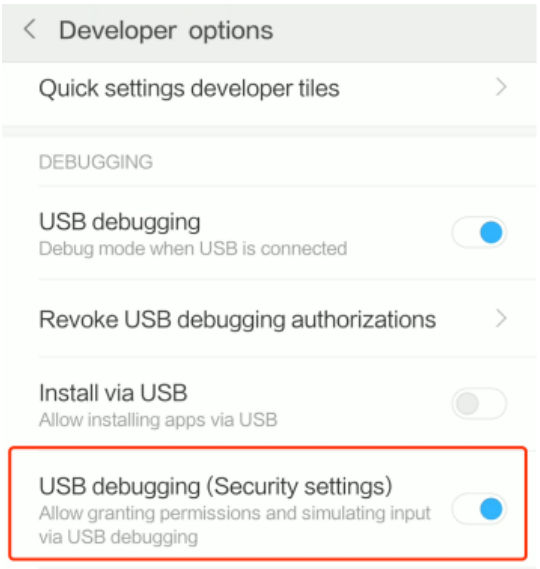
BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
ImageViewer	-			
Elements				
.ImagePath	STRING[256]	Write	Path to image file.	
.GenericViewPortUID	U32	Write	Define generic view port UID for image output	
.Status	S16	Read	**-1 =** error while loading image **0 =** image is not loaded **1 =** image is loaded **2 =** loading image	
.ImageWidth	U16	Read	Actual width size of image. Value is valid when Status = 1	
.ImageHeight	U16	Read	Actual height size of image. Value is valid when Status = 1	
.ScrollHorizontal	U32	Write	Scrolls image down and up, value in pixels	
.ScrollVertical	U32	Write	Scrolls image right and left, value in pixels	
.Zoom	U16	Write	Scaling image, value is in %, minimum is 10% and maximum is 400%. If value is out of range then it will use previously set correct value.	

Screen Mirror

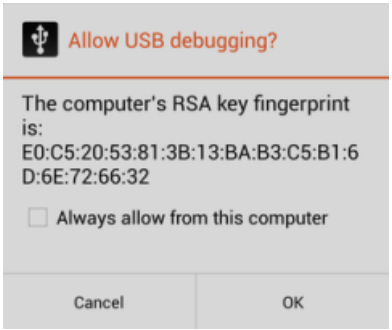
Scrcpy API provides display and control of Android devices connected via USB.

Requirements:

- The Android device with API version at least 21 (from Android 5.0 Lollipop).
- USB adb debugging must be enabled on android device. Developer options screen is hidden by default.
  To make it visible, go to Settings > About phone and tap Build number seven times.
  Return to the previous screen to find Developer options at the bottom.
  The Developer options screen might be located or named differently on some devices.
- Some devices need to have enabled an additional option to control it using buttons and touch controls.
  It is located in Developer options screen menu like USB Debugging - Allow Granting Permissions and Simulating Input via USB debugging.



- The following dialog is shown when you connect android device to display controller running application with scrcpy enabled. Click OK to allow USB debugging to enable screen mirroring via scrcpy. If you accidentally click Cancel, disconnect your device from your display controller and connect it back to make the dialog show up again on your device.



BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
ScrCpy	-			
Elements				
.GenericViewPortUID	U32	Write	Define generic view port UID for screen mirror output. If value is set 0xFFFFFFFF then scrcpy API is disabled.	
.KeepAspect	BOOL	Write	**TRUE =** Keep aspect ratio. **FALSE =** Use dimensions of generic view port, default value.	
.Stream	-			
Elements				
. .FPS	U8	Write	Frames Per Second of video stream from connected android device. Minimum value is 1 and maximum value is 30. Default is set to 20. If value is out of range then it will use previously set correct value. This parameter is sent to server on android OS side where mirror stream is generated, to update it the server must be restarted either by setting GenericViewPortUID to default value 0xFFFFFFFF which stops server and then switch it back to UID of belonging Generic View Port or simple disconnect android device from USB cable and reconnect it again.	
. .BitRate	U32	Write	Bit rate of video stream from connected android device. Minimum value is 100000 bps (100kbps) and maximum value is 10000000 bps (10Mbps). Default is set to 2000000 bps (2Mbps). If value is out of range then it will use previously set correct value. This parameter is sent to server on android OS side where mirror stream is generated, to update it the server must be restarted either by setting GenericViewPortUID to default value 0xFFFFFFFF which stops server and then switch it back to UID of belonging Generic View Port or simple disconnect android device from USB cable and reconnect it again.	

... continued on next page

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
. .MaxSize	U16	Write	Limit both the width and height of the video to max size value. The other dimension is computed so that the device aspect-ratio is preserved. Minimum value is 320 and maximum value is 1920. Default value is set to 1280. This parameter is sent to server on android OS side where mirror stream is generated, to update it the server must be restarted either by setting GenericViewPortUID to default value 0xFFFFFFFF which stops server and then switch it back to UID of belonging Generic View Port or simple disconnect android device from USB cable and reconnect it again.	
.Buttons	-			
Elements				
. .Home	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
. .Back	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
. .AppSwitch	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
. .Power	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
. .VolumeUp	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
. .VolumeDown	BOOL	Write	**TRUE =** Button is pushed **FALSE =** Button is released	
.Status	S16	Read	**-1 =** error **0 =** device is not connected **1 =** device is succesfully connected	
.Width	U16	Read	Width of picture of received stream	
.Height	U16	Read	Height of picture of received stream	

Pdf Viewer

This group contains variables that handle the pdf viewer. If page from pdf document contains too big images which consume a lot of memory to render then this page will not be loaded and status error is returned. Maximum loadable size of image in page or whole page in pdf document is limited to width = 2000px and height = 2000px.

BIOS-name	Variable Type	Variable Direction	Function, Scaling	Miscellaneous
PdfViewer	-			
Elements				
.PdfPath	STRING[256]	Write	Path to pdf file.	
.GenericViewPortUID	U32	Write	Define generic view port UID for pdf output	
.Status	S16	Read	**-1 =** error while loading pdf **0 =** pdf is not loaded **1 =** pdf is loaded **2 =** loading pdf file	
.PageWidth	S16	Read	Actual width size of pdf page in pixels. Value is valid when Status = 1	
.PageHeight	S16	Read	Actual height size of pdf page in pixels. Value is valid when Status = 1	
.CountOfPages	S32	Read	Count of pages	
.PageNumber	U32	Write	Current page to view, possible values from 1 to CountOfPages	
.ScrollHorizontal	U32	Write	Scrolls pdf document page down and up, value in pixels	
.ScrollVertical	U32	Write	Scrolls pdf document page right and left, value in pixels	
.Zoom	U16	Write	Scaling pdf document, value is in %, minimum is 10% and maximum is 400%	

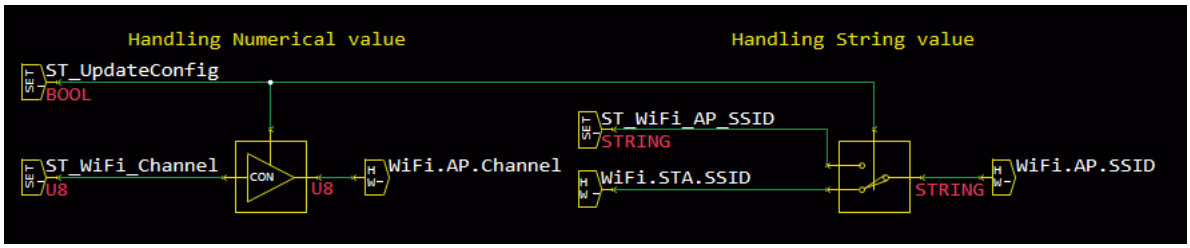
Notes

Note 1

Element is initializable and setable.
This signal can use both symbols "Initialize Hardware Output" and "Hardware Output". "Initialize Hardware Output" means that this output will be updated before the application starts. "Hardware Output" means that this output will be updated every loop in the application.

Note 2

Element is stored in persistent memory
In case the signal is not set, it uses value from the last application run. The value from the last application run is stored in non-volatile memory.
Example how the signals can be handled:



Note 3

Touch panel orientation
Please note that the reported touch coordinates and directions of the gestures always refer to the default landscape view orientation.

Miscellaneous

All Scaling for inputs and outputs are theoretical values, for exact data see engineering specification for hardware.
PLUS+1 GUIDE 11.1.5.1001 or higher is required.

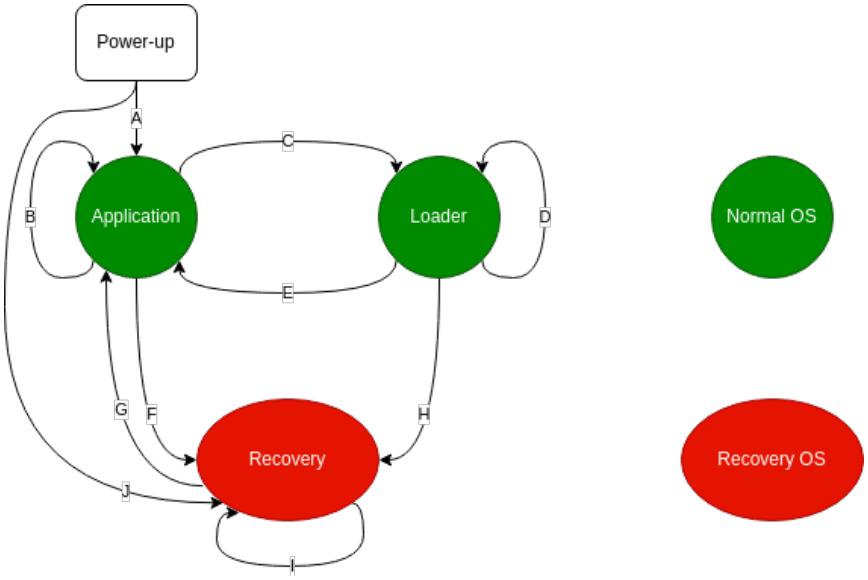
Running modes

The unit has different running modes for different purposes, where some modes are running with different operation system (OS).

- **Application mode -** The mode runs user defined application.
- **Loader mode -** The mode is running during download of a new application. The mode can be forced, see Transitions.
- **Recovery mode -** Its purpose is backup, when anything goes wrong during update. The mode is acting the same as Loader mode. User can distinguish it from loader mode in Service tool by its Application ID containing **"Recovery"** string. The mode can be forced, see Transitions.

Transitions

Each transition can occur under different conditions. From eache state you can get to Application mode thru reboot. Preferred interface for **Recover ECU** from Service Tool is CAN.



A transition Power-up -> Application

- On power-up.
- On reboot.

B transition Application -> Application

- On first 2 application fails. After power-up application is 3 times trying to run before Application->Loader transition.

C transition Application -> Loader

- On start of download application.
- On **Recover ECU** from Service Tool.
- After third faulty application run.

D transition Loader -> Loader

- On **Recover ECU** from Service Tool.
- On repeated start of download application.

E transition Loader -> Application

- On successfull download of application.

F transition Application -> Recovery

- On **Recover ECU** from Service Tool for four times in less than 60 seconds. (Application->Loader->Recovery)
- On faulty OS.

G transition Recovery -> Application

- On successfull download of application. (Download in Recovery mode always forces full download.)

H transition Loader -> Recovery

- On **Recover ECU** from Service Tool for four times in less than 60 seconds.
- On faulty OS.

I transition Recovery -> Recovery

- On **Recover ECU** from Service Tool.

J transition Power-up -> Recovery

- On **Recover ECU** from Service Tool during power-up. (CAN only)

Supported PLUS+1 GUIDE Components

The following PLUS+1 GUIDE components which needs support from the SYS are allowed

- Initialize Hardware Output
- Integer Sine
- Integer Cosine
- Integer Tangent
- Integer Arc Sine
- Integer Arc Cosine
- Integer Arc Tangent
- Integer Square Root
- Module Input
- Module Bus Input
- Module Bus Output
- Hardware Input/Output
- Hardware Input
- Read Output from Hardware
- Open Parameter Set
- Close Parameter Set
- Read-only Parameter Input with Namespace
- Read-only Parameter Input
- Transmit CAN
- Receive CAN with Filter
- Receive CAN with ID Mask

- Receive CAN Basic
- Non Volatile memory Dynamic with Default
- Non Volatile memory Dynamic
- Non Volatile memory Dynamic Input
- Access App Log Enable
- Disable Raw Applog data Readout
- Accessrights App Log Diagnostics
- Accessrights App Log Errors
- Accessrights App Log Others
- Accessrights History
- Accessrights Read
- Accessrights Write
- Repeat
- Until
- Get Time us

Screen Editor/ Multi Language

Supported.

Diagnostic Data (PLG) in Target

Diagnostic Data (PLG file) is dynamic allocated in target FLASH memory.

ToolKey

"LOGKEY" Supported.

TimeBase

The following time bases are supported

- T1M
- T10M
- T100M
- T1S
- T60S
- T1H
- TLOOP

Unit History

Unit History is supported. The 20 latest activities are logged.

Read Only Parameters Support

This software supports Multiple Read Only Parameters.
131072 bytes are allocated and there is theoretically no limit on the number of files that can be used. However, the minimum size for each file is 230 bytes, so no more than 569 files can be used.

Needed Information for csv File

```
ADDRESSMODE: LSBFIRST
DEFAULTTYPEDATA: 1
MIN_DATASIZE: 8
```

SW Licenses

All software contained in this package is owned by Danfoss or a third-party licensor. For details see License PDF document.

Application Log Support

This software supports Multiple Application Log.
Both Circular and Linear type is supported.

The maximum size allocated for application log is 33554432 bytes and the block size is 262144 bytes. There is theoretically no limit on the number of files that can be used. However, because the minimum size for each file is 1 block size for Linear Type and 2 block sizes for Circular Types, no more than 128 files for Linear Type and 64 files for Circular Type can be used.

Performance of application log

The application log memory is updated as a low priority task.
Examples (hardware dependent) that have an impact on the application log performance:

- Speed of memory writing
- Frequency inputs
- CAN communication
- PWM outputs usage
- Graphic update
- OS.ExecTime - OS.ExecTimeWork (-OS.ExecTimeGraph)
- Non-Volatile memory access
- Array Constant from Binary File
- Multiple application log files accessed

Host Settings

In General the PLUS+1 Setup program does this.

Known Issues

See the revision history document included in the HWD for more information.

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