IVI-F47-DN1
DeviceNet
USER MANUAL

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General Information

The IVI-F47-DN1 (DN1) is a DeviceNet bus coupler for the Pepperl+Fuchs IDENT-I System V inductive ID system and functions as a slave on the DeviceNet network. The unit supports explicit messages and polled I/O messages of the predefined master/slave connection set, but does not support the Explicit Unconnected Message Manager (UCMM). The DN1 performs all protocol related steps (regarding the Pepperl+Fuchs IDENT-I System V identification system) automatically allowing seamless operation.

The DN1 provides a DeviceNet interface with the IDENT-I System V inductive identification system. It functions as a slave on the DeviceNet network and as a master to the ID system controller. All RS232 connection parameters (baud rate, parity, etc.) can be programmed through DeviceNet or adjusted using the potentiometers on the DN1.

The DN1 bus coupler offers full, intelligent support of serial IDENT-I System V ID system controllers. The following control interfaces are supported:

- ❑ IRI-KHD2-4.RX
- ❑ IRI-KHA6-4.RX
- ❑ IVI-KHD2-4.RX
- ❑ IVI-KHD2-4.RX

This operating mode will be referred to as the Intelligent Support Method. It is the default-operating mode of the DN1, once power is applied[1].

The DN1 supports all IDENT-I System V commands and performs many tasks automatically. The DN1 automatically detects if an IRI (R/O) or IVI (R/W) style ID system controller is being used. This allows seamless operation of the ID system and eliminates the need for the user to monitor transmissions between the ID system controller and the DN1. Since the amount of data transmitted and received across the DeviceNet (quantity Consumed and Produced) is different for R/O and R/W systems, the appropriate EDS file must be used. The DN1 comes with a 3½" diskette that contains 2 EDS files, one EDS file (1.EDS) for R/W ID systems and one (2.EDS) for R/O ID systems. In the Intelligent Support Method, two types of commands can be selected for each read/write head connected to the ID system controller: Auto Repeat Commands and Manual Commands (see "User Defined (IDENT-I System V) Object – Class Code 64", see also "DeviceNet Commands on page 6 and page 12).

[1] The **Disable Support Method** is the alternate operating mode of the DN1. In this mode, the DN1 functions as a generic DeviceNet-to-Serial bus coupler, enabling it to provide DeviceNet presents for any RS232 compatible peripheral device.

The head is continuously read by the ID system in the Auto Mode. The read cycle continues even after a valid read function has been completed. The data read function is stored in the DN1 buffer until it is read through the DeviceNet.

The tag reader becomes passive in the Manual Mode, allowing the user to communicate with the ID system controller through the serial class (class 64). This will be the standard mode of operation in most cases because it allows the user precise control over the ID system.

Disable Support Method

The DN1 provides a generic RS232 serial interface in the Disable Support Method, allowing serial data to be transmitted and received from any RS232 compatible peripheral device. The RS232 serial data is stored in an internal 64-byte receive FIFO buffer, allowing the unit to function asynchronously to the DeviceNet network. Likewise, information transmitted to the serial device is stored in a 64-byte serial FIFO buffer. The DN1 can be configured to operate at a number of different baud rates and it supports flow control and parity.

Intelligent Support Method – With R/O ID System

The Intelligent Support Method fully supports read only (R/O) and read/write (R/W) ID systems. Use file 2.EDS for ID systems in the R/O mode. Employ the following command structure in R/O mode ID systems:

Command Word
Apply the following format to send commands to the ID system:

[command,1][head#,1]

[command, 1] is a one byte command that determines the type of read operation to take place. The number "1" indicates the length in bytes needed to specify the command.

[head, 1] is a one byte parameter that determines which read head (1 to 4) will be used for the operation.

DeviceNet Response
The poll response is formatted as follows:

[status,1][head #,1][ID command,1][ID status,2][response data,8]

[status, 1] this 1 byte status indicator contains the following information:

bit #7: 0 indicates communication with a read only (R/O) ID system

bit #6,5: fixed at 01

bit # 4: This bit has a value of 1 when the DeviceNet scanner transmits <u>new</u> data from the ID system to the PLC. It has a value of 0 when the DeviceNet scanner transmits data previously received from the ID system.

bit#3,2,1,0:

0000	no heads in auto repeat mode
xxx1	head 1 is in auto repeat mode
xx1x	head 2 is in auto repeat mode
x1xx	head 3 is in auto repeat mode
1xxx	head 4 is in auto repeat mode

[head #, 1] This byte command indicates the head (1 to 4) used in the operation therefore yielding [response data,8].

[ID command, 1] is the 1 byte command sent to the IDENT-I System V controller.

Note: This byte provides diagnostic help but does not contain any user-data or operating-status information.

[ID status, 2] is the 2 byte error response for the previous command. A list of the error codes can be found in the IDENT-I System V Manual. In addition, the DN1 generates a $\mathbf{D1_{ASCII}}$ = $\mathbf{(44_{hex}\ 31_{hex})}$ error message if the RS 232 connection between the DN1 and the ID system interface has been compromised.

If a code carrier is read successfully, the 2 byte [ID status,2] command contains one byte representing the read head number followed by <space> = 20_{hex}.

If an error occurred, the 2 byte [ID status,2] command contains two bytes representing the ID system error-code listed in the IDENT-I System V manual.

[response data, 8] is the data returned from the command. For example, this field contains the data returned from the head if a read function was requested. If no tag was read, no response data will be transmitted and the appropriate error code will be issued via **[ID status,2]**.

DeviceNet Commands

The following lists commands for [command,1] which can be issued across the DeviceNet. The DN1 performs all the necessary protocol related steps. The commands listed below operate on one read head at a time. This means that the previous command is canceled when a new command is issued to a different read head.

Manual Mode Commands:

[COMMAND,1]	OPERATION
Hex Values	
00	End Running Command
01	Read Head
02	Read Head Auto – Command is executed until a code carrier is found
03	Read Code[2]
04	Read Code Auto[3]– Command is executed until a code carrier is found
0D	Dual-Sided Mode of ID Control Interface activated – This mode remains active until the system is restarted (Hex Value = 11)
11	Restart ID Control Interface – Stops Dual-Sided Mode.

Auto-Repeat Mode Commands:

The Auto Repeat-Read Head Auto and Auto Repeat-Read Code Auto[4] commands are executed until canceled by using the End Auto Repeat command. This makes it possible to simultaneously read code carriers using several read heads without having to reissue commands.

80	End Auto Repeat
81	Auto Repeat-Read Head Auto
83	Auto Repeat-Read Code Auto[4]

[2] Command 03 is identical to command 01.
[3] Command 04 is identical to command 02.
[4] Command 83 is identical to command 81.

EXAMPLES

The following examples assume the use of an Allen-Bradley SLC and the mapping of a DN1 with a word offset of zero (0). The command string starts in Word 1 since DeviceNet uses Word 0. All words in the Output and Input Images are byte-swapped, allowing the customer to use the examples exactly as they are listed below. The "**mode28**" tag code is **28162139**$_{\text{ASCII}}$. The Output and Input Images are expressed in hexadecimal format. Word 1 of the Input Image contains the new data bit, which can have changing values. This is indicated by x. The bit has a value of 1 whenever the DN1 transmits data that has been read from the ID system. The DN1 transmits stored data resulting in a value of 0, during the next DeviceNet scan. Data read from the tag is **bold-faced** in the tables below.

(1) READING AN (R/O) CODE CARRIER ONCE, USING HEAD 1 – TAG PRESENT

Output (Command) Image		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
01 01		01 x0	31 52	**32** 20	**31 38**	**31 36**	**33 31**	00 **39**

(2) READING AN (R/O) CODE CARRIER ONCE, USING HEAD 3 – NO TAG PRESENT

Output (Command) Image		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
03 01		03 x0	4D 52	0D 37	00 0A			

(3) CONTINUOUSLY READING AN (R/O) CODE CARRIER USING HEAD 2 – TAG PRESENT

Output (Command) Image		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
02 02		02 x0	31 52	**32** 20	**31 38**	**31 36**	**33 31**	00 **39**

(4) CONTINUOUSLY READING AN (R/O) CODE CARRIER USING HEAD 4 – NO TAG PRESENT

Output (Command) Image		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
04 02		04 x0	4D 52	0D 37	00 0A			

(5) READING AN (R/O) CODE CARRIER WITH AUTO REPEAT USING HEAD 1 – TAG PRESENT

Output (Command) Image		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
01 81		01 x1	31 52	**32** 20	**31 38**	**31 36**	**33 31**	00 **39**

(6) READING AN (R/O) CODE CARRIER WITH AUTO REPEAT USING HEAD 3 – NO TAG PRESENT

Output Image (Command)	
Word 1	Word 2
03 81	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
03 x4	4D 52	0D 37	00 0A			

(7) SETTING THE DUAL-SIDED MODE

Output Image (Command)	
Word 1	Word 2
00 0D	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
00 00	Do not use					

Since the ID system does not respond to this command, the DN1 assumes that the RS232 link was interrupted and attempts to reconnect. The value of Words 2-4 then changes and should not be analyzed. Simply issue a read head command (e.g. 0101) and check the response.

(8) RESETTING THE ID INTERFACE

Output Image (Command)	
Word 1	Word 2
00 11	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
00 00	Do not use					

Since the ID system does not respond to this command, the DN1 assumes that the RS232 link was cut and attempts to reconnect. The value of Words 2-4 then changes and should not be analyzed. Simply issue a read head command (e.g. 0101) and check the response.

(9) LOST RS232 COMMUNICATIONS

Output Image (Command)	
Word 1	Word 2
00 11	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
00 00	44 xx	00 31				

The DN1 response indicates that RS232 communications have been lost.

Intelligent Support Method – With an R/W ID System

The Intelligent Support Method fully supports read only (R/O) and read/write (R/W) ID systems. The 1.EDS file must be used with an ID system in the R/W mode. The poll command is in the following format when using an R/W ID system. Please note that IMC series and IDC series data carriers may have slightly different command formats in some cases.

COMMAND WORD

Use the following command structure for sending a command to an R/W ID system:

Reading the first 32 bytes on a data carrier or the code of a code carrier

[command,1][head#,1]

[command,1] is a one byte command specifying the type of operation to be performed. A list of possible commands is given later.

[head#,1] is the byte identifying which read/write head (1 to 4) will be used for the operation

This command format applies to commands 01, 02,03,04, 81 and 83.

Reading a specific page of a data carrier

[command,1][head#,1][page #,w1]

[command,1] and **[head#,1]** as specified above

[page#,w1] is one word[5] specifying which page is read from the data carrier. One page contains 32 bytes of user data. The range of [page#,w1] depends on the data carrier as listed below:

IDC	Not supported by 256-bits data carrier
IDC-…-1K	0000 to 0003 (4 pages)
IMC-…-64K	0000 to 00ff (256 pages)
IMC-…-256K	0000 to 03ff (1024 pages

This command format applies to commands 07, 08 and 87.

[5] Note that one byte commands and parameters are treated by DeviceNet as *short integers*, while one-word commands are treated as an *unsigned integer*. This is important to note since DeviceNet reverts the order of the bytes in short integers ("byte swap"), while bytes of unsigned integers are not reverted. This difference is important for certain R/W commands.

Writing to a specific page of a data carrier – Only IMC series data carriers support this command

[command,1][head#,1][page #,w1][0000][user data,32]

[command,1] and **[head#,1]** as specified above

[page#,w1] is one word[6] specifying which page is read or written to. One page contains 32 bytes of user data. The range of [page#,w1] depends on the data carriers listed below:

IDC	Not supported by 256-bit data carrier
IDC-…-1K	Not supported by 1K bit data carrier
IMC-…-64K	0000 to 00ff (256 pages)
IMC-…-256K	0000 to 03ff (1024 pages

[user data,32] determines 32 user bytes that are written to a specific page on the data carrier.

This command format applies to commands 0B and 0C.

Read a particular address on the data carrier

[command,1][head#,1][start address,w1][#bytes,1]

[command,1] and **[head#,1]** as specified above

[start address,w1] is a one-word address specifying the data carrier address where [#bytes,w1] bytes of user data are stored in or read from the data carrier. The allowable range depends on the data carriers listed below:

IDC	0000 to 001f
IDC-…-1K	0000 to 007f
IMC-…-64K	0000 to 1fff
IMC-…-256K	0000 to 7fff

[#bytes,1] is a one byte data length specifying how many bytes of user data are stored in or read from the data carrier, starting with address

[6] Note that one byte commands and parameters are treated by DeviceNet as *short integers*, while one-word commands are treated as an *unsigned integer*. This is important to know since DeviceNet reverts the order of the bytes in short integers ("byte swap"), while bytes of the unsigned integers are not reverted. This difference is important for certain R/W commands.

[start address,w1]. DeviceNet restricts this parameter to a maximum of 20_{Hex} bytes. If a larger number is used, only the first 20_{Hex} bytes are written or read.

This command format applies to commands 05, 06 and 85.

Write bytes to a particular address on the data carrier

[command,1][head#,1][start address,w1][#bytes,1][user data,n]

[command,1] and **[head#,1]** as specified above

[start address,w1] is a one-word address specifying the data carrier address where [#bytes,w1] bytes of user data are stored in or read from the data carrier. The allowable range depends on the type of data carrier used listed below:

IDC	0000 to 001f
IDC-…-1K	0000 to 007f
IMC-…-64K	0000 to 1fff
IMC-…-256K	0000 to 7fff

[#bytes,1] is a one byte data length specifying the number of bytes to be written to the data carrier starting with address [start address,w1]. DeviceNet restricts this parameter to a maximum of 20_{Hex} bytes. Only the first 20_{Hex} bytes are written or read when using a larger number.

[user data,n] specifies the user data that will be written to the data carrier starting with address [start address,w1]. The [#bytes,1] command specifies the number of user data bytes (n).

This command format applies to commands 09and 0A.

DeviceNet Response
The poll response uses the following command format:

[status,1][head #,1][ID command,1][ID status,2] [response data,m]

[status,1] this byte contains the following information:

bit #7: 1 indicates communication with a read/write ID system

bit #6,5: fixed at 00

bit # 4: This bit has a value of 1 when the DeviceNet scanner transmits new data from the ID system to the PLC. It has a value of 0 when the DeviceNet scanner transmits data previously received from the ID system.

bit#3,2,1,0:	0000	no heads in auto repeat mode
	xxx1	head 1 is in auto repeat mode
	xx1x	head 2 is in auto repeat mode
	x1xx	head 3 is in auto repeat mode
	1xxx	head 4 is in auto repeat mode

[head#,1] is the head (1 to 4) the operation was performed on.

[ID command,1] is the command sent to the IDENT-I System V controller.

Note: This byte only provides diagnostic help. It does not contain any user data or operations related status information.

[ID status,2] is the 2-byte error response for the previous command. A list of the error codes can be found in the IDENT-I System V Manual. In addition, the DN1 generates the $\mathbf{D1_{ASCII}}$ = $\mathbf{(44_{hex}\ 31_{hex})}$ error message when the RS 232 connection between the DN1 and the ID system interface has been compromised. The 2-byte [ID status, 2] response contains 30_{hex} (00_{ASCII}) when a command is successfully executed.

[response data,m] is the commands response data. This field contains the data returned from the head when a read function is requested. For example, when a read function is requested, this field contains the head's data response. If a tag is not read, the response data is not transmitted and the appropriate error code is issued using **[ID status,2]**.

DeviceNet Commands

The following commands can be issued through the DeviceNet. The DN1 performs all required protocol related steps. The following commands operate on one read head at a time. For example, the previous command is cancelled when a new command is issued to a different read head.

Manual Mode Commands:

HEX VALUE	OPERATION
00	End Running Command
01	Read Head (reads data carrier)
02	Read Head Auto – Command is executed until a data carrier has been read
03	Read Code (reads code carrier with IVI-Series ID control interface)
04	Read Code Auto – Command is executed until a code carrier has been read
05	Read Bytes
06	Read Bytes Auto – Command is executed until a data carrier has been read
07	Read Page
08	Read Page Auto – Command is executed until a data carrier has been read
09	Write Bytes
0A	Write Bytes Auto– Command is executed until a data carrier has been written
0B	Write Page
0C	Write Page Auto– Command is executed until a data carrier has been written
0D	Double Sided Mode of ID Control Interface activated – this mode remains active until a Restart (Hex Value = 11)
0F	Set Data Carrier – Specifies the type of data carrier used (256bit = type 1, 1Kbit = type 4, or 64/256Kbit = type 3) – The data carrier type remains active until changed by another Set Data Carrier command or a Restart (Hex Value = 11)
11	Restart ID Control Interface – Stops Double-Sided Mode and reset to D4 data carriers.

Auto Repeat Mode Commands:

The Auto Repeat-Read Head Auto, Auto Repeat-Read Code Auto, Auto Repeat- Read Bytes Auto and the Auto Repeat-Read Page Auto commands are executed until cancelled using the End Auto Repeat command. This makes it possible to simultaneously read code carriers and data carriers using multiple read heads without reissuing commands.

80	End Auto Repeat
81	Auto Repeat-Read Head Auto
83	Auto Repeat-Read Code Auto
85	Auto Repeat- Read Bytes Auto
87	Auto Repeat-Read Page Auto

EXAMPLES

The following examples assume the use of an Allen-Bradley PLC and the mapping of the DN1 with a word offset of zero. The command string starts with Word 1 since DeviceNet uses Word 0. All words in the Output and Input Images are byte-swapped (this is a feature of the A-B PLC) allowing the user to simply type them in exactly as they are listed in the following examples.

Exceptions: [page#,w1] and [start address,w1] are *unsigned integers.* This should be noted because DeviceNet does not restore the order of the bytes in unsigned integers (e.g. no "byte swap").

The code carrier's code is B002139. Data written to or read from a data carrier is named D_1, D_2, D_3 and so on. Output and input images are expressed as hexadecimal values. Word 1 of the input image contains the new data bit and can therefore have changing values. This is indicated by x for which the possible values are 9 (new data available) or 8 (no new data available). Data written to or read from a tag is **boldfaced** in the examples below.

Note: ETX CHK is part of the ID system response and is only provided as a diagnostic tool. The customer does not need to verify the checksum (CHK) which is done by the DN1.

(1) READING AN R/O CODE CARRIER ONCE USING HEAD 1 – TAG PRESENT

Output Image (Command)	
Word 1	Word 2
01 03	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
01 x0	30 69	**42** 30	**30 30**	**31 32**	**39 33**	ETX CHK

(2) READING AN R/O CODE CARRIER ONCE USING HEAD 3 – NO TAG PRESENT

Output Image (Command)	
Word 1	Word 2
03 03	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
03 x0	30 69	CHK 33	00 ETX			

(3) CONTINUOUSLY READING AN R/O CODE CARRIER USING HEAD 2 – TAG PRESENT

Output Image (Command)	
Word 1	Word 2
02 04	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
02 x0	30 69	**42** 30	**30 30**	**31 32**	**39 33**	ETX CHK

(4) CONTINUOUSLY READING AN R/O CODE CARRIER USING HEAD 4 – HEAD NOT PRESENT

Output Image (Command)	
Word 1	Word 2
04 04	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
02 x0	30 69	CHK 32	00 ETX			

(5) READING AN R/O CODE CARRIER WITH AUTO REPEAT USING HEAD 1 – TAG PRESENT

Output Image (Command)	
Word 1	Word 2
01 83	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
01 x1	30 69	**42** 30	**30 30**	**31 32**	**39 33**	ETX CHK

(6) READING AN R/O CODE CARRIER WITH AUTO REPEAT USING HEAD 3 – NO TAG PRESENT

Output Image (Command)	
Word 1	Word 2
03 83	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
03 x4	30 69	CHK 33	00 ETX			

(7) READING THE FIRST 32_{DEC} BYTES ON A DATA CARRIER USING HEAD 4 –HEAD NOT PRESENT

Output Image (Command)	
Word 1	Word 2
04 01	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
04 x0	30 61	CHK 32	00 ETX			

(8) READING THE FIRST 32_{DEC} BYTES ON A DATA CARRIER USING HEAD 3 – TAG PRESENT

Output Image (Command)	
Word 1	Word 2
03 01	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
03 x0	30 61	**D_1** 30	**D_3 D_2**	**D_5 D_4**	**D_7 D_6**	***Cont.***

(9) AUTO REPEAT READING THE FIRST 32_{DEC} BYTES ON DATA CARRIER USING HEAD 2 – TAG PRESENT

Output Image (Command)	
Word 1	Word 2
02 81	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
02 x2	30 61	**D_1** 30	**D_3 D_2**	**D_5 D_4**	**D_7 D_6**	***Cont.***

(10) READ 5_{HEX} BYTES AT DATA CARRIER ADDRESS $0B_{HEX}$ USING HEAD 1 – TAG PRESENT

Output Image (Command)			
Word 1	Word 2	Word3	Word4
01 05	00 0B	00 05	

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
01 x0	30 77	**D_1** 30	**D_3 D_2**	**D_5 D_4**	ETX CHK

(11) AUTO REPEAT READ $0A_{HEX}$ BYTES AT DATA CARRIER ADDRESS 13_{HEX} USING HEAD 3 – TAG PRESENT

Output Image (Command)			
Word 1	Word 2	Word3	Word4
03 81	00 13	00 0A	

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x4	30 61	**D_1** 30	**D_3 D_2**	**D_5 D_4**	***Cont.***

(12) READ 2ND DATA PAGE USING HEAD 3 – TAG PRESENT

Output Image (Command)			
Word 1	Word 2	Word3	Word4
03 07	00 02		

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x0	30 6C	D_1 30	D_3 D_2	D_5 D_4	***Cont.***

(13) WRITING 2_{HEX} BYTES AT DATA CARRIER ADDRESS 09_{HEX} USING HEAD 2 – TAG PRESENT

Output Image (Command)			
Word 1	Word 2	Word3	Word4
02 09	00 09	**D1** 02	xx **D2**

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
02 x0	30 6B	CHK 30	00 ETX		

(14) SWITCH INTERFACE TO USE IMC-SERIES DATA CARRIER (TYPE 3) – THE FOLLOWING EXAMPLE ASSUMES THE USE OF IMC SERIES DATA CARRIERS

Output Image (Command)			
Word 1	Word 2	Word3	Word4
03 0F			

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
00 x0	64 64	ETX CHK			

(15) READ 3C[TH] DATA PAGE USING HEAD 3 – TAG PRESENT (IMC-SERIES DATA CARRIER ONLY)

Output Image (Command)			
Word 1	Word 2	Word3	Word4
03 07	00 3C		

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x0	30 6C	D_1 30	D_3 D_2	D_5 D_4	***Cont.***

(16) WRITING 2_{HEX} BYTES AT DATA CARRIER ADDRESS 09_{HEX} USING HEAD 3 – TAG PRESENT (IMC-SERIES DATA CARRIER ONLY)

Output Image (Command)			
Word 1	Word 2	Word3	Word4
0309	0009	**D1**02	xx**D2**

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x0	30 6B	CHK 30	00 ETX		

(17) WRITING 3_{HEX} BYTES AT DATA CARRIER ADDRESS 100^{HEX} USING HEAD 3 – TAG PRESENT (IMC-SERIES DATA CARRIER ONLY)

Output Image (Command)			
Word 1	Word 2	Word3	Word4
0309	0100	**$D_1$03**	**D3D2**

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x0	30 6B	CHK 30	00 ETX		

(18) WRITING 3[RD] PAGE TO DATA CARRIER USING HEAD 4 – TAG PRESENT (IMC-SERIES DATA CARRIER ONLY)

Output Image (Command)			
Word 1	Word 2	Word3	Word4
03 0B	00 03	00 00	*32Bytes*

Input Image (Response)					
Word1	Word2	Word3	Word4	Word5	Word6
03 x0	30 6D	CHK 30	00 ETX		

(19) SETTING THE DUAL-SIDED MODE

Output Image (Command)	
Word 1	Word 2
00 0d	

Input Image (Response)						
Word1	Word2	Word3	Word4	Word5	Word6	Word7
00 x0	62 63	ETX CHK				

RESETTING THE ID INTERFACE

Output Image (Command)		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
0011		00 x0	4F 4F	ETX CHK				

LOST RS232 COMMUNICATIONS

Output Image (Command)		Input Image (Response)						
Word 1	Word 2	Word1	Word2	Word3	Word4	Word5	Word6	Word7
0011		00 00	44 xx	00 31				

The D1(ASCII) = 44_{hex} 31_{hex} response indicates that RS232 communication have been lost.

EDS Files -- Consumed and Produced Size

R/O (Read Only) ID systems

Use the 2.EDS file found on the accompanying diskette, if connecting the DN1 to an R/O ID system. This results in the following Produced and Consumed Size values:

	Produced Size (Rx)	Consumed Size (Tx)
Read Only	13	2

R/W (Read/Write) ID systems

Use file 1.EDS found on the diskette if connecting the DN1 to an R/W ID system. This results in the following Produced and Consumed Size values:

	Produced Size (Rx)	Consumed Size (Tx)
Read/Write	37	38

DeviceNet Message Types and Class Services

DeviceNet Message Types

The IVI-F47-DN1 supports the following message formats as a Group 2 slave:

CAN IDENTIFIER	GROUP 2 Message Type
10xxxxxx111	Duplicate MACID Check Message
10xxxxxx110	Unconnected Explicit Request Message
10xxxxxx101	Master I/O Poll Command Message
10xxxxxx100	Master Explicit Request Message

xxxxxx = Node Address

DeviceNet Class Services

The IVI-F47-DN1 supports the following class services and instance services as a Group 2 slave:

SERVICE CODE	SERVICE NAME
05 (0x05)	Reset
14 (0x0E)	Get Attribute Single
16 (0x10)	Set Attribute Single
75 (0x4B)	Allocate Group 2 Identifier Set
76 (0x4C)	Release Group 2 Identifier Set

DeviceNet Object Classes

The IVI-F47-DN1 supports the following DeviceNet object classes:

CLASS CODE	OBJECT TYPE
01 (0x01)	Identity
02 (0x02)	Router
03 (0x03)	DeviceNet
04 (0x04)	Assembly
05 (0x05)	Connection
64 (0x40)	User defined serial interface
65 (0x41)	Parameter (IDENT-I System V support)

Identity Object *Class Code: 01 (0x01)*

The Identity Object is necessary for all devices and provides device identification and general information.

IDENTITY OBJECT CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	7

IDENTITY OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Vendor	UINT	57
2	Get	Product Type	UINT	0 = Generic
3	Get	Product Code	UINT	1
4	Get	Revision	STRUCT OF	
		Major Revision	USINT	1
		Minor Revision	USINT	$59_{hex} = 89_{dec}$
5	Get	Device Status	UINT	**(1) Refer to "Possible Attribute Values"**
6	Get	Serial Number	UINT	**(2) Refer to "Possible Attribute Values"**
7	Get	Product Name	STRUCT OF	
		Length	USINT	6
		Name	STRING [6]	IVI-F47-DN1

COMMON SERVICES

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single

POSSIBLE ATTRIBUTE VALUES

(1) Device Status

bit 0	owned	0=not owned 1=owned (allocated)
bit 1	reserved	0
bit 2	configured	0
bit 3	reserved	0
bit 4-7	vendor specific	0
bit 8	minor cfg fault	0=no fault 1=minor fault
bit 9	minor dev.fault	0=no fault 1=minor device fault
bit 10	major cfg.fault	0=no fault 1=major cfg. fault
bit 11	major dev.fault	0=no fault 1=major device fault
bit 12-15	reserved	0

(2) Serial Number

Unique Serial Number

Router Object *Class Code: 02 (0x02)*

The Message Router Object provides a messaging interface which a client can use to address a service to any object class or instance within the actual device.

ROUTER OBJECT CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	2

ROUTER OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
2	Get	Number of Connections	UINT	2

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single

DEVICENET OBJECT CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2

ROUTER OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get/Set	MACID	USINT	(1)
2	Get/Set	Baud Rate	USINT	(2)
3	Get/Set	Bus Off Interrupt	BOOL	(3)
4	Get/Set	Bus Off Counter	USINT	(4)
5	Get/Spc	Allocation Information	STRUCT of	(5)
		Choice Byte	BYTE	
		Master Node Addr.	USINT	

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single
75 (0x4B)	No	Yes	Allocate Master/Slave
76 (0x4C)	No	Yes	Release Master/Slave

POSSIBLE ATTRIBUTE VALUES

1) MACID

Only adjustable when the MacID switches are set to a value greater than 63. The value returned is the switch value if it is less than 64 or the last value entered.

(2) Baud Rate

Only adjustable when the baud rate switch is set to a value greater than two. The value returned will be the switch value if less than four or the last value entered.

Switch/Value	Speed
0	125 kbits
1	250 kbits
2	500 kbits
3	Software adjustable

(3) Bus Off Interrupt

Bus Off Interrupt (BOI) determines the next action when a Bus Off state is encountered. The following values are supported:

Bus Off Interrupt (BOI)	Action
0	Hold chip in OFF state (default)
1	Reset CAN chip if possible

(4) Bus Off Counter

Bus Off Counter will be forced to zero whenever set, regardless of the data.

(5) Allocation_byte

bit 0	explicit	set to 1 to allocate
bit 1	polled	set to 1 to allocate
bit 2	strobed	(not supported)
bit 3-7		reserved (always 0)

Assembly Object *Class Code: 04 (0x04)*

The Assembly Object combines attributes of multiple objects allowing object data to be transmitted or received through a single connection.

ASSEMBLY OBJECT CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Class ID	UINT	2

ASSEMBLY OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get	Data Stream (Input)	see notes	**(1) Refer to "Possible Attribute Values"**

ASSEMBLY OBJECT, INSTANCE 2 ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get/Set	Data Stream (Output)	see notes	**(2) Refer to "Possible Attribute Values"**

COMMON SERVICES

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	Yes	Yes	Set_Attribute_Single

Note: See the DeviceNet information above for an explanation of the poll command and response specifications.

Connection Object *Class Code: 05 (0x05)*

The Connection Object manages the characteristics of each communication link. The IVI-F47-DN1 supports one explicit message connection and a poll message connection as a Group 2-only Slave Device.

CONNECTION OBJECT CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1

CONNECTION OBJECT, INSTANCE 1 ATTRIBUTES (EXPLICIT MESSAGE)

Attribute	Access	Name	Type	Value
1	Get	State	USINT	**(1) Refer to "Possible Attribute Values"**
2	Get	Instance Type	USINT	0 = Explicit Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Production Connection	UINT	**(2) Refer to "Possible Attribute Values"**
5	Get	Consumed Connection	UINT	**(2) Refer to "Possible Attribute Values"**
6	Get	Initial Comm. Char.	USINT	0x21
7	Get	Production Size	UINT	67
8	Get	Consumed Size	UINT	71
9	Get/Set	Expected Packet Rate	UINT	Default 2500 msec
12	Get/Set	Timeout Action	USINT	**(3) Refer to "Possible Attribute Values"**
13	Get	Prod. Path Length	USINT	0
14	Get	Production Path		**(4)** (null) **Refer to "Possible Attribute Values"**
15	Get	Cons. Path Length	USINT	0
16	Get	Consumed Path		**(4)** (null) **Refer to "Possible Attribute Values"**
17	Get	Production Inhibit	UINT	0

CONNECTION OBJECT, INSTANCE 2 ATTRIBUTES (POLL CONNECTION)

Attribute	Access	Name	Type	Value
1	Get	State	USINT	**(1) Refer to "Possible Attribute Values"**
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x82
4	Get	Production Connection	UINT	**(2) Refer to "Possible Attribute Values"**
5	Get	Consumed Connection	UINT	**(2) Refer to "Possible Attribute Values"**
6	Get	Initial Comm. Char.	USINT	0x1
7	Get	Production Size	UINT	See Stream Object
8	Get	Consumed Size	UINT	See Stream Object
9	Get/Set	Expected Packet Rate	UINT	Default 2500 msec
12	Get/Set	Timeout Action	USINT	**(3) Refer to "Possible Attribute Values"**
13	Get	Prod. Path Length	USINT	6
14	Get	Production Path	STRUCT of	
		Log. Seg., Class	USINT	0x20
		Class Number	USINT	0x04
		Log.Seg., Instance	USINT	0x24
		Instance Number	USINT	0x01
		Log.Seg., Attribute	USINT	0x30
		Attribute Number	USINT	0x03
15	Get	Cons. Path Length	USINT	6
16	Get	Production Path	STRUCT of	
		Log. Seg., Class	USINT	0x20
		Class Number	USINT	0x04
		Log.Seg., Instance	USINT	0x24
		Instance Number	USINT	0x02
		Log.Seg., Attribute	USINT	0x30
		Attribute Number	USINT	0x03
17	Get	Production Inhibit	USINT	0

COMMON SERVICES

Service Code	Class	Instance	Service Name
05 (0x05)	Yes	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

POSSIBLE ATTRIBUTE VALUES

(1) States

Connection State

0 = nonexistent
1 = configuring
3 = established
4 = timed out

(2) Production Connection/Consumed Connection

Connection ID:

Connection 1 Produced Connection ID: 10xxxxxx011
Connection 1 Consumed Connection ID: 10xxxxxx100
Connection 2 Produced Connection ID: 01111xxxxxx
Connection 2 Consumed Connection ID: 10xxxxxx101
xxxxxx = Node Address.

(3) Timeout Action

Watch Dog TimeOut Activity:

0 = Timeout (Explicit Messaging default)
1 = Auto Delete
2 = Auto Reset (I/O Message default)

(4) Production Path/Consumed Path

A 0 length (null) packet is received if data is not available during the poll response.

User Defined (Serial Stream) Object *Class Code: 64 (0x40)*

The Serial Stream Object model supports a bi-directional serial stream of data. The object includes the transmit FIFO, the receive FIFO and the serial channel configuration attributes.

SERIAL STREAM CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	18

SERIAL STREAM OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Get	Receive Data	See Notes	**(1) Refer to "Possible Attribute Values"**
4	Set	Transmit Data	See Notes	**(1) Refer to "Possible Attribute Values"**
5	Get/Set	Status	USINT	**(2) Refer to "Possible Attribute Values"**
6	Get/Set	Baud Rate	USINT	**(3) Refer to "Possible Attribute Values"**
7	Get/Set	Parity	USINT	**(4) Refer to "Possible Attribute Values"**
8	Get	Data Size	USINT	**(5) Refer to "Possible Attribute Values"**
9	Get	Stop Bits	USINT	**(6) Refer to "Possible Attribute Values"**
10	Get/Set	Flow Control	USINT	**(7) Refer to "Possible Attribute Values"**
11	Get/Set	Receive Count	USINT	**(8) Refer to "Possible Attribute Values"**
12	Get/Set	Transmit Count	USINT	**(9) Refer to "Possible Attribute Values"**
13	Get/Set	Maximum Receive Size	USINT	**(10) * Refer to "Possible Attribute Values"**
14	Get/Set	Data Format	USINT	**(11) * Refer to "Possible Attribute Values"**
15	Get/Set	Block Mode	USINT	**(12) * Refer to "Possible Attribute Values"**
16	Get/Set	Receive Delimiter	USINT	**(13) Refer to "Possible Attribute Values"**

17	Get/Set	Pad Char	CHAR	**(14) Refer to "Possible Attribute Values"**
18	Get/Set	Maximum Transmit size	USINT	**(15) * Refer to "Possible Attribute Values"**
19	Get/Set	Idle String	SHORT_STRING	**(16) Refer to "Possible Attribute Values"**
20	Get/Set	Fault String	SHORT_STRING	**(17) Refer to "Possible Attribute Values"**

Service Code	Class	Instance	Service Name
5 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

** Items marked with an asterisk may affect the produced or consumed size of the poll connection.*

POSSIBLE ATTRIBUTE VALUES

(1) Receive Data/Transmit Data

The Received Data (Attribute 3) and Transmitted Data (Attribute 4) are either an array of bytes or a SHORT_STRING defined by DeviceNet consisting of a length byte followed by the specific number of valid data bytes. The format is determined by the Data Format parameter. Note that reading the Transmit Data will return a single byte, indicating the last byte of the FIFO.

Data is not transmitted when a packet with zero data bytes is received. A response packet is not generated if there is insufficient room for the packet in the transmit FIFO.

The response packet will either be an array of bytes or a SHORT_STRING when the data is read. A NULL packet or an array with a zero length byte is received if data is not available.

(2) Status

The Status information (Attribute 5) indicates whether data transfer errors have occurred. It is bit mapped as follows:

bit 0	Transmit channel blocked
bit 1	Transmit FIFO empty
bit 2 *	Receive Parity error
bit 3	Receive FIFO empty
bit 4 *	Receive Overflow
bit 5 *	Framing Error
bit 6 *	Transmit FIFO Overflow
bit 7	State of CTS signal (1 = Asserted)

** Writing any value into the status field will clear the error bits.*

Possible Attribute Values, cont.

(3) Baud Rate

The baud rate (Attribute 6) can be adjusted using the RS232 baud rate switch or the software. The switch must be in the 'PRG' position to allow software adjustments.

Baud Rate	Interpretation
0	9600 baud
1	4800 baud
2	2400 baud
3	1200 baud
4	600 baud
5	300 baud
6	19.2 Kbaud

(4) Parity

The parity (Attribute 7) can be adjusted using the software. Note: setting the parity to zero changes the data length size to eight. Setting the parity to a value other than zero changes the data length size to seven.

Parity	Interpretation
0	No parity
1	Even parity
2	Odd parity
3	N/A
4	N/A
5	Force to 1
6	Force to 0

(5) Data Size

The data size (Attribute 8) is read-only. The IVI-F47-DN1 serial channel always processes eight information bits. Eight data bits are transmitted/received if parity is set to zero (no parity). If the parity is set to a value other than zero, then only seven data bits are transmitted and the 8^{th} bit is used as the parity bit. The data size field is read-only.

(6) Stop Bits

The Stop bits (Attribute 9) is read-only. The IVI-F47-DN1 serial channel always operates with one stop bit. The Stop Bits field is read-only and fixed at one stop bit.

Possible Attribute Values, cont.

(7) Flow Control

Flow control (Attribute 10) can be set by software.

Flow Control	Interpretation
0	No flow control
1	X-ON/X-OFF flow control
2	Hardware flow control
3	DO NOT USE
4	CTS Detect Mode

If the flow control is set to one, the ASCII standard X-OFF (CTRL S) character will force the transmit function to block. Characters will be stored in the transmit-FIFO's buffer until the transmitter is reactivated using the X-ON (CTRL Q) character. Note that the CTRL-S and CTRL-Q characters are stripped from the incoming data stream making this protocol unsuitable for binary data transmission.

The IVI-F47-DN1 will transmit an X-OFF character when the receive-FIFO is full. An X-ON character is transmitted when the number of characters in the receive-FIFO drops below 50%.

The IVI-F47-DN1 uses the RTS and CTS hardware signals to control flow if the flow control is set to 2. The unit will only transmit if the CTS signal (Pin 8) is asserted (+ voltage).

The RTS (pin 7) signal is asserted (+ voltage) if the receive-FIFO has room to receive characters.

The CTS Detect mode allows the IVI-F47-DN1 to detect the presence of the CTS signal. The IVI-F47-DN1 is free to communicate to the RS232 device when the signal is asserted. When unasserted, the IVI-F47-DN1 will purge the receive-FIFO as if the RS232 device were offline. The CTS Detect mode can be used to determine if the RS232 device is connected to the IVI-F47-DN1.

(8) Receive Count

The Receive Count (Attribute 11) indicates the number of characters currently available in the receive-FIFO. Writing any value will purge the receive-FIFO.

(9) Transmit Count

The Transmit Count (Attribute 12) indicates the number of characters currently in the transmit-FIFO. Writing any value will purge the transmit-FIFO.

Possible Attribute Values, cont.

(10) Maximum Receive

The Maximum Receive Size (Attribute 13) indicates the maximum number of data bytes returned when the receive-FIFO is read (attribute 3) by either using EXPLICIT messages or through the POLL connection. Setting this attribute will automatically reset the Produced Connection size to:

Connection size = Max Rcv Size (Maximum size is 64)
\+ 1 (if String Format enabled)
\+ 1 (if Receive Seq. Num. enabled)

The maximum connection size is 66 bytes.

(11) Data Format

The Data Format (Attribute 14) control byte determines the type of data strings transmitted through the DeviceNet channel, which can either be an array of bytes or a SHORT_STRING defined by DeviceNet, consisting of a length byte followed by the specific number of valid data bytes. Note that the data length byte does not appear on the serial channel. The Data Format control byte also determines whether the parity information is retained in the receive-FIFO. If the bit is cleared then the parity information is retained. When it is set, the parity information is overwritten with zero ensuring that only valid ASCII characters (0-7FH) appear in the FIFO.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	PADR	PL/R	Strip Parity	String Format

String Format	Interpretation
0	Process FIFO packets as SHORT_STRING variables
1	Process FIFO packets as an array of bytes. The array length defines the number of valid bytes.

Strip Parity	Interpretation
0	Retain Parity information in receive FIFO
1	Set MSB of receive FIFO data to 0

PL/R	Interpretation
0	Left-justify received character string if PADR set
1	Right-justify received character string if PADR set

PADR	Interpretation

Possible Attribute Values, cont.

0	Do not attempt to PAD received characters
1	Pad received characters strings with PADCHAR

If the PADR bit is set in block mode with the Strip Delimiter bit, clear the pad characters will be inserted between the last valid data bit and the end of the packet.

(12) Block Mode

The Block Mode (Attribute 15) control byte determines whether or not the unit prepares the RS232 serial stream, whether block sequence numbers are pre-pended to the DeviceNet packets and whether received data is retransmitted on subsequent POLL requests. The control byte has the following format:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Sync	ReSend	Enable Xmit Seq. Number	Enable Rcv. Seq.Number	Delimiter Enable	Strip Delimiter	Pre/Post Delimiter

Pre/Post Delimiter	Interpretation
0	Delimiter (if enabled) occurs at the end of the packet.
1	Delimiter (if enabled) occurs at the start of the packet. The packet length is limited to the <Max Receive Size> length. Excess characters are discarded.

Strip Delimiter	Interpretation
0	The delimiter character appears in the response packet.
1	The delimiter character is removed from the response packet.

Delimiter Enable	Interpretation
0	Disable the delimit character function
1	Enable the delimit character function

Enable Rcv.Seq.Num	Interpretation
0	Disable the receive sequence number
1	Each response packet will have a sequential number pre-pended to allow the scanner to detect new response data.

Enable Xmt.Seq.Num	Interpretation
0	Disable the transmit sequence number

Possible Attribute Values, cont.

1	The first byte of the poll request must contain a number that is different from the one in the last request to allow for an update of the scanner data field without generating erroneous data on the RS232 channel.

Resend	Interpretation
0	Valid data is only transmitted once.
1	Valid data is present during subsequent poll requests until a new string of valid data is received over the RS232 serial channel.

Sync	Interpretation
0	Do not apply synchronous “hand-shake” protocol
1	Apply synchronous “hand-shake” protocol

The first byte contains a sequence number and the second byte contains the string length information when using <string> formatting and sequence numbers in the configuration of a IVI-F47-DN1.

The receive-packet size may affect data responses if the delimiter function is enabled. If the post delimiter field is zero, the IVI-F47-DN1 will not transmit response data until the delimiter character is detected or until <receive data size> bytes are available. If the receive-data size setting is less than the number of available characters, then the initial poll-response will contain the first <receive data size> bytes and the second poll response will receive the remaining characters up to the delimiter.

The IVI-F47-DN1 will not transmit response-data when the post delimiter field setting is one, until a delimiter is detected and:

1) more than <receive data size> bytes have been received, or
2) another delimiter is detected

Possible Attribute Values, cont.

Characters, which exceed the receive data size are discarded.

When the Resend bit is set, the device will retransmit data on subsequent poll requests until another valid data packet has been received.

The Sync bit enables the synchronous handshake protocol, which provides further control over the sequence numbers during poll request/response transactions, to allow the master to determine whether or not…

a) …the previous poll request packet has been accepted.
b) …the current poll response represents a new data string.

The Xmt.Seq.Num and Rcv.Seq.Num bits will change to one when the Sync bit is set to one.

The Xmt.Seq.Num is received in the poll request and interpreted as two, four-bit numbers:

Bit Numbers 4-7	Bit Numbers 0-3
ReceiveAcknowledgeNumber	TransmitRequestNumber

The TransmitRequestNumber functions in the same way as the Xmt.Seq.Num described above. The IVI-F47-DN1 ignores data in the poll request until the TransmitRequestNumber changes from the previously received TransmitRequestNumber. The current data (if any) will be ignored when a value of 0 is received. Zero acts as a 'reset' function for the TransmitRequestNumber.

The ReceiveAcknowledgeNumber is compared to the ReceiveRequestNumber (see below). If it equals the ReceiveRequestNumber, it releases the current receive data buffer allowing the IVI-F47-DN1 to send new information. A value of zero will reset the ReceiveRequestNumber.

The Rcv.Seq.Num is transmitted in the poll response and interpreted as two, four-bit numbers:

Bit Numbers 4-7	Bit Numbers 0-3
ReceiveRequestNumber	TransmitAcknowledgeNumber

The TransmitAcknowledgeNumber will be the same value as the most recently processed TransmitRequestNumber. The TransmitRequestNumber is compared to the last TransmitAcknowledgeNumber when a poll request packet is received. The data contained in the poll request is transmitted if the TransmitRequestNumber differs from the TransmitAcknowledgeNumberent (see above).

Possible Attribute Values, cont.

The TransmitRequestNumber is then transferred to the TransmitAcknowledgeNumber to notify the master that the transaction has been processed.

The IVI-F47-DN1 notifies the master that the poll response contains new data with the ReceiveRequestNumber. The IVI-F47-DN1 will increment the most previous ReceiveAcknowledgeNumber (see above) and return it using the poll response if new data is available. Note that the IVI-F47-DN1 will generate numbers from 1-15 using zero as the reset value.

The Sync mode is typically used with a 'scanner' that generates continuous poll requests. The Xmt.Seq.Num should be set to a value of 00 during the first poll request (possibly no valid data), thereby resetting the receive-handshaking logic on the IVI-F47-DN1. The poll response will have the Rcv.Seq.Num set to ?0 when there is no available receive data. If data is available, the IVI-F47-DN1 will generate a poll response with the Rcv.Seq.Num set to ?1 with the associated data contained in the response packet. Further data will be stored in the buffers until the scanner generates a poll request with a Xmt.Seq.Num having a value of ?1. This acknowledges the receipt and processing of the previous poll. The scanner should increment the ReceiveAcknowledgeNumber after processing each poll response, wrapping from 15-1.

During transmission, the scanner application code may build the request message in memory and then increment the TransmitRequestNumber (1-15). This allows the background scanner function to send 'partially complete' poll requests without generating extraneous RS232 transmissions. When the scanner application code detects that the TransmitAcknowledgeNumber is received as part of the poll response and matches the previous TransmitRequestNumber, it will indicate that the scanner has successfully transmitted the previous poll data and the application can proceed to generate new RS232 transmit data.

(13) Receive Delimiter

The delimiter character (Attribute 16) determines the start or end of packet character for the RS232 channel. It is only effective if the delimiter enable bit in the block control byte is set.

(14) Pad Char

The Pad Char (Attribute 17) is used to pad string formatted receive data. It is typically set to ASCII <space> (020H) or an ASCII <null> (0).

Possible Attribute Values, cont.

(15) Maximum Transmit Size

The Maximum Transmit Size (Attribute 18) indicates the maximum number of data bytes to be transmitted across the RS232 channel. Setting this attribute will automatically reset the Poll Consumed Connection size as:

Connection size = Max Xmt Size (Maximum value 64)
+ 1 (if String Format enabled)
+ 1 (if Transmit Seq. Num. enabled)

The maximum connection size is 66 bytes.

(16) Idle String

The idle tring will be transmitted across the RS232 serial channel if the device receives a 'receive_idle' (null poll). If the string length by is set to 0, no data will be transmitted.

(17) Fault String

The fault string will be transmitted on the RS232 serial channel if the device experiences a connection timeout. If the string length by is set to zero, no data will be transmitted.

User Defined (IDENT-I System V) Object Class Code: 65 (0x41)

The object model provides a command/data interface to the inductive identification system.

TAG READER CLASS ATTRIBUTES

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	10

IDENT-I SYSTEM V OBJECT, INSTANCE 1 ATTRIBUTES

Attribute	Access	Name	Type	Value
3	Set	Command	ARRAY OF BYTES	**(1) Refer to Possible Attribute Values**
4	Get	Response	ARRAY OF BYTES	**(2) Refer to Possible Attribute Values**
5	Get/Set	Data Carrier	USINT	**(3) Refer to Possible Attribute Values**
6	Get	Read/Write Mode	USINT	**(4) Refer to Possible Attribute Values**
7	Get/Set	Head	USINT	**(5) Refer to Possible Attribute Values**
8	Get/Set	Head Mode	USINT	**(6) Refer to Possible Attribute Values**
9	Get/Set	ID System Enable	USINT	**(7) Refer to Possible Attribute Values**
10	Get	Data Size	USINT	**(8) Refer to Possible Attribute Values**

COMMON SERVICES

Service Code	Class	Instance	Service Name
5 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

POSSIBLE ATTRIBUTE VALUES

(1) Command

The Command attribute corresponds to the poll command. (Refer to *General Information* on page 1)

(2) Response

The Response attribute corresponds to the poll response. (Refer to *General Information* on page 1)

(3) Data Carrier

The data carrier (Attribute 5) is defined as follows:

1 IDC-...-256
3 IMC-...-64K
4 IDC-…-1K

(4) Read/Write Mode

The Read/Write Mode is "Get" (i.e. read) only. It is set internally by determining if a R/O or R/W ID system control interface has been connected to the DN1.

(5) Head

Head is the number of the read/write head that current operations are performed on. The range is from 1-4.

(6) Head Mode

The Head Mode is the current mode of the head (specified in Attribute 7). The values are defined as follows:

0 Manual Mode- the above format (Attributes 3 and 4) is used to command the head (specified in Attribute 7)

Possible Attribute Values, cont.

1 Auto Read Mode- the Head is continuously read by the unit, even after receiving a valid read. This value is buffered until read by DeviceNet

7) Tag ID System Enable

The ID System Enable attribute controls whether the device uses the ID System class (Class 65) or the Serial Stream class (Class 64) to communicate with the inductive tag reader system.

(8) Data Size

The Data Size attribute controls the amount of data written to or read from the heads. It will be as follows:

Data Format	Data Size
Fixed	8
Read/Write	32

Operating Mode	Produced Size (Rx)	Consume Size (Tx)
Read Only	13	2
Read/Write	37	38

Proper configuration of the scanner for Read/Write

The IVI-F47-DN1 produces 37 bytes; therefore, DeviceNet must be configured to receive 37 bytes.

The IVI-F47-DN1 receives 38 bytes from DeviceNet; therefore, DeviceNet must be configured to transmit 38 bytes.

Proper configuration of the scanner for Read Only

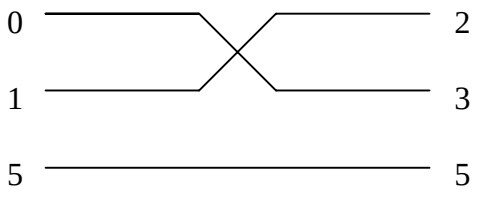
The IVI-F47-DN1 produces 13 bytes; therefore, DeviceNet must be configured to receive 13 bytes.

The IVI-F47-DN1 receives two bytes from DeviceNet; therefore, DeviceNet must be configured to transmit two bytes.

RS232 connections

1	No connection
2	Receive Data
3	Transmit Data
4	No connection
5	Ground
6	No connection
7	Request to Send
8	Clear to Send
9	No connection

The cable connection to the 9-pin DSUB for the IDENT-I system:



Connection to DeviceNet via V15 Cable:

Pin	Function	Cable Color	DNet Color
1	Shield	Brown	N/A
2	Bus +	White	Red
3	Bus -	Blue	Black
4	Can_H	Black	White
5	Can_L	Gray	Blue