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Master Revision History

Revision	Date	Author(s)	Change Description
0	10/06/2013	D.Natati	Preliminary Revision
1	19/08/2013	D.Natati	First Official Revision

Overview

This document is a quick guide to the Function Block “DAD” named; that block has been designed according to the Profibus-DP fieldbus specifications, the showed screenshots refer S7-300 Siemens PLC series.

“DAD” comes from “Datalogic Anybus Driver”; it indicates the data flow control protocol that Datalogic currently provides on the readers supporting the fieldbus software drivers.

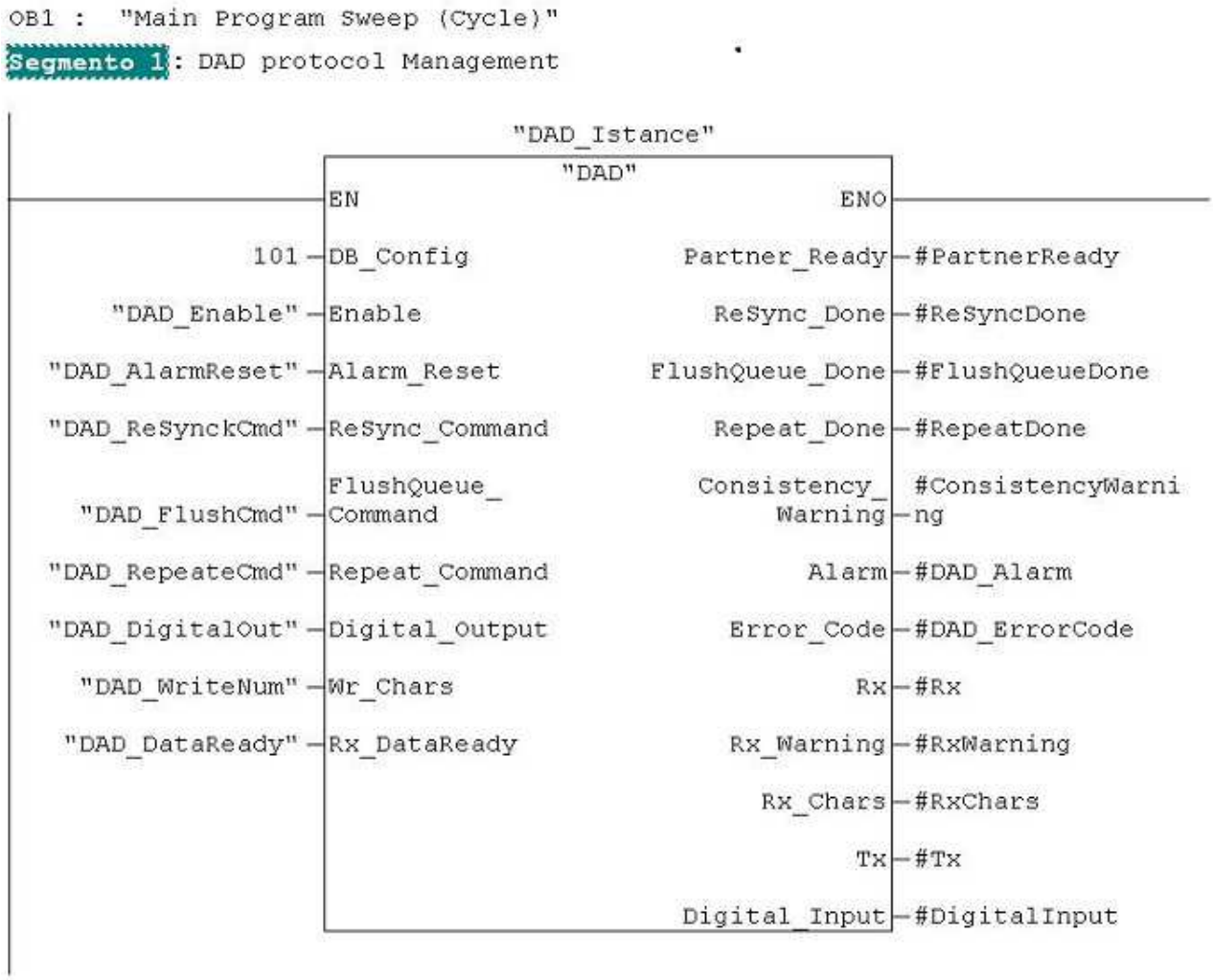
“Anybus” is the manufacturer of the fieldbus interface cards supported by the Datalogic readers belonging to the 2KN-4K series and to the Matrix series.

Following sections describe:

- DAD Function Block
- DAD FB inputs
- DAD FB outputs
- DAD Configuration Parameters
- DAD Alarm Table

DAD Function Block

The picture below shows an instance (DAD_Instance) of DAD FB, as included into the Main organizer block OB1:



Inputs

This section quickly describes the INPUTS side of the DAD FB instance.

- **DB_Config**

  Integer. It indicates the number of the Data Block containing the configuration parameters of the DAD instance.

- **Enable**

  Boolean. It enables/disables the DAD instance.

- **Alarm_Reset**

  Boolean. It clears the DAD instance alarm (see “Alarm Table” section)

- **Resync_Command**

  Boolean. It activates the Resync procedure. For further details see the “DAD Driver Reference” manual.

- **FlushQueue_Command**

  Boolean. It activates the FlushQueue procedure. For further details see the “DAD Driver Reference” manual.

- **Repeat_Command**

  Boolean. It activates the command repeater, it means the content of TX buffer (UDT101 byte 20)is sent to the node one more time. The characters number to send is the current value of the “Wr_Chars” variable.

  It can be activated even a write procedure is running; in this case the repeat procedure starts just after the writing end.

- **Digital_Output**

  Byte. Bit by bit it allows to drive the node outputs as following:

  - Bit 0 → Digital Output 0
  - Bit 1 → Digital Output 1
  - Bit 6 → One Shot Trigger (Matrix series only)
  - Bit 7 → Phase Trigger

➢ Wr_Chars

Integer. It is the number of the remaining characters to send to the node. Set this input to the "0" value means the runnig writing is canceled.
These characters have to be written into the "Tx_Buffer" (UDT101 byte 20)

➢ Rx_DataReady

Boolean. IN/OUT variable: it can be written as input, it can be read by DAD as output, also.
If its value is "true", it indicates that a string from the node has been fully received.

- If OverwriteProtect (UDT101 bit 28.4) = 1
  - No one else message from the node can be accepted until this input is "1". Then the user must reset this input in order to accept the next string coming from the node; the "Rx_Warning" output = "1" just signals that a new string from the node is waiting.

- If OverwriteProtect (UDT101 bit 28.4) = 0
  - All strings coming from the node will be accepted; Rx_DataReady input will be automatically cleared at the beginning of the string receiving and raised up at the receiving end.

Outputs

This section quickly describes the OUTPUTS side of the DAD FB instance.

- **PartnerReady**

  Boolean. It shows the partner(node) status for the communication.

  True → partner ready

  False → partner NOT ready

  This flag goes to 1 (0 →1) just PLC detects the "1" value of bit 7 on the Input control byte. Then PLC copies the Input handshake bits (bit 0, bit1) on its own handshake bits, in order to synchronize the initial status and start the communication.

  The "PartnerReady_Tout" (Configuration DB, address 30.0)timer value is the timeout to complete this initial synchronization. If the timer expires the "Partner Not Ready" alarm goes up (error code = 100).

- **ResyncDone**

  Boolean. It indicates the correct completion of the ReSync command.
  The duration of the "1" level of this flag depends on the command type, if this is a "pulsed" or a "stable" command (see note 1, pag.8)

- **FlushQueueDone**

  Boolean. It indicates the correct completion of the FlushQueue command.
  The duration of the "1" level of this flag depends on the command type, if this is a "pulsed" or a "stable" command (see note 1, pag.8)

- **RepeatDone**

  Boolean. It indicates the correct completion of the Repeat command.
  The duration of the "1" level of this flag depends on the command type, if this is a "pulsed" or a "stable" command (see note 1, pag.8)

- **ConsistencyWarning**

  Boolean. It goes up in case of a consistency mismatch, it means if the “Data Consistency” feature is not enabled on both communication partners. This warning goes down to 0 just the mismatch is solved.

- **DAD_Alarm**

  Boolean. It goes up if the “DAD_ErrorCode” variable is not equal to 0 (see “Alarm Table” for further details).

- **DAD_ ErrorCode**

  Integer. If this value is not equal to 0 there is a wrong block condition; in this case the block behavior is stopped (see “Alarm Table” for further details).

- **Rx**

  Boolean. It goes up to signal a message receiving in progress.

- **RxWarning**

  Boolean. It goes up to signal the communication partner is asking to send a message (Input control byte.bit 0 change). This flag can raise up to 1 only if the “Overwrite” (UDT101 byte 28.4) protection has been enabled.

- **RxChars**

  Intero. It shows the number of the received characters. These charcters are stored in the receiving buffer “Rx_Buffer” (UDT101 byte 12)

- **Tx**

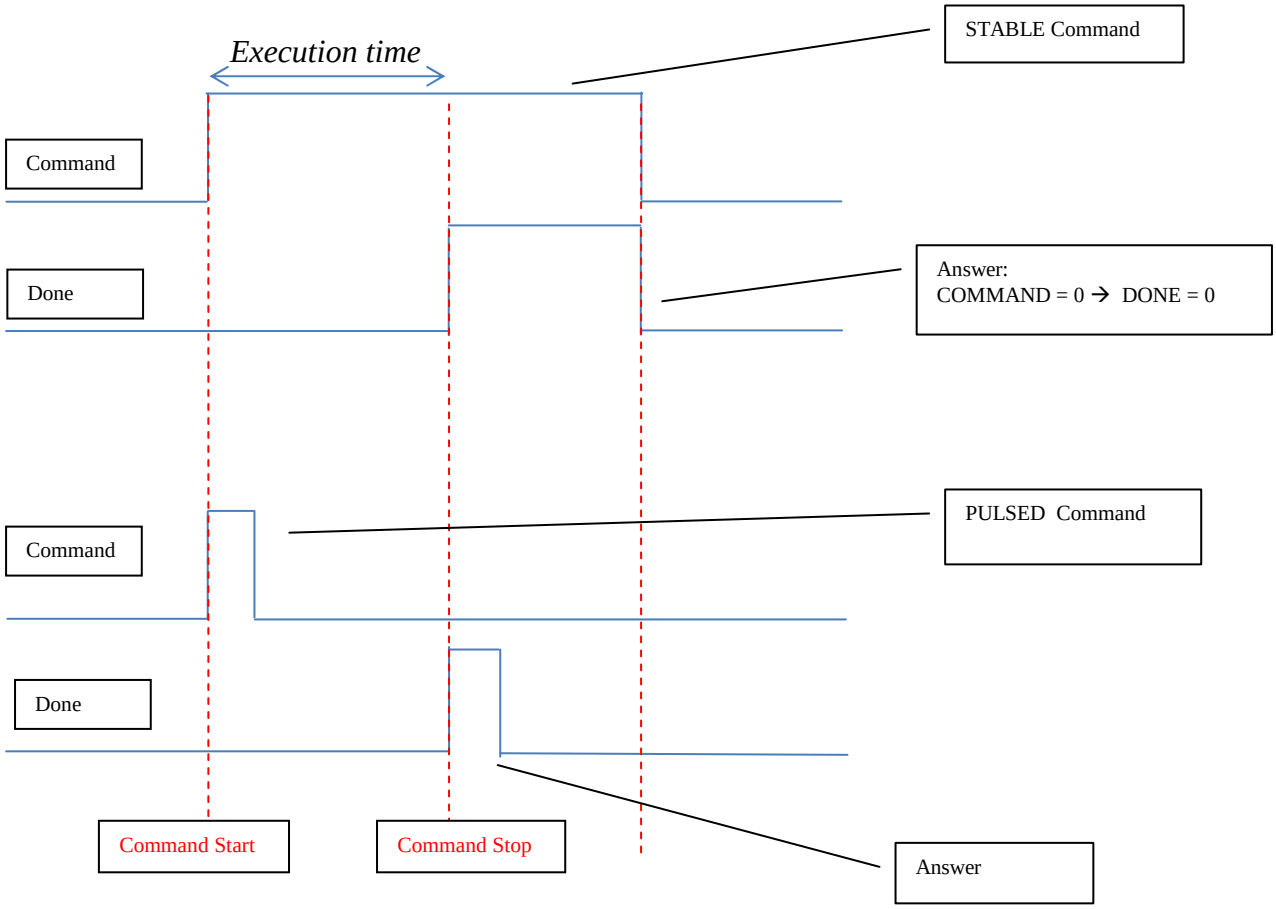
  Boolean. It goes up to signal a message sending in progress.

- **DigitalInput**

  Byte. If the Digital_IO (UDT101 bit 28.1) option is enabled, its bit values show the current status of following digital inputs

  - Bit 0 → Digital Input 0
  - Bit 1 → Digital Input 1
  - Bit 7 → Reading Phase

Nota 1: timing diagrams of pulsed and stable commands, and related answers



Configuration Data Block

KOP/AWL/FUP - [DB101 -- "DAD_Config" -- DAD_V2-2013_06\ProfibusRack\CPU 315-2 PN/DP\...\DB101]

File Modifica Inserisci Sistema di destinazione Test Visualizza Strumenti Finestra ?

Indirizzo	Nome	Tipo	Valore iniziale	Valore attuale	Commento
0.0	V2.In_Field	INT	0	0	Input field area first byte number
2.0	V2.In_Field	INT	0	0	Input field area size (num. of bytes)
4.0	V2.In_Field	INT	1	1	Input field area type: 1 = Input (E) / 3 = Memory (M)
6.0	V2.Out_Fiel	INT	0	0	Output field area first byte number
8.0	V2.Out_Fiel	INT	0	0	Output field area size (num. of bytes)
10.0	V2.Out_Fiel	INT	2	2	Output field area type: 2 = Output (A) / 3 = Memory (M)
12.0	V2.Rx_Buffe	INT	0	0	Receive Buffer 1st byte address (number)
14.0	V2.Rx_Buffe	INT	0	0	Receive Buffer size (num. of bytes) (Min.= 8)
16.0	V2.Rx_Buffe	INT	0	0	Receive Buffer area type: 2 = Output (A) / 3 = Memory (M) / 4 = DataBlock (DB
18.0	V2.Rx_Buffe	INT	0	0	Receive Buffer DB number (valid only if 'Area' = 4)
20.0	V2.Tx_Buffe	INT	0	0	Transmit Buffer 1st byte address (number)
22.0	V2.Tx_Buffe	INT	0	0	Transmit Buffer size (num. of bytes) (Min.= 8)
24.0	V2.Tx_Buffe	INT	0	0	Transmit Buffer area type:1=Input(E)/ 2=Output(A)/ 3=Memory(M)/ 4=DataBlock(D
26.0	V2.Tx_Buffe	INT	0	0	Transmit Buffer DB number (valid only if 'Area' = 4)
28.0	V2.Setting.	BOOL	TRUE	TRUE	Flow Control Reserved --- DON'T MODIFY ! ---
28.1	V2.Setting.	BOOL	FALSE	FALSE	Digital Input conditioning enabled
28.2	V2.Setting.	BOOL	FALSE	FALSE	Consistency mode is enabled
28.3	V2.Setting.	BOOL	FALSE	FALSE	Reserved for future use
28.4	V2.Setting.	BOOL	FALSE	FALSE	This option disable data reception while 'DataReady' is TRUE
28.5	V2.Setting.	BOOL	TRUE	TRUE	Read from partner function enabled (HostMode bypass it)
28.6	V2.Setting.	BOOL	TRUE	TRUE	Write to parnter function enabled (HostMode bypass it)
28.7	V2.Setting.	BOOL	FALSE	FALSE	Consistency Guard: On Consistency invalid -> ON=Alarm - OFF=Warning
30.0	V2.PartnerR	TIME	T#20S	T#20S	Maximum delay for communication protocol data matching with Partner
34.0	V2.Function	TIME	T#5S	T#5S	Maximum work time for procedures (ReSynchronization,FlushQueue command,Repeat

DB Configuration Instance

KOP/AWL/FUP - [UDT101 -- "DAD_Config_Form" -- DAD_V2-2013_06\ProfibusRack\CPU 315-2 PN/DP\...\UDT101]

File Modifica Inserisci Sistema di destinazione Test Visualizza Strumenti Finestra ?

Indirizzo	Nome	Tipo	Valore ini	Commento
0.0		STRUCT		
+0.0	In_Field	STRUCT		Input field area
+0.0	FirstByte	INT	0	Input field area first byte number
+2.0	Size	INT	0	Input field area size (num. of bytes)
+4.0	Area	INT	1	Input field area type: 1 = Input (E) / 3 = Memory (M)
=6.0		END_STRUCT		
+6.0	Out_Field	STRUCT		Output field area
+0.0	FirstByte	INT	0	Output field area first byte number
+2.0	Size	INT	0	Output field area size (num. of bytes)
+4.0	Area	INT	2	Output field area type: 2 = Output (A) / 3 = Memory (M)
=6.0		END_STRUCT		
+12.0	Rx_Buffer	STRUCT		Receive Buffer: area where messages (from Partner) will stored
+0.0	FirstByte	INT	0	Receive Buffer 1st byte address (number)
+2.0	Size	INT	0	Receive Buffer size (num. of bytes) (Min.= 8)
+4.0	Area	INT	0	Receive Buffer area type: 2 = Output (A) / 3 = Memory (M) / 4 = DataBlock (DB)
+6.0	DB_Num	INT	0	Receive Buffer DB number (valid only if 'Area' = 4)
=8.0		END_STRUCT		
+20.0	Tx_Buffer	STRUCT		Transmit Buffer: area where put messages to send (at Partner)
+0.0	FirstByte	INT	0	Transmit Buffer 1st byte address (number)
+2.0	Size	INT	0	Transmit Buffer size (num. of bytes) (Min.= 8)
+4.0	Area	INT	0	Transmit Buffer area type:1=Input(E)/ 2=Output(A)/ 3=Memory(M)/ 4=DataBlock(DB)
+6.0	DB_Num	INT	0	Transmit Buffer DB number (valid only if 'Area' = 4)
=8.0		END_STRUCT		
+28.0	Setting	STRUCT		Protocol, Communication control and Options configuration
+0.0	FC_Reserved	BOOL	TRUE	Flow Control Reserved --- DON'T MODIFY ! ---
+0.1	Digital_IO	BOOL	FALSE	Digital Input conditioning enabled
+0.2	Consistency	BOOL	FALSE	Consistency mode is enabled
+0.3	Spare_1	BOOL	FALSE	Reserved for future use
+0.4	OverwriteProtect	BOOL	FALSE	This option disable data reception while 'DataReady' is TRUE
+0.5	Read_En	BOOL	TRUE	Read from partner function enabled (HostMode bypass it)
+0.6	Write_En	BOOL	TRUE	Write to parnter function enabled (HostMode bypass it)
+0.7	ConsistencyAlarm	BOOL	FALSE	Consistency Guard: On Consistency invalid -> ON=Alarm - OFF=Warning
=2.0		END_STRUCT		
+30.0	PartnerReady_TOut	TIME	T#20S	Maximum delay for communication protocol data matching with Partner
+34.0	Functions_TOut	TIME	T#5S	Maximum work time for procedures (ReSynchronization,FlushQueue command,Repeat)
=38.0		END_STRUCT		

UDT101 Structure

- 0.0 **In_Field**

  Bus Input buffer (node → PLC)
  - **.0 First_Byte** starting address
  - **.2 Size** buffer size
  - **.4 Area** area type

- 6.0 **Out_Field**

  Bus Output buffer (PLC → node)
  - **.0 First_Byte** starting address
  - **.2 Size** buffer size
  - **.4 Area** area type

- 12.0 **Rx_Buffer**

  Received Data Buffer. PLC here copies data that partner wrote into the In_Field buffer
  - **.0 First_Byte** starting address
  - **.2 Size** buffer size
  - **.4 Area** area type
  - **.6 DB_Num** DB number (if Area type = Datablock)

- 20.0 **Tx_Buffer**

  Sending Data Buffer. PLC writes here data to move into the Out_Field buffer
  - **.0 First_Byte** starting address
  - **.2 Size** buffer size
  - **.4 Area** area type
  - **.6 DB_Num** DB number (if Area type = Datablock)

- 28.0 **Setting**

  Configuration Options

  - **.0 FC_reserved**
  - **.1 Digital_IO** Boolean.

    It enables the I/O Control Function; this feature uses the first byte of both Input and Output area
  - **.2 Consistency** Boolean.

    It enables the Data Consistency function; due to this feature the control byte and the last byte of the I/O area must have the same value
  - **.3 Spare_1**
  - **.4 OverWriteProtect** Boolean.
    - **true** → next message cannot be accepted until Rx_DataReady = 1
    - **false** → all messages are accepted (also see Inputs: Rx_DataReady)
  - **.5 Read_En** Boolean: enable/disable the Reading function
  - **.6 Write_En** Boolean: enable/disable the Writing function
  - **.7 ConsistencyAlarm** Boolean.

    Through this flag the user decides the action following a consistency mismatch
    - **false** → a consistency mismatch makes ”Consistency Warning” going to “1”
    - **true** → a consistency mismatch causes a ”Consistency error” alarm

- 30.0 **PartnerReady_Tout**

  Timer.

  The “PartnerReady_Tout” timer value is the timeout to the initial synchronization between PLC and node. PLC waits for the DAD bit (control byte. Bit 7 = 1).

  If the timer expires the “Partner Not Ready” alarm goes up (error code = 100).

34.0 **Functions_Tout**

Timeout timers for the correct completion of the Resync, FlusQueue and Repeat procedures.

If these timers expire the following alarms raise up:

- **ReSync Timeout (Error Code = 200)** , in case of Resync procedure activation
- **FlushQueue Timeout (Error Code = 300)** , in case of FlushQueue procedure activation
- **Error Code = 400** , in case of Repeat command procedure activation

Alarm Table

Config DB number out of range (0 < DB < MaxDB)	Err = 01
Config DB not present	Err = 02
Config DB bad size (may be a wrong DB)	Err = 03

Input field area size error (< min)	Err = 10
Unsupported Input field area code	Err = 11

Output field area size error (< Min)	Err = 20
Unsupported Output field area code	Err = 21

Receive Buffer wrong area type	Err = 30
Receive Buffer DB number out of range (0 < DB < MaxDB)	Err = 31
Receive Buffer DB not present	Err = 32
Receive Buffer DB 'Unlinked' attribute set	Err = 33
Receive Buffer DB is 'WriteProtect'	Err = 34
Receive Buffer size not big enough	Err = 36

Transmit Buffer wrong area type	Err = 40
Transmit Buffer DB number out of range (0 < DB < MaxDB)	Err = 41
Transmit Buffer DB not present	Err = 42
Transmit Buffer DB 'Unlinked' attribute set	Err = 43
Transmit Buffer DB is 'WriteProtect'	Err = 44
Transmit Buffer DB not big enough	Err = 46

Configuration mismatch timeout (partner NOT ready)	Err = 100
Consistency error	Err = 102

Sync timeout	Err = 200

'FlushQueue' timeout	Err = 300
'FlushQueue' command rejected	Err = 301
'FlushQueue' answer unknown	Err = 302

'Repeat' command: Write procedure isn't available	Err = 400
'Repeat' command: Nothing to write	Err = 401

Rx_Buffer overflow READ INCOMPLETE	Err= 500
Rx_Buffer full: impossible to receive other segment; Reset 'DataReady' to clear Rx_Buffer	Err = 501

Tx_Buffer overflow	Err= 600