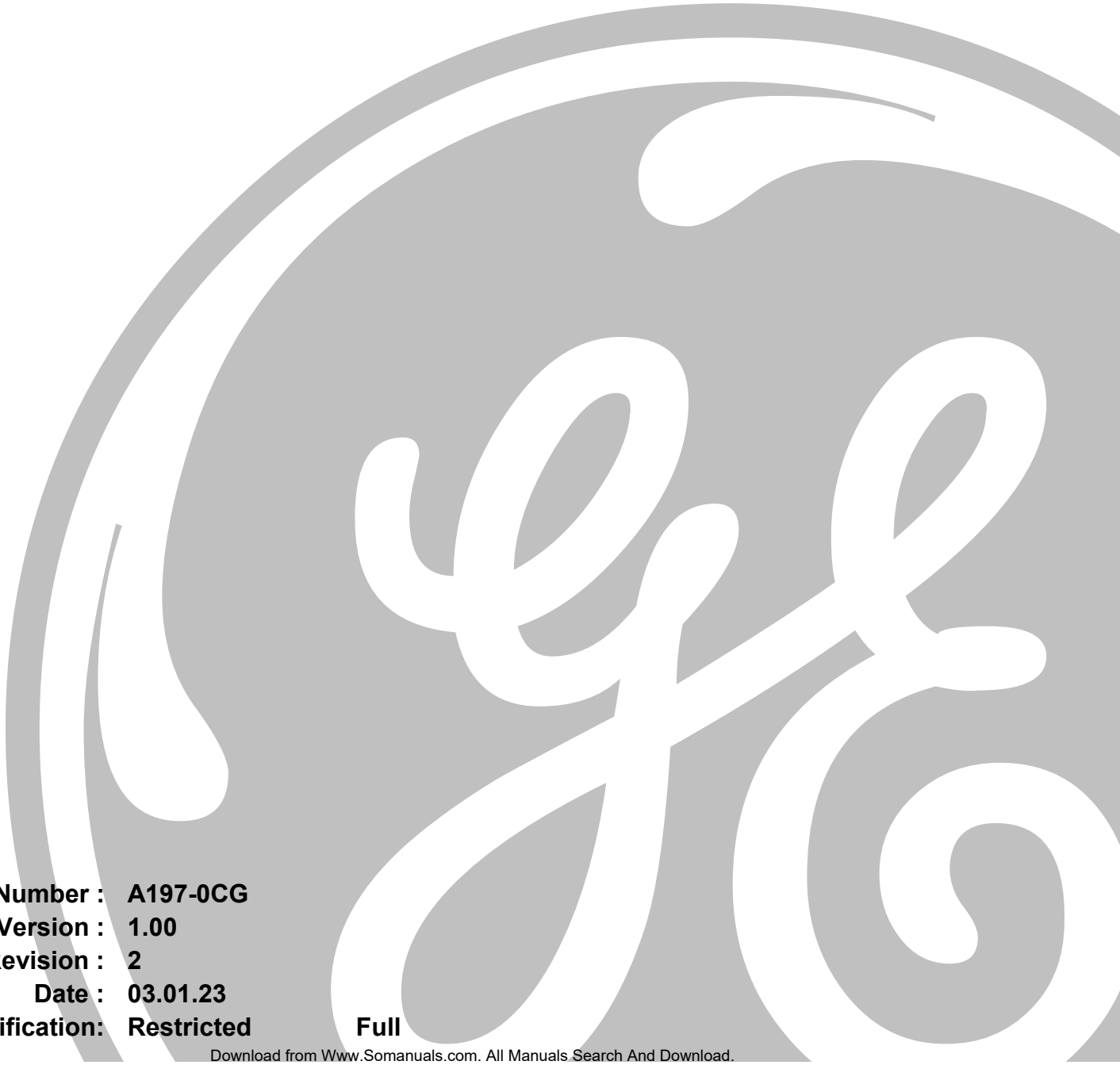
GE Energy Services

Allen-Bradley ANSI X3.28 DCA
Configuration Guide



Document Number :	**A197-0CG**
Version :	**1.00**
Revision :	**2**
Date :	**03.01.23**
Classification:	**Restricted** **Full**

NOTICE OF COPYRIGHT & PROPRIETARY RIGHTS

TRADEMARK NOTICES

Table of Contents

List of Figures

List of Tables

About this Guide

This guide describes how to configure the Allen-Bradley ANSI X3.28 Data Collection Application (ANSI X3.28 DCA).

About this Guide

This document describes the purpose and use of each of the configuration parameters of the ANSI X3.28 DCA. This document makes no attempt to explain how the configuration process operates; it is limited to describing the format and content of the DCA configuration only.

Who should use this Guide

This document is intended for use by individuals responsible for the configuration of the ANSI X3.28 DCA in GE Energy Services RTUs. These people should be familiar with the operation and maintenance of RTUs in general, but may not be familiar with the GE Energy Services family of products.

Before reading this document, you should have a basic understanding of the GE Energy Services hardware environment, the configuration system, and the ANSI X3.28 DCA.

Additional Documentation

The following supporting texts are available:

- *Allen-Bradley ANSI X3.28 DCA Functional Specification (A197-0FS)*
- *WESMAINT II Maintenance Facility Configuration Guide (B014-0CG)*
- *WESMAINT II+ Configuration Guide (B014-1CG)*
- *WIN User's Configuration Guide for the WESDAC D20 (B008-0CG)*
- *WIN User's Configuration Guide for the CCU (B008-1CG)*
- *Config Pro Configuration System User's Guide (P012-0UG)*

Overview

The ANSI X3.28 DCA software is installed in GE Energy Services WESDAC equipment to provide an interface to Sub-Remote Units (SRUs) using the ANSI X3.28 communication protocol.

Product Perspective

The ANSI X3.28 DCA software is custom software installed in the GE Energy Services Remote Terminal Unit (RTU) to act as a data concentrator for one or more SRUs using the ANSI X3.28 communication protocol. After the system is installed, the RTU has the ability to function as a sub-master within a Supervisory Control and Data Acquisition (SCADA) system, which controls multiple SRUs. Figure 1 represents a complete system overview of how the ANSI X3.28 DCA interfaces with the WESDAC Interface Node (WIN) in a typical GE Energy Services RTU.

The application is designed to communicate with SRUs via the ANSI X3.28 protocol. The ANSI X3.28 DCA receives data from the SRUs by polling for data in a master-slave relationship, or through unsolicited messages.

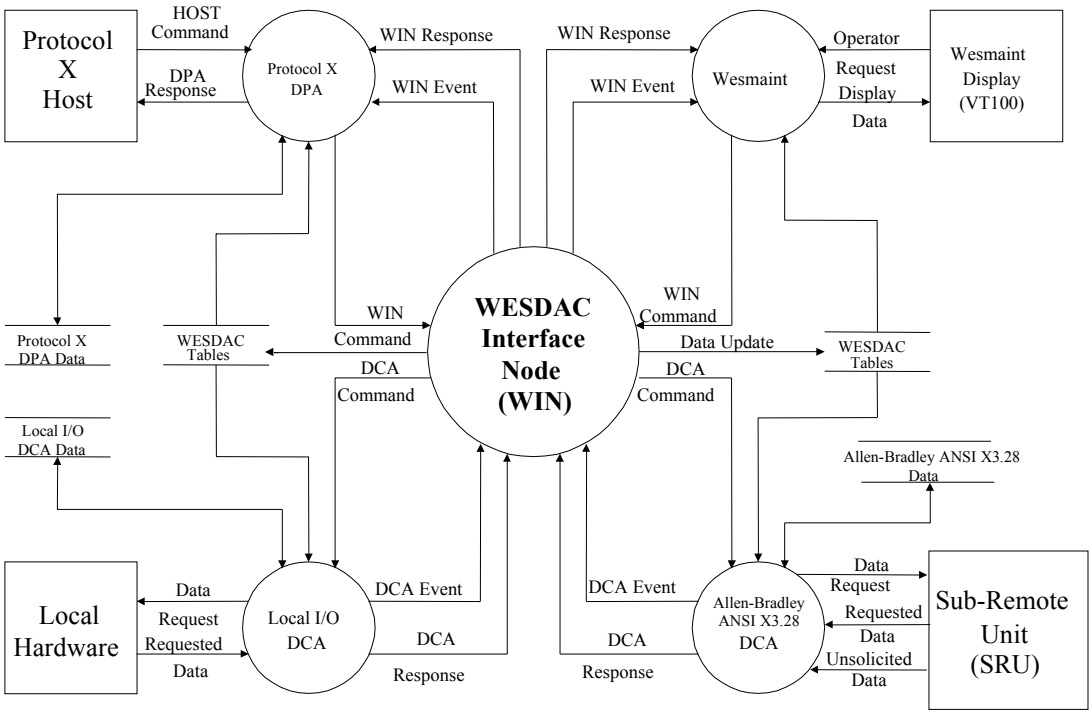


Figure 1 System Overview

Chapter 1: Configuring Tables

The ANSI X3.28 DCA configuration contains all of the data structures necessary to configure a RTU to poll devices using the ANSI X3.28 protocol.

1.1 ANSI X3.28 DCA Configuration Tables

The purpose of each configuration table is described below.

Table Name	Description
A197MAIN	The Main Application configuration table is used to define global settings for the entire ANSI X3.28 DCA application. These parameters pertain to all channels and SRUs connected within the system.
A197_COM	The Communication Port Configuration table contains data related to the communication port set-up for each communication port used by the ANSI X3.28 DCA.
A197_SRU	The SRU configuration table contains data required to perform polling and control operation on the connected SRUs.
A197_PAR	The Partition Definition table contains data required to define the different digital input and analog input partitions in the system.
A197_SYS	The System Parameters configuration table allows the user to define the parameters used to configure the connected SRUs.
A197_VC	The Virtual Connection table is used to configure the behavior of the virtual connection channels.

Table 1 ANSI X3.28 DCA Configuration Tables

1.2 Configuration Sequence

The following is a list of the steps required to configure the ANSI X3.28 DCA:

1. Edit the ANSI X3.28 DCA configuration. Prepare it according to the guidelines in this document and the specific use for which the ANSI X3.28 DCA is required.
2. Edit the configuration for the other applications that will run on the product. Prepare them according to their own configuration guides.
3. Generate the configuration and download it to the product using a GE Energy Services Configuration System. The list of applications to be compiled must include the ANSI X3.28 DCA, application A197-0.
4. Restart the product. If the ANSI X3.28 DCA encounters an error during its initialization, it will log a message to the WESMAINT Error Log and then, depending on the severity of the error, terminate or continue with its run-time function.
5. Check for error messages. Log into the WESMAINT maintenance interface, select the System Functions item from the Main Menu, and then select the Error Log item from the System Functions Menu. If any error messages are displayed, correct the problem as described in *Appendix A: Messages Logged by the ANSI X3.28 DCA*, and repeat steps 3 through 5.

When the ANSI X3.28 DCA has successfully validated all the configuration parameters, configuration is complete.

Chapter 2: Configuring the Main Application Table (A197MAIN)

The Main Application configuration table is used to define global settings for the entire ANSI X3.28 **DCA**. These parameters pertain to all channels and **SRUs** connected within the system. The Main Application configuration must contain a single record.

Name	Range	Description
DCA Index	Index into the System Point Database	The indexed System Point Database table record must contain the WESDAC database point counts for this application. The System Point Database table configuration is described in *Chapter 8:* The DCA Index is automatically configured and so may not be visible.
Extra Message Buffers	0 .. 65535	This parameter defines an additional number of message buffers to allocate for each configured port in this application in addition to the minimum number allocated automatically by the DCA. Increasing this number increases the amount of memory required to run the DCA. The total number of message buffers allocated by the ANSI X3.28 DCA will be: (2 + Extra Message Buffers) per port A typical number of Extra Message Buffers is 25.

Table 2 Main Application Configuration Table Parameters

Chapter 3: Configuring the Communication Port Table (A197_COM)

The Communication Port A197_COM table contains the relevant configuration information for communication port setup. Each record in the Communication Port table defines the communication parameters for a single communication port.

Table 3 Communication Port Configuration Table Parameters

Name	Range	Description
First SRU record	Indexes A197_SRU	This parameter contains the first **SRU** table record to associate with this communication port.
Number of SRUs	Number of Records of A197_SRU table	This parameter contains the number of **SRU** table records to associate with this communication port. The range of **SRUs** specified by First SRU and Number of **SRUs** must specify a valid range of **A196_SRU** records. In the SRU is configured for Full-Duplex Mode, the Number of SRUs should be set to 1.
Retries Before Failure	0 .. 65535	This parameter defines the number of times to retry a message before reporting a communication failure. A typical value is 3.
Failures Before Off-line	1 .. 65535	This parameter defines the number of consecutive communication failures that cause a **SRU** to be taken off- line. A typical value is 3.
Communication Port	Any valid communication port (hardware dependent) COM1 – COM7	This parameter contains the ASCII descriptor for the communication port to use. For example, for the D20, valid communication ports are "COM1" through "COM7".
Baud Rate	110, 300, 600, 1200, 2400, 4800, 7200, 9600, 19.2k, 38.4k	This parameter specifies the communication baud rate to use on this port. A typical value is 9600.
Data Bits	7 or 8	This parameter specifies the number of bits used for data.

Name	Range	Description
		A typical value is 8.
Stop Bits	1 or 2	This parameter specifies the number of framing bits used at the end of the data bits. A typical value is 1.
Parity	None Odd Even	This parameter specifies the type of parity error checking used on the communication port. A typical value is None.
RTS Enable	Enable Disable	This parameter specifies whether or not to enable the use of the Request to Send **(RTS)** control line.
CTS Enable	Enable Disable	This parameter specifies whether or not to enable the use of the Clear to Send **(CTS)** control line.
DCD Enable	Enable Disable	This parameter specifies whether or not to enable the use of the Data Carrier Detect **(DCD)** control line.
Rx Message Timeout	50 .. 2147483647	This parameter defines the total message timeout in milliseconds. Received messages must be completed in this time frame to be considered valid responses. Message timeout is measured from the end of command transmission to the end of the response. Refer to *Table 4 Character Times*. A typical value would be 500 character times.
Inter Char Timeout	0 .. 2147483647	This parameter specifies the maximum time, in milliseconds, that may expire between received characters. If this time expires, the message is considered to be finished. Refer to *Table 4 Character Times*. A typical value would be 3 character times.
RTS On Time	0 .. 2147483647	This parameter defines the number of milliseconds to hold RTS on before beginning transmission. If a modem is not used, this parameter is ignored. A typical RTS On value would be 15 ms.
RTS Off Time	0 .. 2147483647	This parameter defines the number of milliseconds to hold RTS on after completion of data transmission. If a modem is not used, this parameter is ignored. Refer to *Table 4* for *Character Times*. Typically RTS Off Times are set to 3 character times.
DCD Wait Time	0 .. 2147483647	This parameter defines the number of milliseconds that DCD must be asserted before data will be accepted by the **DCA**. If a modem is not used, this parameter is ignored. A typical DCD Wait time is 0.
VC Param.	Indexes A197_VC or Not Used (-1)	This is an offset into **A197_VC** (Virtual Connection Table) and is used for choosing the required virtual connection parameters for this port. If 'Not Used' is selected, Virtual Connection will not be available for this port.
Duplex Mode	Half-Duplex Full-Duplex	This parameter specifies the communication mode. When the SRU is configured for Full-Duplex mode, the DCA will expect unsolicited messages from the SRU device and will disable THE polling sequence. In this mode, only one SRU is allowed for this port, thus the Number of SRUs parameter should be set to 1. When the SRU is configured for Half-Duplex mode, the polling sequence is enabled and the DCA expects no unsolicited messages. Multiple SRUs are allowed in this mode. This parameter also determines the message format used when transmitting a message.

Baud Rate	One Character Time (ms)
110	91
300	34
600	17
1200	9
2400	5
4800	3
7200	2
9600	2
19.2k	1
38.4k	1

Table 4 Character Times

☞**NOTE:** All character times in Table 4 are based on a 10 bit character, and are rounded up to the nearest millisecond.

Chapter 4: Configuring the SRU Table (A197_SRU)

The SRU table contains the relevant configuration information for SRU polling and control. Each record in the SRU table defines the parameters for a single SRU.

Table 5 SRU Configuration Table Parameters

Name	Range	Description
SRU Address	0 .. 255	This parameter defines the communication address for this **SRU**. Also referred to as Destination Station Number (DST).
Station Address	0 .. 255	This parameter defines the communication address for the DCA. Also referred to as Source Station Number (SRC).
Re-Init Interval	-1 (disabled) 0 .. 1000000000	This parameter defines the frequency (in milliseconds) at which communication with the SRU will be attempted when it is off-line. A typical Re-Init interval is 60000 milliseconds.
Time Sync Interval	-1 (disabled) 0 .. 1000000000	This parameter defines the frequency (in milliseconds) at which the Time Synchronization sequence will be executed. A typical Time Sync interval is 3600000 milliseconds (1 hour).
Data Read Interval	-1 (disabled) 0 .. 1000000000	This parameter defines the frequency (in milliseconds) at which Data Read sequence will be executed. This sequence is used to retrieve all the digital input and analog input data from the SRU as configured in the A197_PAR Partition Table. A typical scan interval is 60000 milliseconds.
Polling Interval	-1 (disabled) 0 .. 1000000000	This parameter defines the frequency (in milliseconds) at which the **SRU** will be polled. If 0 is used, data will be retrieved as often as possible. If -1 is used, the scan is disabled. If the COM record for this SRU record is set to Full-Duplex mode, this sequence is disabled. A typical scan interval is 60000 milliseconds.

Name	Range	Description
Diagnostics Interval	-1 (disabled) 0 .. 1000000000	This parameter defines the frequency (in milliseconds) at which the Diagnostic sequence will be executed. This sequence is used to retrieve the Diagnostic Counter information and to read the Buffer Overflow Flag from the SRU. A typical scan interval is 3600000 milliseconds (1 hour).
AI with time	No Yes	This parameter is used to indicate if the analog input information is expected to be received with or without time when the SRU is polled or when it sends an unsolicited message. **NOTE:** This parameter should match the way the device is configured to report analog input information, otherwise the message could be interpreted incorrectly and the DCA could report inaccurate analog input information.
First Partition	Index into A197_PAR or Not Used (-1)	This parameter specifies the first partition definition record that is associated with this **SRU**. This offset must be less than the total number of records defined in the A197_PAR table. The range of partitions specified by this offset and the Number of Partitions must specify a valid range of A197_PAR records.
No. of Partitions	0…255	This parameter specifies the number of records in the A197_PAR table that are associated with this **SRU**. This value in combination with First Partition parameter specifies the range of A197_PAR records that define the data partitions for this port. The default value is 0.
First System Parameter	Index into A197_SYS or Not Used (-1)	This parameter specifies the first System Parameter definition record that is associated with this **SRU**. This offset must be less than the total number of records defined in the A197_SYS table. The range of partitions specified by this offset and the Number of Parameters must specify a valid range of A197_SYS records.
No. Of Parameters	0…255	This parameter specifies the number of records in the A197_SYS table that are associated with this **SRU**. This value in combination with First System Parameter specifies the range of A197_SYS records that define the System Parameters for this port. The default value is 0.

Chapter 5: Configuring the Partition Definition Table (A197_PAR)

The A197_PAR table contains one record for each data partition defined for each **SRU**. A data partition is a continuous range of X3.28 word addresses that contain sub-system data. The range of records for a particular **SRU** is specified in configuration table A197_SRU by the First Partition and Number of Partitions parameters. Each **SRU** can have more than one of each type of partition.

Name	Range	Description
Data Type	Digital Input Analog Input	This parameter specifies the type of data that the partition will contain. Digital Input partitions require 16 digital input system points per word. Analog Input partitions require one analog input system point per word.
Start Address	0 .. 32767	This parameter specifies the word address of the first word in the partition. Each partition must have a range of addresses that is unique to all other partitions mapped by the same SRU record. In other words, partitions that are mapped by the same SRU record should not have ranges that overlap.
Number of Words	1 .. 32767	This parameter specifies the number of 16-bit words in this partition. Note that Analog Input partitions require an even number of words. For Digital Input partitions, each word requires 16 digital input system points. For Analog Input partitions, each SRU analog input point value requires two words and each word requires 1 analog input system point.

Table 6 Partition Definition Table Parameters

The following table shows the mapping of the various data types for the Coupler for Allen-Bradley Data Highway.

Type	Start Address (word address)	Num. Words
DI	0	500
DO*	500	500
AI	1000	500
AO*	1500	500

*data type not supported

Table 7 Point Mapping for the Coupler for Allen-Bradley Data Highway

Analog Input partitions in the Partition Definition Table (A197_PAR) can also be used to read any values located in unprotected memory ranges in the SRU. For example, the Event Buffer Monitoring values shown in *Table 8* can be monitored by configuring an Analog Input partition with a start word address of 3060 and a Number of Words 7. In the same manner, the system parameter values described in *Table 10* can be read if desired.

Word Address	System Parameter	Unit
3060	Actual Buffer Level	Integer
3061	Average Buffer evel over 100 events	Integer
3062	Max Buffer Level since last read	Integer
3063	Max Buffer Level since Bootup	Integer
3064	Num. of Overflows since Bootup	Integer
3065	DI Scan Rate	ms
3066	CPU load	%

Table 8 Coupler for Allen-Bradley Data Highway Event Buffer Monitoring Values

Chapter 6: Configuring System Parameters Table (A197_SYS)

The A197_SYS table allows the user to configure System Parameters to be sent to the SRU at startup for its configuration. This table contains one record for each system parameter the user wishes to send to the **SRU** at system startup or when communication is re-established with the SRU after being off-line.

Name	Range	Description
Address	0 .. 65535	This parameter specifies the word address of the System Parameter to be sent to the **SRU**.
Value	0 .. 65535	This parameter specifies value of the System Parameter to be sent to the **SRU**.

Table 9 System Parameters Table Parameters

Table 10 shows the configurable System Parameters that are specific for the Coupler for Allen-Bradley Data Highway. The System Parameters Table (A197_SYS) can be used to direct the ANSI X3.28 DCA to send any of these parameters to the SRU at system startup and every time communication is re-initiated after being offline. To instruct the coupler to store the parameters to EEPROM, the last parameter in the selected range should have an Address of 3002 and a Value of 1. This will force the DCA to send a "Store to EEPROM command" after all the parameters have been sent.

☞**NOTE:** The Duplex-Mode configured in the Communication Port Table (A197_COM) and the AI with time parameter in the SRU Table (A197_SRU) must match the configuration of the SRU. You can use this table to configure the ANSI X3.28 DCA to send the correct parameters to the SRU at startup. Also, ensure that the DI Event parameter is disabled in the coupler since the ANSI X3.28 DCA does not support DI events, it only supports DI Change.

Address	System Parameter	Unit	Value	Default
3000	DI Event Enable		1 = Enable / 0 = Disable	0
3001	DI Change Enable		1 = Enable / 0 = Disable	0
3002	Store To EEPROM Command		1 = Store Parameters	
3003	DI Change With Timestamp		1 = Enable / 0 = Disable	0
3004	AI Event With Timestamp		1 = Enable / 0 = Disable	0
3005	Duplex Mode		0 = Half-duplex mode	0
3006	Station Address		8 .. 63, 72 .. 254	101
3007	Scan Alper Cycle		0 = no scan, range 0 .. 1	0
3008	Default AI Delta lowword		0 .. 65535	0x00
3009	Default AI Delta highword		0 .. 32768	0x16
Automatic tuning				
3010	Automatic tuning		1 = start / 0 = stop	0
3011	Already tuned signals	%	Read only	0
3012	Min Events Per Period			1
3013	Max Events Per Period			10
3014	Tuning Period	Ms		10
3015	Basic DI Cycle	Ms	3 .. 20	5
Automatic tuning				
3020	Field 0: Start Address	Word Addr.	Allen-Bradley Address	100
3021	Field 0: Length	Words		0
3022	Field 0: Periode	100ms		0
3023	Field 1: Start Address	Word Addr.	Allen-Bradley Address	100
3024	Field 1: Length	Words		0
3033	Field 2: Length	Words		0
3034	Field 2: Periode	100ms		0
Satellite Clock				
3055	Channel Parameters			100
Analogue Fields				
3070	Field 0: Start Address	Word Addr.	Allen-Bradley Address	100
3071	Field 0: Length	Words		AI Lenght
3072	Field 0: Scan Rate	X DI Cycle		0
3073	Field 1: Start Address	Word Addr.	Allen-Bradley Address	100
3074	Field 1: Length	Words		0
3083	Field 2: Length	Words		0
3084	Field 2: Scan Rate	X DI Cycle		0

Table 10 Coupler for Allen-Bradley Data Highway System Parameters.

Chapter 7: Configuring the Virtual Connection Table (A197_VC)

The Virtual Connection table is used to configure the behavior of the virtual connection channels. The user can create as many fields as desired, each one defining a different type of virtual connection mode. As described *Chapter 3: Configuring the Communication Port Table (A197_COM)*, the user can configure each port to use one of these types of virtual connection.

Field	Range	Description
Termination Character	Disabled USE ESCAPE SEQUENCE ^A (1) ^B (2) ^C (3) . . . ^Z (26)	If 'Disabled' is chosen, the virtual connection will terminate only if a VC Channel Timeout occurs or if the telnet connection is dropped. If 'USE ESCAPE SEQUENCE' is selected, the user should describe an escape sequence in the 'Describe Escape Sequence' sub-table. If a termination character is selected (^A, ^B, etc.), this indicates the character that should be detected for the virtual connection to close. Note: '^' means to press the CTRL key and, while holding it, press the key for the specified letter. Values in parentheses represent the ASCII value of the control characters. The default value is ^C (3).
Describe Escape Sequence	40 Characters	A string that will be displayed in the WESMAINT screen explaining to the user how to enter the escape sequence.
Esc Seq	0..FF (Hex value)	Virtual Terminal Escape Sequence. A table with 16 hexadecimal entry values that describe the escape sequence. The hexadecimal ASCII value of each character of the desired escape sequence should be entered on each field. The unused fields should be set to zero. If any value other than 'USE ESCAPE SEQUENCE' is selected in the Termination Character field, this table will be ignored.
Pre/Post Esc. Seq. Timer	1..300	Time (in seconds) that must elapse before the escape sequence can be accepted, and the time that must elapse after the correct escape sequence is received, without any characters being received so that it is accepted. The default value is 2 seconds.
VT Connection Timeout	0 .. 65535	Time (in seconds) that must elapse, with no activity, for the virtual connection to time out. If a timeout occurs, the virtual channel is automatically closed. This feature is disabled if the field is set to zero. The default value is 0 (timeout disabled).

Table 11 Virtual Connection Configuration Table Parameters

Chapter 8: Configuring WIN for the ANSI X3.28 DCA

This chapter describes how to configure the WIN application to work with the ANSI X3.28 DCA. The WIN application allocates the WESDAC data points for all applications. In order to work properly the ANSI X3.28 DCA must have its own record within the WIN application's System Point Database. This record is referenced by the DCA Offset specified in the Main Application configuration table. Additional information on configuring WIN can be found in the WIN Configuration Guide listed in the Additional Documentation section of this document.

8.1 WESDAC Point Allocation

The ANSI X3.28 DCA requires the following number of points. Additional points configured will be initialized, but will never come on-line or be used by the ANSI X3.28 DCA.

Digital Inputs: 1 per mapped SRU + 13 per configured SRU + 16 per mapped DI word

Digital Outputs: 1 per COM port + 7 per configured SRU

Accumulators: 0

Analog Inputs: 13 per configured SRU + 1 per mapped AI Word

Analog Outputs: 0

Device Status: 1 per configured SRU

For more information on the order of the configured points, refer to the ANSI X3.28 DCA Functional Specification listed in the Additional Documentation.

Appendix A: Messages Logged by the ANSI X3.28 DCA

This appendix contains a description of all error messages posted to the WESMAINT Error Log by the ANSI X3.28 DCA. This appendix also provides an explanation of all output return codes returned by the ANSI X3.28 DCA.

During startup, the ANSI X3.28 DCA checks its configuration tables for invalid entries. If no configuration errors are encountered the DCA attempts to spawn a number of processes during start-up. If any invalid data is found or a problem is encountered while starting one of the processes, an error message is logged to the WESMAINT Error Log.

Messages logged to the WESMAINT Error Log by the DCA will be pre-pended with a process name. This name will be one of the following:

A197:

A197-<x>-<yy>: Where <x> is one of E, C R, T or S
<yy> is a process number

Expressions in angular brackets like "<xx>", are filled with the appropriate values by the **DCA**.

A.1 Fatal Error Messages

Fatal error messages indicate the application is suspending due to either an invalid critical configuration parameter, or a critical process initialization sequence failed.

F001: Unable to locate table <table_name>

Cause:

- The **DCA** was unable to locate one of its required configuration tables.

Remedy:

- Ensure the <table_name> table exists and is comprised of at least one record.

F002: A197_SRU rec <x>, duplicate SRU address <y>

Cause:

- Two SRUs mapped by the same record in A197_COM table have the same SRU address.

Remedy:

- Make sure all records in the A197_SRU table that are mapped byt the same communication port have different addresses.

F003: A197_SRU rec <x>, SRU used for multiple COM recs

Cause:

- Record <x> in the A197_SRU table is mapped by more than one communication port.

Remedy:

- Make sure that no records in the A197_SRU table are mapped by the same communication port.

F004: COM rec <x>, Interchar Timeout must be less than Rx Time

Cause:

- The RX Message Timeout in record <x> of the A197_COM table is less than the Inter Char Timeout.

Remedy:

- Make sure the Interchar Timeout is less than the RX Message Timeout.

F005: A197_PAR rec <x> and <y>, Partitions overlap

Cause:

- Records <x> and <y> of the A197_PAR are mapped by the same SRU record and have ranges of addresses that overlap.

Remedy:

- Make sure all partitions that are mapped by the same SRU have address ranges that do not overlap.

F006: A197_COM rec <x>, Only one SRU allowed in Full-Duplex

Cause:

- When in Full-Duplex mode, only one SRU should be mapped.

Remedy:

- Make sure there is only one SRU mapped for A197_COM records that are configured for Full-Duplex mode.

F100: Future expansion points not NULLPTR

Cause:

- There is an interface error between the DCA and the DCA engine.
- The **DCA** stack is not valid.

Remedy:

- Contact the Customer Service Department and report this error.
- Reboot the RTU.

F101: Unable to find table <table_name>

Cause:

- The **DCA** was unable to locate one of its required configuration tables.

Remedy:

- Ensure the <table_name> table exists and is comprised of at least one record.

F102: Unable to open a channel to WIN

Cause:

- The **DCA** was unable to initiate communications with WIN.

Remedy:

- Contact the Customer Service Department and report this error.

F103: Unable to create an exchange, <name>, status=<y>

Cause:

- The system was unable to create a specified message exchange. This message exchange is vital to the operation of the entire application.

Remedy:

- Contact the Customer Service Department and report this error.

F104: Unable to spawn process, <process_name>

Cause:

- The system was unable to start specified process. The process is vital to the operation of the entire application.

Remedy:

- Contact the Customer Service Department and report this error.

F105: Not enough memory!!!

Cause:

- The **DCA** was unable to allocate enough memory to start the ANSI X3.28 DCA.

Remedy:

- Reduce the amount of memory used by this or other applications in the system.
- Contact the Customer Service Department and report this error.

F106: Missing Callout, <callout>

Cause:

- The **DCA** was unable to locate a callout function <callout>.

Remedy:

- Contact the Customer Service Department and report this error.

F107: Unable to get pointer <table name>

Cause:

- The **DCA** was unable to get a pointer to a configuration table <table name>. The configuration table <x> is vital to the operation of the entire application.

Remedy:

- Contact the Customer Service Department and report this error.

F108: Not enough<x> points, <y> required

Cause:

- There are not enough WESDAC data points allocated to the ANSI X3.28 DCA.

Remedy:

- Ensure the **DCA** Index configured in A197MAIN refers to the correct **WIN** CFG_DCA record.
- Refer to *Table 12 WESDAC Point Types* and ensure the required number of data points are allocated for the ANSI X3.28 DCA in the appropriate WIN System Point Database record. The WESDAC point types are described in the following table.

WESDAC Name	Point Type
WESDAC_1	Digital Inputs
WESDAC_2	Digital Outputs
WESDAC_3	Counter
WESDAC_4	Analog Inputs
WESDAC_5	Analog Outputs
WESDAC_6	Devices

Table 12 WESDAC Point Types

F109: User data memory overflow

Cause:

- There has been a memory overflow in the application's user memory.

Remedy:

- Contact the Customer Service Department and report this error.

F200: Unable to get pointer to COM config record = <x>

Cause:

- There is an interface error between the DCA and the DCA engine.

Remedy:

- Contact the Customer Service Department and report this error.

F201: Unable to create exchange, <exchage>, status=<x>

Cause:

- DCA was not able to create the <exchange> exchange.

Remedy:

- Contact the Customer Service Department and report this error.

F202: Unable to spawn process, <x>

Cause:

- The DCA was unable to start a process.

Remedy:

- Contact the Customer Service Department and report this error.

F203: L062_COM_EXTENSIONS should be initialized

Cause:

- There is an interface error between the DCA and the DCA engine.

Remedy:

- Contact the Customer Service Department and report this error.

F204: Check_response() function is req'd for full-duplex.

Cause:

- There is an interface error between the DCA and the DCA engine.

Remedy:

- Contact the Customer Service Department and report this error.

F205: Echo mode is not supported by L061-0.

Cause:

- There is an interface error between the DCA and the DCA engine.
- The NVRAM has been corrupted.

Remedy:

- Contact the Customer Service Department and report this error.
- Download the configuration and restart the system.

A.2 Non-Fatal Error Messages

These messages indicate the application has encountered a non-fatal configuration error or a non-fatal stage of process initialization failed. The application will not suspend as a whole, but rather attempt to run in a limited or reduced capacity.

E101: Restart failed for <process_name>

Cause:

- The **DCA** was unable to spawn and activate the process.

Remedy:

- Note the process name and contact the Customer Service Department to report this error.

E102: Not enough memory!!!

Cause:

- The **DCA** was unable to allocate enough memory to start the ANSI X3.28 DCA.

Remedy:

- Reduce the amount of memory used by this or other applications in the system.
- Contact the Customer Service Department and report this error.

E110: Unable to open <com_port>, status = <x>

Cause:

- The **DCA** was unable to open the requested communication port.

Effect:

- The ANSI X3.28 DCA will be unable to communicate over the specified communication port, <com_port>.

Remedy:

- Ensure the specified communication port, <com_port>, is not already used in another record in **A197_COM**, or by another application.
- Ensure the specified port name is supported by the hardware platform being used. Valid port names for the D20 are COM0 to COM7. COM0 is normally used for WESMAINT.

E111: <com_port> unable to set parameters, status = <x>

Cause:

- The system was unable to set the communication parameters for the specified communication port.

Effect:

- The ANSI X3.28 DCA will be unable to communicate over the port, <com_port>.

Remedy:

- Note the return status, <x>, and contact the Customer Service Department to report this error.

E112: <com_port> unable to set timers, status = <x>

Cause:

- The system was unable to set the communication timers for the specified communication port.

Effect:

- The ANSI X3.28 DCA will be unable to communicate over the port, <com_port>.

Remedy:

- Note the return status, <x>, and contact the Customer Service Department to report this error.

E201: Com initialization failed, status = <com_port>

Cause:

- The **DCA** was unable to initialize the requested communication port.

Effect:

- The ANSI X3.28 DCA will be unable to communicate over the specified communication port, <com_port>.

Remedy:

- Ensure the specified communication port, <com_port>, is not already used in another record in **A197_COM**, or by another application.
- Ensure the specified port name is supported by the hardware platform being used. Valid port names for the D20 are COM0 to COM7. COM0 is normally used for WESMAINT.

E202: Not enough memory!!!

Cause:

- The **DCA** was unable to allocate enough memory to start the ANSI X3.28 DCA.

Remedy:

- Reduce the amount of memory used by this or other applications in the system.
- Contact the Customer Service Department and report this error.

E204: A child process has died, suspending...

Cause:

- One of the ANSI X3.28 DCA processes stopped unexpectedly. If this error occurs, the system has become unstable.

Effect:

- ANSI X3.28 DCA functionality will become un-reliable.

Remedy:

- Contact the Customer Service Department and report this error.

E205: Encountered error = <x> while closing <com_port>

Cause:

- The **DCA** was unable to close <com_port>.

Remedy:

- Restart the system.
- If the problem persists, contact the Customer Service Department and report this error.

A.3 Warning Messages

Warning messages indicate recoverable run-time errors, either within the application or through one of the software interfaces. The application will attempt to handle these errors without suspending or jeopardizing the integrity of the system. If a warning message occurs repeatedly, contact the Customer Service Department to report the error.

W001: win_write failed, status = <x>

W101: send_x failed, status = <x>

W102: send_x failing, status = <x>

W103: win_write failing, status = <x>

failure condition cleared

W201: Tx Failed, <x> reset - Check Cabling

W202: Error getting a communication buffer"

W203: send_x failing, status = <x>

A.4 Information Messages

Information messages indicate the application is taking some special action based on certain configuration or initialization criteria.

I101: Unable to find table* A197*MAIN, deleting

Cause:

- The **DCA** could not find the Main Application configuration table. If the Main Application configuration cannot be located, the application assumes the user does not want it to run.

Effect:

- The ANSI X3.28 DCA will delete itself from the system.

Remedy:

- If the ANSI X3.28 DCA is intended to run, ensure the Main Application configuration table, **A197MAIN**, exists and is comprised of at least a single record.

I102: Process Restarted, <process_name>

Cause:

- The **DCA** process <process_name> has restarted.

Effect:

- The ANSI X3.28 DCA will post the information message and continue to run.

A.5 Control Request Return Codes

When processing a disable communications output request, the **DCA** may not be able to execute the request. If this occurs, the **DCA** will set the status code returned with the request to the appropriate error code, and negatively acknowledge (NACK) the control request. This section describes the possible status codes returned.

Control Already Active (0x0002)

The control point is already in the requested state. Refer to the *Allen-Bradley ANSI X3.28 DCA Functional Specification* for more information on whether controls latch on or off, or toggle.

Illegal Point Number (0x0003)

There is no function associated with this output point. Refer to the *Allen-Bradley ANSI X3.28 DCA Functional Specification* for more information on the number of digital output points required by the **DCA** and each point's associated functionality.

Command Transmission Failed (0x0080)

The **DCA** was unable to successfully transmit the command to the associated controller due to poor communications.

Invalid Control Type (0x0081)

The control point selected does not support the requested control type.

Value Out of Range (0x0082)

For setpoints, the requested setpoint value is outside the allowable range.

For R/L controls, the multiplier is too large.

Point Off-Line (0x0083)

The control was not attempted because the selected control point is currently off-line.