Kyle® Form 4C Recloser Control
Serial Communications

Reference Information
R280-90-16

# DNP3 Device Profile

## Device Profile Template

## Data Dictionary

## Release 2.0

## January 30, 2001

## For Use With
## Cooper Power Systems
## Form 4C Recloser Controls

December 2003 • Supersedes 10/01
Printed in USA

# Contents

# Introduction

The F4C Recloser Control is available with the DNP 3.0 communication protocol the "realtime"serial port. This document provides details for users that need to interface to the control using this protocol.

The document is divided into sections that give an overview of the data dictionary for the control, describe configuration parameters to get started communicating, error indication definitions, and reference documents. Appendices provide the *DNP 3.0 Device Profile Template* filled out for the F4C control and the data dictionary for accessing the control.

Unsolicited Report by Exception can be configured as either "supported" or "unsupported" via a configuration parameter. If supported, upon device reset a null unsolicited message is sent. No further unsolicited messages will be sent until a DNP messages to enable unsolicited operation is received by the control.

Data link and Application retries and timeouts are configurable. See the section *DNP Related Configuration Parameters* for more detail.

# Data Dictionary Overview

Appendix B contains a listing of the data dictionary for the F4C Recloser Control. This section discusses items of interest from the data dictionary.

**Class 0 and 1 Binary Inputs**

1. All binary input events are fixed as Class 1 data.
2. Event data is updated immediately on every change.

**Class 0 through 3 Counters**

1. When an incoming request specifies 32-bit counters, only the lower 16 bits of the counters will be meaningful.
2. Event data is updated on a 1 second basis.

**Class 0 through 3 Analog Inputs**

1. The data dictionary section that describes the analogs includes scale factors (for 16 bit variation) and units to translate the raw data.
2. Event data is updated on a 1 second basis.

**Control Relay Output Block (CROB)**

1. The data dictionary CROB section indicates whether the control point is pulsed or latched.
2. The section also specifies the default condition of a point on powerup or reset.
3. Points may *only* be controlled using SBO as shown on the table.

**File ID objects in general**

1. Internal objects (records) consist of static read-only data, live read-only data, configuration parameters, pseudo registers (drag-hands) and time-tagged data.
2. All data records are low byte - high byte (Big Endian) format.
3. “File Name” column in section is the ASCII file ID for accessing data and any required arguments.
4. The only allowed operations on the records are *read, response* or *write* (where appropriate).
5. Individual records may be read or written.
6. Status of the last file write operation is found in the read-only file *ERR*. This file is automatically over written with the status of the most recent write ACK information.

**File ID, Static Data**

1. See the F4C product data specification for more detail on the meaning of the data objects.

**File ID, Dynamic Data**

1. See the F4C product data specification for more detail on the meaning of the data objects.

**File ID, Configuration Data**

1. See the F4C product data specification for more detail on the meaning of the data objects.
2. ACK/NAK codes are described in ***TBD***.

**File ID, Pseudo Registers**

1. See the F4C product data specification for more detail on the meaning of the data objects.
2. Writes to these records ignore the data that is "written" to the record. The present value of the associated live data is actually written.

**File ID, Time-tagged**

1. See the F4C product data specification for more detail on the meaning of the data objects.
2. A variable number of records starting with the **next available** record are returned when all time-tagged data is requested. Additionally, each record is a variable size depending on the type of time-tagged record. The first requested record must be "0".

| OBJECT | | | REQUEST (DNP message components parsed by the CL4C/5 Series) | | RESPONSE (DNP message components reported by the CL4C/5 Series) | |
|---|---|---|---|---|---|---|
| **Obj** | **Var** | **Description** | **Func Codes (dec)** | **Qual Codes (hex)** | **Func Codes (dec)** | **Qual Codes (hex)** |
| 1 | 0 | Binary Input - All Variations | 1 | 00,01,06 | | |
| 1 | 1 | Binary Input | 1 | 00,01,06 | 129 | 00,01 |
| 1 | 2 | Binary Input with Status | 1 | 00,01,06 | 129 | 00,01 |
| 2 | 0 | Binary Input Change - All Variations | 1 | 06,07,08 | | |
| 2 | 1 | Binary Input Change without Time | 1 | 06,07,08 | 129,130 | 17, 28 |
| 2 | 2 | Binary Input Change with Time | 1 | 06,07,08 | 129 | 17, 28 |
| 2 | 3 | Binary Input Change with Relative Time | | | | |
| 10 | 0 | Binary Output - All Variations | 1 | 00,01,06 | | |
| 10 | 1 | Binary Output | 1 | 00,01,06 | 129 | 00, 01 |
| 10 | 2 | Binary Output Status | 1 | 00,01,06 | 129 | 00, 01 |
| 12 | 0 | Control Block - All Variations | | | | |
| 12 | 1 | Control Relay Output Block | 3,4,5,6 | 17, 28 | 129 | echo of request |
| 12 | 2 | Pattern Control Block | | | | |
| 12 | 3 | Pattern Mask | | | | |
| 20 | 0 | Binary Counter - All Variations | 1, 7, 8, 9,10 | 00,01,06 | | |
| 20 | 1 | 32-Bit Binary Counter | 1, 7, 8, 9,10 | 00,01,06 | 129 | 00, 01 |
| 20 | 2 | 16-Bit Binary Counter | 1, 7, 8, 9,10 | 00,01,06 | 129 | 00, 01 |
| 20 | 3 | 32-Bit Delta Counter | | | | |
| 20 | 4 | 16-Bit Delta Counter | | | | |
| 20 | 5 | 32-Bit Binary Counter without Flag | 1, 7, 8, | 00,01,0 | 129 | 00, 01 |

| OBJECT | | | REQUEST (DNP message components parsed by the CL4C/5 Series) | | RESPONSE (DNP message components reported by the CL4C/5 Series) | |
|---|---|---|---|---|---|---|
| Obj | Var | Description | Func Codes (dec) | Qual Codes (hex) | Func Codes (dec) | Qual Codes (hex) |
| | | | 9,10 | 6 | | |
| 20 | 6 | 16-Bit Binary Counter without Flag | 1, 7, 8, 9,10 | 00,01,06 | 129 | 00, 01 |
| 20 | 7 | 32-Bit Delta Counter without Flag | | | | |
| 20 | 8 | 16-Bit Delta Counter without Flag | | | | |
| 21 | 0 | Frozen Counter - All Variations | 1 | 00,01,06 | | |
| 21 | 1 | 32-Bit Frozen Counter | 1 | 00,01,06 | 129 | 00,01 |
| 21 | 2 | 16-Bit Frozen Counter | 1 | 00,01,06 | 129 | 00,01 |
| 21 | 3 | 32-Bit Frozen Delta Counter | | | | |
| 21 | 4 | 16-Bit Frozen Delta Counter | | | | |
| 21 | 5 | 32-Bit Frozen Counter with Time of Freeze | | | | |
| 21 | 6 | 16-Bit Frozen Counter with Time of Freeze | | | | |
| 21 | 7 | 32-Bit Frozen Delta Counter with Time of Freeze | | | | |
| 21 | 8 | 16-Bit Frozen Delta Counter with Time of Freeze | | | | |
| 21 | 9 | 32-Bit Frozen Counter without Flag | 1 | 00,01,06 | 129 | 00, 01 |
| 21 | 10 | 16-Bit Frozen Counter without Flag | 1 | 00,01,06 | 129 | 00, 01 |
| 21 | 11 | 32-Bit Frozen Delta Counter without Flag | | | | |
| 21 | 12 | 16-Bit Frozen Delta Counter without Flag | | | | |
| 22 | 0 | Counter Change Event - All Variations | 1 | 06,07,08 | | |
| 22 | 1 | 32-Bit Counter Change Event without Time | 1 | 06,07,08 | 129,130 | 17, 28 |
| 22 | 2 | 16-Bit Counter Change Event | 1 | 06,07,0 | 129 | 17, 28 |

| OBJECT | | | REQUEST (DNP message components parsed by the CL4C/5 Series) | | RESPONSE (DNP message components reported by the CL4C/5 Series) | |
|---|---|---|---|---|---|---|
| **Obj** | **Var** | **Description** | **Func Codes (dec)** | **Qual Codes (hex)** | **Func Codes (dec)** | **Qual Codes (hex)** |
| | | without Time | | 8 | | |
| 22 | 3 | 32-Bit Delta Counter Change Event without Time | | | | |
| 22 | 4 | 16-Bit Delta Counter Change Event without Time | | | | |
| 22 | 5 | 32-Bit Counter Change Event with Time | | | | |
| 22 | 6 | 16-Bit Counter Change Event with Time | | | | |
| 22 | 7 | 32-Bit Delta Counter Change Event with Time | | | | |
| 22 | 8 | 16-Bit Delta Counter Change Event with Time | | | | |
| 23 | 0 | Frozen Counter Event - All Variations | | | | |
| 23 | 1 | 32-Bit Frozen Counter Event without Time | | | | |
| 23 | 2 | 16-Bit Frozen Counter Event without Time | | | | |
| 23 | 3 | 32-Bit Frozen Delta Counter Event without Time | | | | |
| 23 | 4 | 16-Bit Frozen Delta Counter Event without Time | | | | |
| 23 | 5 | 32-Bit Frozen Counter Event with Time | | | | |
| 23 | 6 | 16-Bit Frozen Counter Event with Time | | | | |
| 23 | 7 | 32-Bit Frozen Delta Counter Event with Time | | | | |
| 23 | 8 | 16-Bit Frozen Delta Counter Event with Time | | | | |
| 30 | 0 | Analog Input - All Variations | 1 | 00,01,06 | | |
| 30 | 1 | 32-Bit Analog Input | | | | |
| 30 | 2 | 16-Bit Analog Input | 1 | 00,01,06 | 129 | 00,01 |

| OBJECT | | | REQUEST (DNP message components parsed by the CL4C/5 Series) | | RESPONSE (DNP message components reported by the CL4C/5 Series) | |
|---|---|---|---|---|---|---|
| **Obj** | **Var** | **Description** | **Func Codes (dec)** | **Qual Codes (hex)** | **Func Codes (dec)** | **Qual Codes (hex)** |
| **30** | **3** | **32-Bit Analog Input without Flag** | | | | |
| **30** | **4** | **16-Bit Analog Input without Flag** | **1** | **00,01,06** | **129** | **00,01** |
| **30** | **5?** | **32-Bit Floating Point Analog Input** | | | | |
| **30** | **8?** | **32-Bit Floating Point Analog Input without Flag** | | | | |
| **31** | **0** | **Frozen Analog Input - All Variations** | | | | |
| **31** | **1** | **32-Bit Frozen Analog Input** | | | | |
| **31** | **2** | **16-Bit Frozen Analog Input** | | | | |
| **31** | **3** | **32-Bit Frozen Analog Input with Time of Freeze** | | | | |
| **31** | **4** | **16-Bit Frozen Analog Input with Time of Freeze** | | | | |
| **31** | **5** | **32-Bit Frozen Analog Input without Flag** | | | | |
| **31** | **6** | **16-Bit Frozen Analog Input without Flag** | | | | |
| **32** | **0** | **Analog Change Event - All Variations** | **1** | **06,07,08** | | |
| **32** | **1** | **32-Bit Analog Change Event without Time** | | | | |
| **32** | **2** | **16-Bit Analog Change Event without Time** | **1** | **06,07,08** | **129,130** | **17, 28** |
| **32** | **3** | **32-Bit Analog Change Event with Time** | | | | |
| **32** | **4** | **16-Bit Analog Change Event with Time** | | | | |
| **32** | **5?** | **32-Bit Floating Point Analog Input** | | | | |
| **32** | **8?** | **32-Bit Floating Point Analog Input without Flag** | | | | |
| **33** | **0** | **Frozen Analog Event - All Variations** | | | | |
| **33** | **1** | **32-Bit Frozen Analog Event without Time** | | | | |

| OBJECT | | | REQUEST (DNP message components parsed by the CL4C/5 Series) | | RESPONSE (DNP message components reported by the CL4C/5 Series) | |
|---|---|---|---|---|---|---|
| **Obj** | **Var** | **Description** | **Func Codes (dec)** | **Qual Codes (hex)** | **Func Codes (dec)** | **Qual Codes (hex)** |
| **33** | **2** | **16-Bit Frozen Analog Event without Time** | | | | |
| **33** | **3** | **32-Bit Frozen Analog Event with Time** | | | | |
| **33** | **4** | **16-Bit Frozen Analog Event with Time** | | | | |
| **34** | **1** | **16-bit Analog Change Deadband** | **1**<br>**2** | **06, 07,08**<br>**17, 28** | **129**<br>**129** | **17, 28** |
| **40** | **0** | **Analog Output Status - All Variations** | **1** | **00,01,06** | | |
| **40** | **1** | **32-Bit Analog Output Status** | **1** | **00,01,06** | **129** | **00, 01** |
| **40** | **2** | **16-Bit Analog Output Status** | **1** | **00,01,06** | **129** | **00, 01** |
| **41** | **0** | **Analog Output Block - All Variations** | | | | |
| **41** | **1** | **32-Bit Analog Output Block** | **3,4,5,6** | **17,28** | **129** | **Echo of request** |
| **41** | **2** | **16-Bit Analog Output Block** | **3,4,5,6** | **17,28** | **129** | **Echo of request** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **50** | **0** | **Time and Date - All Variations** | | | | |
| **50** | **1** | **Time and Date** | **1**<br><br>**2** | **07 where quantity = 1**<br><br>**07 where quantity = 1** | **129**<br><br>**129** | **07 where quantity = 1**<br><br>**echo of request** |
| **50** | **2** | **Time and Date with Interval** | | | | |
| **51** | **0** | **Time and Date CTO - All Variations** | | | | |
| **51** | **1** | **Time and Date CTO** | | | | |
| **51** | **2** | **Unsynchronized Time and Date CTO** | | | | |
| **52** | **0** | **Time Delay - All Variations** | | | **129** | **07 where quantity = 1** |
| **52** | **1** | **Time Delay Coarse** | | | **129** | **07 where quantity = 1** |
| **52** | **2** | **Time Delay Fine** | | | **129** | **07 where quantity = 1** |
| **60** | **0** | | | | | |
| **60** | **1** | **Class 0 Data** | **1** | **06** | | |
| **60** | **2** | **Class 1 Data** | **1**<br>**20, 21** | **06,07,08**<br>**06** | | |
| **60** | **3** | **Class 2 Data** | **1**<br>**20, 21** | **06,07,08**<br>**06** | | |
| **60** | **4** | **Class 3 Data** | **1**<br>**20, 21** | **06,07,08**<br>**06** | | |
| **70** | **1** | **File Identifier** | **1, 2** | **5B** | **129** | **5B** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **80** | **1** | **Internal Indications** | **2** | **00**<br><br>**index= 7** | | |
| **81** | **1** | **Storage Object** | | | | |
| **82** | **1** | **Device Profile** | | | | |
| **83** | **1** | **Private Registration Object** | | | | |
| **83** | **2** | **Private Registration Object Descriptor** | | | | |
| **90** | **1** | **Application Identifier** | | | | |
| **100** | **1** | **Short Floating Point** | | | | |
| **100** | **2** | **Long Floating Point** | | | | |
| **100** | **3** | **Extended Floating Point** | | | | |
| **101** | **1** | **Small Packed Binary-Coded Decimal** | | | | |
| **101** | **2** | **Medium Packed Binary-Coded Decimal** | | | | |
| **101** | **3** | **Large Packed Binary-Coded Decimal** | | | | |
| | | **No object (Cold Restart)** | **13** | | **129** | |
| | | **No object (Delay Measurement)** | **23** | | **129** | |

# DNP Related Configuration Parameters

For DNP implementations, the communication programming values are:

| Item name | Size (in bytes) | Range | Default | Description |
|---|---|---|---|---|
| | | | | |
| Baud rate | 2 | 300 – 19200 | 9600 | Serial port speed (BPS) |
| Dead line sync | 2 | 0 – 65535 | 50 | Time for synchronizing to start of message. (in milliseconds) |
| Report-by-Exception (Master) Address | 2 | 0 – 65534 | 1234 | Destination address of unsolicited report by exception info |
| Remote IED Address | 2 | 0 – 65534 | 1 | Address of this IED, i.e. this port of this control in the DNP network |
| Handshake Mode | 2 | 0 – 4 | 0 (Normal) | Code for method of controlling handshake lines:<br>0. NONE<br>1. CTS ignored/RTS Asserted<br>2. RTS/CTS<br>3. CTS ignored/ RTS is “transmit enable”<br>4. XON/XOFF software flow control |
| Transmit enable delay | 2 | 0 – 65535 | 0 | Time to wait after transmit enable signal to start of data transmission. (in milliseconds) |
| Transmit disable delay | 2 | 0 – 65535 | 0 | Time to wait after data transmission to disable transmit enable signal. (in milliseconds) |
| Data link confirm mode | 2 | 0 – 2 | 0 (Never) | Code to determine when the IED will request data link ACKs from master:<br>0. Never<br>1. Sometimes (When multi frame messages are sent)<br>2. Always |
| Number of data link retries for confirm | 2 | 0 – 10 | 3 | Number of data link layer retries |
| Data link confirm timeout | 2 | 1 – 500 | 100 | Data link retry timeout period. Units are 10’s of milliseconds |
| Application confirm timeout | 2 | 1 – 500 | 100 | Application layer retry timeout period from. Units are 10’s of milliseconds |

| Item name | Size (in bytes) | Range | Default | Description |
|---|---|---|---|---|
| Application Layer Retries | 2 | 0 – 10 | 0 | The number of times the application layer will retry sending a message which it previously sent and had no reply to. 0 indicates infinite retries |
| Unsolicited response minimum quantity per class | 2 | 1 – 255 | 10 | Minimum number of events in any class that will immediately generate an unsolicited response |
| Unsolicited response notification delay | 2 | 0 – 36000 | 1500 | Maximum time after an event occurs to generate an unsolicited response. Units are 10's of milliseconds.<br>(0 = use minimum number of events only) |
| Unsolicited responses supported | 2 | 0 (False),<br>1 (True) | 0 (False) | **Bool** to enable support of unsolicited response operation |
| Delivery attempts before back off | 2 | 0 - 9999 | 3 | The consecutive number of times the application layer will send unsolicited responses without the correct acknowledgement from the master before commencing an unsolicited response back-off time-out period. 0 indicates unsolicited response back-off mode will never commence.<br>Refer also to "Flush events after attempts Exhausted". |
| Back-off terminates after time period | 2 | 0 – 65535 | 60 | The initial unsolicited response back off period for the device to wait before recommencing transmission attempts of unsolicited responses. Units are seconds. |
| Back-off Increment On Timeout | 2 | 0 - 65535 | 0 | The amount of time the unsolicited response back-off period increments each time following failed unsolicited response transmission cause the device to re-enter back-off mode. Units are seconds. |
| Absolute Max Back-off Time | 2 | 0 – 65535 | 3600 | The capped maximum period of unsolicited response back-off period that can be incremented – ie successive increments of the unsolicited response back-off period will be capped to this value. Units are seconds. |
| Flush Events After Attempts Exhausted | 2 | 0 (False),<br>1 (True) | 0 (False) | Bool to delete current events from the unsolicited response buffer – ie no further unsolicited responses will be generated until new events (that would cause an unsolicited response to be generated) are created.<br>*Note:* If "Flush events after attempts Exhausted" is set to YES, the "Delivery attempts before back off" setting effectively becomes the number of attempt cycles (including application & data link layer retries) that the device will make to transmit the USR before abandoning all attempts to send the USR and flushing the event from the device's event buffer. |
| Back-off Terminates On 'Enable USR' | 2 | 0 (False),<br>1 (True) | 1 (True) | Bool to enable receipt of "enable USR" message from a master (with the same address as the configured report by exception address in the device) to reset the unsolicited response back-off timer. |
| Back-off Terminates On Any Message | 2 | 0 (False),<br>1 (True) | 1 (True) | Bool to enable receipt of any valid message from a master (with the same address as the configured report by exception address in the device) to reset the unsolicited response back-off timer. |
| Channel Timeout | 2 | 0 – 65535 | 0 | The time delay to wait for the channel to be ready, ie time from when device asserts RTS to when CTS is asserted by the DCE. Units are 10's of milliseconds. 0 indicates infinite time delay. |

| Item name | Size (in bytes) | Range | Default | Description |
|---|---|---|---|---|
| Arm / Execute Delay | 2 | 0 to 65535 | 5000 | Maximum time between receiving Arm command and receiving corresponding Execute command for the command to be carried out.<br>Units are in milliseconds. |
| Fixed Delay | 2 | 0 – 60000 | 0 | Fixed collision avoidance delay |
| Maximum random delay | 2 | 0 – 6000 | 0 | Maximum collision avoidance hold-off time |
| Collision Avoidance Channel Busy Indicator | 2 | 0 – 7 | 0 | Code to determine which RS232 control line to use to indicate channel is busy.<br>0 Never Busy<br>1 DCD Asserted (On)<br>2 DCD Unasserted (Off)<br>3 CTS Asserted (On)<br>4 CTS Unasserted (Off)<br>5 DSR Asserted (On)<br>6 DSR Unasserted (Off)<br>7 PSTN (software - Hayes character string indication) |
| Hang up time | 2 | 0 – 255 | 255 | A device which has not transmitted or received any packets I the last period of time (hang up time) will terminate the connection. |
| Modem Initialisation string | 25 | | ATZ | Hayes commands to initialize modem (dial up only) |
| Modem Dial String | 12 | | | Hayes command to dial out (dial up only) |
| Modem Connect Time Out | 2 | 0 to 60000 | 60 | Maximum time for modem to return CONNECT<br>Units are in sec. |
| Modem TX Idle Disconnect Time Out | 2 | 0 –65535 | 3 | The device will disconnect the dial up call if the device does not transmit any packets for a period longer than the Modem Tx idle disconnect timeout. |
| Modem RX Idle Disconnect Time Out | 2 | 0 –65535 | 3 | The device will disconnect a dial up session if the device does not receive any packets for a period longer than the Modem RX idel disconnect timeout. |
| Allow obsolete 0x1B qualifier for files | 2 | 0 (False),<br>1 (True) | 0 (False) | Bool to enable support of 0x1B qualifier for file transfers. Provides backward compatibility with master that is not compliant with DNP Users Group technical bulletin TB9905-001. |

# DNP Error Indications

The Internal Indications (IIN) bits from Section 3.6 of the *DNP 3.0 Application Layer* document are defined as follows:

## 1st Octet

**Bit 0** All stations message received.

As defined Section 3.6.

**Bit 1** Class 1 data available.

As defined Section 3.6.

**Bit 2** Class 2 data available.

As Defined in Section 3.6.

**Bit 3** Class 3 data available.

Not used. Device has no Class 3 data.

**Bit 4** Time sync required from master.

As defined Section 3.6.

**Bit 5** Outstation is in local.

As defined Section 3.6 for CROB points.

*Configuration Parameters* are not writeable when the outstation is in local.

**Bit 6** Device Trouble.

As defined by Custom Logic for this control.

**Bit 7** Device restart.

As defined Section 3.6.

## 2nd Octet

| | |
|---|---|
| **Bit 0** | Function code not implemented.<br>As defined Section 3.6. |
| **Bit 1** | Requested objects unknown.<br>As defined Section 3.6. |
| **Bit 2** | Parameters in the qualifier, range or data fields are invalid or out of range.<br>As defined Section 3.6.<br>Writes to *Configuration Parameters* will set this bit to indicate that data could not be written. The file *ERR* must be read to determine the cause of failure. |
| **Bit 3** | Event buffer overflow.<br>Not used. |
| **Bit 4** | Request understood but already executing..<br>As defined Section 3.6. |
| **Bit 5** | Current configuration is corrupted.<br>Not used. |
| **Bit 6** | Reserved. |
| **Bit 7** | Reserved. |

# References

DNP 3.00 Basic 4, Rev. 01

DNP V30.00 Subset Definitions, Version 1.00

DNP Control Relay Output Block Minimum Implementation, 3/8/96

F4C Recloser Control Product Data - DATA 2163

# Appendix A: F4C DNP 3.0 Device Profile Template

# DNP V3.00
## DEVICE PROFILE DOCUMENT

**This document must be accompanied by a table having the following headings:**

**Object Group** **Request Function Codes** **Response Function Codes**
**Object Variation** **Request Qualifiers** **Response Qualifiers**
**Object Name (optional)**

**Vendor Name: Cooper Power Systems**

**Device Name: 6A00042501 Protocol Converter for F4C Recloser Control**

| **Highest DNP Level Supported:** | **Device Function:** |
|---|---|
| **For Requests 2**<br>**For Responses 2** | **☐ Master ☑ Slave** |

**Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):**

**Device uses *File Identifier* (Obj. 70 Var. 01) to access Read-only static & live data, configuration data, pseudo registers and time-tagged data.**

**Explanations for items that are configurable may be found in the *DNP Related Configuration Parameters* in this document.**

**Analog deadband parameters are stored in non-volatile memory and will be retained on reset**

**Binary Frozen Counters are not returned in Class 0 response.**

| **Maximum Data Link Frame Size (octets):** | **Maximum Application Fragment Size (octets):** |
|---|---|
| **Transmitted 292**<br>**Received 292** | **Transmitted 2048**<br>**Received 2048** |

| **Maximum Data Link Re-tries:** | **Maximum Application Layer Re-tries:** |
|---|---|
| **☐ None**<br>**☐ Fixed at**<br>**☑ Configurable, range** None **to** 10 | **☐ None**<br>**☑ Configurable, range** None **to** 10<br>**(Fixed is not permitted)** |

**Requires Data Link Layer Confirmation:**

☐ Never
☐ Always
☐ Sometimes If 'Sometimes', when?
_____

☑ Configurable If 'Configurable', how?___Via Item in configuration parameters
_____

**Requires Application Layer Confirmation:**

☐ Never
☐ Always (not recommended)
☑ When reporting Event Data (Slave devices only)
☐ When sending multi-fragment responses (Slave devices only)

☐ Sometimes If 'Sometimes', when?
_____

☐ Configurable If 'Configurable', how?_____

**Timeouts while waiting for:**

| | | | | |
|---|---|---|---|---|
| Data Link Confirm | ☐ None | ☐ Fixed at _____ | ☐ Variable | ☑ Configurable |
| Complete Appl. Fragment | ☑ None | ☐ Fixed at _____ | ☐ Variable | ☐ Configurable |
| Application Confirm | ☐ None | ☐ Fixed at _____ | ☐ Variable | ☑ Configurable |
| Complete Appl. Response | ☑ None | ☐ Fixed at _____ | ☐ Variable | ☐ Configurable |

Others
_____

Attach explanation if 'Variable' or 'Configurable' was checked for any timeout

**Sends/Executes Control Operations:**

| | | | | |
|---|---|---|---|---|
| WRITE Binary Outputs | ☑ Never | ☐ Always | ☐ Sometimes | ☐ Configurable |
| SELECT/OPERATE | ☐ Never | ☑ Always | ☐ Sometimes | ☐ Configurable |
| DIRECT OPERATE | ☐ Never | ☑ Always | ☐ Sometimes | ☐ Configurable |
| DIRECT OPERATE – NO ACK | ☐ Never | ☑ Always | ☐ Sometimes | ☐ Configurable |
| Count > 1 | ☑ Never | ☐ Always | ☐ Sometimes | ☐ Configurable |
| Pulse On | ☐ Never | ☐ Always | ☑ Sometimes | ☐ Configurable |
| Pulse Off | ☐ Never | ☐ Always | ☑ Sometimes | ☐ Configurable |
| Latch On | ☐ Never | ☐ Always | ☑ Sometimes | ☐ Configurable |

| | | | | |
|---|---|---|---|---|
| **Latch Off** | ☐ **Never** | ☐ **Always** | ☑ **Sometimes** | ☐ **Configurable** |
| **Queue** | ☑ **Never** | ☐ **Always** | ☐ **Sometimes** | ☐ **Configurable** |
| **Clear Queue** | ☑ **Never** | ☐ **Always** | ☐ **Sometimes** | ☐ **Configurable** |

**Attach explanation if 'Sometimes' or 'Configurable' was checked for any operation.**

| FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY: | |
|---|---|
| **Expects Binary Input Change Events:**<br><br>☐ Either time-tagged or non-time-tagged for a single event<br>☐ Both time-tagged and non-time-tagged for a single event<br>☐ Configurable (attach explanation) | |
| **FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:** | |
| **Reports Binary Input Change Events when no specific variation requested:**<br><br>☐ Never<br>☐ Only time-tagged<br>☑ Only non-time-tagged<br>☐ Configurable to send both, one or the other (attach explanation) | **Reports time-tagged Binary Input Change Events when no specific variation requested:**<br><br>☑ Never<br>☐ Binary Input Change With Time<br>☐ Binary Input Change With Relative Time<br>☐ Configurable (attach explanation) |
| **Sends Unsolicited Responses:**<br><br>☐ Never<br>☑ Configurable (attach explanation)<br>☐ Only certain objects<br>☐ Sometimes (attach explanation)<br><br>☑ ENABLE/DISABLE UNSOLICITED<br>Function codes supported | **Sends Static Data in Unsolicited Responses:**<br><br>☑ Never<br>☐ When Device Restarts<br>☐ When Status Flags Change<br><br>**No other options are permitted.** |
| **Default Counter Object/Variation:**<br><br>☐ No Counters Reported<br>☐ Configurable (attach explanation)<br>☑ Default Object 20<br>Default Variation 06<br>☑ Point-by-point list attached | **Counters Roll Over at:**<br><br>☐ No Counters Reported<br>☐ Configurable (attach explanation)<br>☐ 16 Bits<br>☑ 32 Bits<br>☐ Other Value _____<br>☐ Point-by-point list attached |
| **Sends Multi-Fragment Responses: ☑ Yes ☐ No** | |

# Appendix B: F4C DNP 3.0 Data Dictionary

| | | |
|---|---|---|
| F4C DNP 3.0 Protocol Device Profile Data Dictionary | | |
| | | |
| THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE PROPERTY OF COOPER INDUSTRIES, INC. | | |
| UNAUTHORIZED REPRODUCTION OR MODIFICATION IS PROHIBITED. | | |
| | | |
| 30-Jan-01 | v 2.0 | Updated Firmware to Version 2.12 DNP3.0 L2 Compliant |
| 29-Jan-01 | v 0.7 | Removed Object 2 descriptions from Object 1 Indices 96-105 |
| 16-May-00 | v 0.6 | Changed: Obj 12 Index 26 to Latched; Obj 22 Variation to 2 |
| 29-Jan-00 | v 0.5c | Updated PCCFG file to V2.12 firmware release |
| 30-Oct-99 | v 0.5b | Added CROB for transparent mode & updated PCCFG file |
| 1-Sep-99 | v 0.5 | Corrected Counters and added Status of CROB to Class 0 |

| INPUT SUBSYSTEM | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | Default Static Variation | | | Default Event Variation | | | | | Cooper 2180 |
| Description | Index | Obj | Var | Desc | Obj | Var | Class | Desc | Comments | Cross Reference |
| | | | | | | | | | | |
| | | | | | | | | | Combined Recloser Status | Seq No 30, Bit xx |
| Binary Input | **00** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Recloser tripped | 00 |
| Binary Input | **01** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Recloser Lockout | 01 |
| Binary Input | **02** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Malfunction | 02 |
| Binary Input | **03** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Battery Not OK | 03 |
| Binary Input | **04** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Recloser closed | 04 |
| Binary Input | **05** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Current above minimum trip | 05 |
| Binary Input | **06** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Accessory operation | 06 |
| Binary Input | **07** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | AC power OK | 07 |
| Binary Input | **08** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Supervisory allowed | 08 |
| Binary Input | **09** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Power status OK | 09 |
| Binary Input | **10** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Alternate minimum trip active | 10 |
| Binary Input | **11** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground trip block actve | 11 |
| Binary Input | **12** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Non-reclose active | 12 |
| Binary Input | **13** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Event data available | 13 |
| Binary Input | **14** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | SGF active/available | 14 |
| Binary Input | **15** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 15 |
| | | | | | | | | | | |
| | | | | | | | | | Combined Internal Control Status - Part 1 | Seq No 31, Bit xx |
| Binary Input | **16** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Power down active | 00 |
| Binary Input | **17** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Sequence co-ordinaton allowed | 01 |
| Binary Input | **18** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Target reset on successful reclose | 02 |
| Binary Input | **19** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Trip counter on/off | 03 |
| Binary Input | **20** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Event recorder on/off | 04 |
| Binary Input | **21** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Interrupter monitor on/off | 05 |
| Binary Input | **22** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase complex TCC 1 on/off | 06 |
| Binary Input | **23** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground complex TCC 1 on/off | 07 |
| Binary Input | **24** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase complex TCC 2 on/off | 08 |
| Binary Input | **25** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground complex TCC 2 on/off | 09 |
| Binary Input | **26** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase high current trip on/off | 10 |
| Binary Input | **27** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground high current trip on/off | 11 |
| Binary Input | **28** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase high current lockout on/off | 12 |
| Binary Input | **29** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground high current lockout on/off | 13 |
| Binary Input | **30** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground trip precedence on/off | 14 |
| Binary Input | **31** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Momentary relay operation on/off | 15 |
| | | | | | | | | | | |
| | | | | | | | | | Target Recorder Status | Seq No 32, Bit xx |
| Binary Input | **32** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Ground | 00 |
| Binary Input | **33** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase A | 01 |
| Binary Input | **34** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase B | 02 |
| Binary Input | **35** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Phase C | 03 |
| Binary Input | **36** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | SGF | 04 |
| Binary Input | **37** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 05 |

| | | Default Static Variation | | | Default Event Variation | | | | | Cooper 2180 |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | Index | Obj | Var | Desc | Obj | Var | Class | Desc | Comments | Cross Reference |
| Binary Input | **38** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 06 |
| Binary Input | **39** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 07 |
| Binary Input | **40** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 08 |
| Binary Input | **41** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 09 |
| Binary Input | **42** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 10 |
| Binary Input | **43** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 11 |
| Binary Input | **44** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 12 |
| Binary Input | **45** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 13 |
| Binary Input | **46** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 14 |
| Binary Input | **47** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 15 |
| | | | | | | | | | | |
| | | | | | | | | | Accessory Operation Code | Seq No 33, Bit xx |
| Binary Input | **48** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | High Current lockout | 00 |
| Binary Input | **49** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Remote trip and lockout | 01 |
| Binary Input | **50** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Supervisory trip and lockout | 02 |
| Binary Input | **51** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 03 |
| Binary Input | **52** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 04 |
| Binary Input | **53** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 05 |
| Binary Input | **54** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 06 |
| Binary Input | **55** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 07 |
| Binary Input | **56** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 08 |
| Binary Input | **57** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 09 |
| Binary Input | **58** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 10 |
| Binary Input | **59** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 11 |
| Binary Input | **60** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 12 |
| Binary Input | **61** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 13 |
| Binary Input | **62** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 14 |
| Binary Input | **63** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 15 |
| | | | | | | | | | | |
| | | | | | | | | | Malfunction Status Code | Seq No 34, Bit xx |
| Binary Input | **64** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Failed to close on remote | 00 |
| Binary Input | **65** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Failed to close on local | 01 |
| Binary Input | **66** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Low battery voltage | 02 |
| Binary Input | **67** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Power down in less than programmed time | 03 |
| Binary Input | **68** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Defective data in EEROM | 04 |
| Binary Input | **69** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 05 |
| Binary Input | **70** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 06 |
| Binary Input | **71** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 07 |
| Binary Input | **72** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 08 |
| Binary Input | **73** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 09 |
| Binary Input | **74** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 10 |
| Binary Input | **75** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 11 |
| Binary Input | **76** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 12 |
| Binary Input | **77** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 13 |
| Binary Input | **78** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 14 |
| Binary Input | **79** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 15 |

| | | Default Static Variation | | | Default Event Variation | | | | | Cooper 2180 |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | Index | Obj | Var | Desc | Obj | Var | Class | Desc | Comments | Cross Reference |
| | | | | | | | | | | |
| | | | | | | | | | Combined Internal Control Status - Part 2 | Seq No 35, Bit xx |
| Binary Input | **80** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | SGF enable | 00 |
| Binary Input | **81** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 01 |
| Binary Input | **82** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 02 |
| Binary Input | **83** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 03 |
| Binary Input | **84** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 04 |
| Binary Input | **85** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 05 |
| Binary Input | **86** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 06 |
| Binary Input | **87** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 07 |
| Binary Input | **88** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | SGF tripping on/off | 08 |
| Binary Input | **89** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Hot line tag active | 09 |
| Binary Input | **90** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Tripping on TCC 2 only on/off | 10 |
| Binary Input | **91** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | UDP switch mode on/off | 11 |
| Binary Input | **92** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | LTC disable output active | 12 |
| Binary Input | **93** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 13 |
| Binary Input | **94** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 14 |
| Binary Input | **95** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not used | 15 |
| | | | | | | | | | | |
| | | | | | | | | | Protocol Converter Status | |
| Binary Input | **96** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | DIP/Rotary switch override on | |
| Binary Input | **97** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Terminal configuration on | |
| Binary Input | **98** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Protocol converter running | |
| Binary Input | **99** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | ROM error | |
| Binary Input | **100** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | RAM error | |
| Binary Input | **101** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not Used | |
| Binary Input | **102** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Control unit responding | |
| Binary Input | **103** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not Used | |
| Binary Input | **104** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Not Used | |
| Binary Input | **105** | 01 | 01 | No Status | 02 | 01 | 1 | Without Time | Invalid protocol convertor real time clock | |

| INPUT SUBSYSTEM | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | Default Static Variation | | | Default Event Variation | | | | | |
| Description | Index | Obj | Var | Desc | Obj | Var | Class | Desc | Comments | Cooper 2180 Cross Reference |
| | | | | | | | | | | Seq No xx |
| | | | | | | | | | Switch operation counters | |
| Binary Counter | 00 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Number of ground OCP targets | 40 |
| Binary Counter | 01 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Number of phase 1-2 OCP targets | 41 |
| Binary Counter | 02 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Number of phase 3-4 OCP targets | 42 |
| Binary Counter | 03 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Number of phase 5-6 OCP targets | 43 |
| Binary Counter | 04 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Switch operation counter | 44 |
| Binary Counter | 05 | 20 | 06 | 16 bit | 22 | 02 | 1 | Without Flag | Number of SGF OCP targets | 45 |
| | | | | | | | | | | |
| | | | | | | | | | Protocol Converter Counters | |
| Binary Counter | 06 | | | 16 bit | | | | | Comms Tx | |
| Binary Counter | 07 | | | 16 bit | | | | | Comms Rx | |
| Binary Counter | 08 | | | 16 bit | | | | | Comms Rx Errors | |
| Binary Counter | 09 | | | 16 bit | | | | | Control Tx | |
| Binary Counter | 10 | | | 16 bit | | | | | Control Rx | |
| Binary Counter | 11 | | | 16 bit | | | | | Control Rx Errors | |

| INPUT SUBSYSTEM | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | |
| | | Default Static Variation | | | Default Deadband Variatio | | | Default Event Variation | | | | | | | |
| Description | Index | Obj | Var | Desc | Obj | Var | Desc | Obj | Var | Class | Desc | Comments | Cooper 2180 Cross Reference | Multiplication Scale Factor | Units |
| | | | | | | | | | | | | | Seq No xx | | |
| | | | | | | | | | | | | Calibration references | | | |
| Analog Input | 00 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Calibration reference 90% (fixed at 29491) | 80 | 1 | |
| Analog Input | 01 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Calibration reference 0 (fixed at 0) | 81 | 1 | |
| | | | | | | | | | | | | | | | |
| Analog Input | 02 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Sequence position | 82 | 1 | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | Instantaneous current values | | | |
| Analog Input | 03 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Instantaneous ground current | 83 | 1 | Amps |
| Analog Input | 04 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Instantaneous current through bushing 1-2 | 84 | 1 | Amps |
| Analog Input | 05 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Instantaneous current through bushing 3-4 | 85 | 1 | Amps |
| Analog Input | 06 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Instantaneous current through bushing 5-6 | 86 | 1 | Amps |
| | | | | | | | | | | | | | | | |
| Analog Input | 07 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Demand ground current | 87 | 1 | Amps |
| Analog Input | 08 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Demand current through bushing 1-2 | 88 | 1 | Amps |
| Analog Input | 09 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Demand current through bushing 3-4 | 89 | 1 | Amps |
| Analog Input | 10 | 30 | 02 | 16 bit | 34 | 01 | 16 bit | 32 | 02 | 2 | Without Flag | Demand current through bushing 5-6 | 8A | 1 | Amps |

| OUTPUT SUBSYSTEM - Control Output Relay Block Operations and Status | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | Default Static Variation | | | | | | |
| Description | Index | Obj | Var | Desc | Operation Type | Default Condition | Comments | Cooper 2180 Cross Reference |
| | | | | | | | | SBO Seq No xx |
| | | | | | | | | |
| Binary Output | 00 | 12 | 1 | CROB | Pulsed | Off | Perform Operation -trip & lockout | 00 |
| Binary Output | 01 | 12 | 1 | CROB | Pulsed | Off | Perform Operation -trip | 01 |
| Binary Output | 02 | 12 | 1 | CROB | Pulsed | Off | Perform Operation - close | 02 |
| Binary Output | 03 | 12 | 1 | CROB | Latched | On | Alternate minimum trip on/off | 03 |
| Binary Output | 04 | 12 | 1 | CROB | Latched | On | Ground trip block on/off | 04 |
| Binary Output | 05 | 12 | 1 | CROB | Latched | Off | Non-reclose on/off | 05 |
| Binary Output | 06 | 12 | 1 | CROB | Latched | Off | Power-down on/off | 06 |
| Binary Output | 07 | 12 | 1 | CROB | Latched | On | Sequence co-ordination on/off | 07 |
| Binary Output | 08 | 12 | 1 | CROB | Latched | Off | Target reset on successful reclose on/off | 08 |
| Binary Output | 09 | 12 | 1 | CROB | Latched | Off | Operation counter on/off | 09 |
| Binary Output | 10 | 12 | 1 | CROB | Latched | Off | Event recorder on/off | 0A |
| Binary Output | 11 | 12 | 1 | CROB | Latched | Off | Interrrupter duty on/off | 0B |
| Binary Output | 12 | 12 | 1 | CROB | Latched | Off | Complex TCC #1 , Phase on/off | 0C |
| Binary Output | 13 | 12 | 1 | CROB | Latched | Off | Complex TCC #1 , Ground on/off | 0D |
| Binary Output | 14 | 12 | 1 | CROB | Latched | Off | Complex TCC #2 , Phase on/off | 0E |
| Binary Output | 15 | 12 | 1 | CROB | Latched | Off | Complex TCC #2 , Ground on/off | 0F |
| Binary Output | 16 | 12 | 1 | CROB | Latched | Off | High current trip, Phase on/off | 10 |
| Binary Output | 17 | 12 | 1 | CROB | Latched | Off | High current trip, Ground on/off | 11 |
| Binary Output | 18 | 12 | 1 | CROB | Latched | Off | High current lockout, Phase on/off | 12 |
| Binary Output | 19 | 12 | 1 | CROB | Latched | Off | High current lockout, Ground on/off | 13 |
| Binary Output | 20 | 12 | 1 | CROB | Pulsed | Off | Reset target indicators | 14 |
| Binary Output | 21 | 12 | 1 | CROB | Pulsed | Off | Reset malfunction status indicators | 15 |
| Binary Output | 22 | 12 | 1 | CROB | Pulsed | Off | Reset accessory status indicators | 16 |
| Binary Output | 23 | 12 | 1 | CROB | Latched | Off | Ground trip precedence on/off | 17 |
| Binary Output | 24 | 12 | 1 | CROB | Latched | Off | Supervisory via momemtary contacts on/off | 18 |
| Binary Output | 25 | 12 | 1 | CROB | Latched | Off | SGF enable | 19 |
| Binary Output | 26 | 12 | 1 | CROB | Latched | Off | Perform combined trip & lockout/close | 1A |
| Binary Output | 27 | 12 | 1 | CROB | Latched | Off | SGF on/off | 1B |
| Binary Output | 28 | 12 | 1 | CROB | Latched | Off | Hot line tag on/off | 1C |
| Binary Output | 29 | 12 | 1 | CROB | Latched | Off | Tripping on TCC #2 only on/off | 1D |
| Binary Output | 30 | 12 | 1 | CROB | Latched | Off | UDP switch mode on/off | 1E |
| | | | | | | | | |
| | | | | | | | Protocol Converter control | |
| Binary Output | 31 | 12 | 1 | CROB | Pulsed | Off | Restart protocol converter | |
| Binary Output | 32 | 12 | 1 | CROB | Pulsed | Off | Load protocol converter defaults | |
| Binary Output | 33 | 12 | 1 | CROB | Pulsed | Off | Force transparent mode | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | Protocol Converter control | Simple Status |
| Binary Output | 00 | 10 | 2 | Status | | | * Perform Operation -trip & lockout | * |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Binary Output | 01 | 10 | 2 | Status | | | * Perform Operation -trip | * |
| Binary Output | 02 | 10 | 2 | Status | | | * Perform Operation - close | * |
| Binary Output | 03 | 10 | 2 | Status | | | Alternate minimum trip on/off | 30-10 |
| Binary Output | 04 | 10 | 2 | Status | | | Ground trip block on/off | 30-11 |
| Binary Output | 05 | 10 | 2 | Status | | | Non-reclose on/off | 30-12 |
| Binary Output | 06 | 10 | 2 | Status | | | Power-down on/off | 31-00 |
| Binary Output | 07 | 10 | 2 | Status | | | Sequence co-ordination on/off | 31-01 |
| Binary Output | 08 | 10 | 2 | Status | | | Target reset on successful reclose on/off | 31-02 |
| Binary Output | 09 | 10 | 2 | Status | | | Operation counter on/off | 31-03 |
| Binary Output | 10 | 10 | 2 | Status | | | Event recorder on/off | 31-04 |
| Binary Output | 11 | 10 | 2 | Status | | | Interrrupter duty on/off | 31-05 |
| Binary Output | 12 | 10 | 2 | Status | | | Complex TCC #1 , Phase on/off | 31-06 |
| Binary Output | 13 | 10 | 2 | Status | | | Complex TCC #1 , Ground on/off | 31-07 |
| Binary Output | 14 | 10 | 2 | Status | | | Complex TCC #2 , Phase on/off | 31-08 |
| Binary Output | 15 | 10 | 2 | Status | | | Complex TCC #2 , Ground on/off | 31-09 |
| Binary Output | 16 | 10 | 2 | Status | | | High current trip, Phase on/off | 31-10 |
| Binary Output | 17 | 10 | 2 | Status | | | High current trip, Ground on/off | 31-11 |
| Binary Output | 18 | 10 | 2 | Status | | | High current lockout, Phase on/off | 31-12 |
| Binary Output | 19 | 10 | 2 | Status | | | High current lockout, Ground on/off | 31-13 |
| Binary Output | 20 | 10 | 2 | Status | | | * Reset target indicators | * |
| Binary Output | 21 | 10 | 2 | Status | | | * Reset malfunction status indicators | * |
| Binary Output | 22 | 10 | 2 | Status | | | * Reset accessory status indicators | * |
| Binary Output | 23 | 10 | 2 | Status | | | Ground trip precedence on/off | 31-14 |
| Binary Output | 24 | 10 | 2 | Status | | | Supervisory via momemtary contacts on/off | 31-15 |
| Binary Output | 25 | 10 | 2 | Status | | | SGF enable | 35-00 |
| Binary Output | 26 | 10 | 2 | Status | | | Perform combined trip & lockout/close | 30-04 |
| Binary Output | 27 | 10 | 2 | Status | | | SGF on/off | 35-08 |
| Binary Output | 28 | 10 | 2 | Status | | | Hot line tag on/off | 35-09 |
| Binary Output | 29 | 10 | 2 | Status | | | Tripping on TCC #2 only on/off | 35-10 |
| Binary Output | 30 | 10 | 2 | Status | | | UDP switch mode on/off | 35-11 |
| | | | | | | | | |
| | | | | | | | Protocol Converter control | |
| Binary Output | 31 | 10 | 2 | Status | | | * Restart protocol converter | * |
| Binary Output | 32 | 10 | 2 | Status | | | * Load protocol converter defaults | * |
| Binary Output | 33 | 10 | 2 | Status | | | * Force transparent mode | * |
| | | | | | | | | |
| | | | | | | | * Non-latching; always reads FALSE | |

| CONSTANT DATA (Read-only) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (All data size is 16 bits) | | | | | |
| | | Static | | | | | | | |
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor |
| File Identifier | | 70 | 1 | | CONST | | | Ordinal Block 5, Offset xxxx | |
| | | | | | | 0 | Control version & device code | 0000 | 100 |
| | | | | | | 1 | Serial number of control ( Modifiable from front panel) | 0002 | 1 |
| | | | | | | 2 | Display firmware version | 0004 | 100 |
| | | | | | | 3 | CPU firmware version | 0006 | 1 |
| | | | | | | | | | |
| File Identifier | | 70 | 1 | | PCCONST | | | | |
| | | | | | | 0 | Protocol converter software version | | 100 |

| MISC. LIVE DATA (Read-only) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | Static | | | | | | | | |
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Data Size (in bytes) | Start Offset in Record (Hex) | Cooper 2180 Cross Reference |
| File Identifier | | 70 | 1 | | ERR | | DNP last file ID write error file | | | Ordinal Block 0, Offset xxxx |
| | | | | | | 0-7 | ACK code | 1 | 0000 | 0000 - 0007 |
| | | | | | | 8-15 | Optional error info | 1 | 0008 | 0008 - 000F |

| CONFIGURATION DATA (Read/Write) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (All data size is 16 bits) | | | | | | |
| | | Static | | | | | | | | |
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor | Units |
| File Identifier | | 70 | 1 | | CFG | | | Ordinal Block 6, Offset xxxx | | |
| | | | | | | 00 | TCC module | 0000 | 1 | |
| | | | | | | 01 | Line frequency (50 Hz or 60 Hz) | 0002 | 1 | Hz |
| | | | | | | 02 | CT selection | 0004 | 1 | |
| | | | | | | 03 | PGS close delay time | 0006 | 100 | Seconds |
| | | | | | | 04 | Close re-try time | 0008 | 1 | Seconds |
| | | | | | | 05 | Close On time | 000A | 1 | Cycles |
| | | | | | | 06 | Security code for Level 1 | 000C | 1 | |
| | | | | | | 07 | Security code for Level 2 | 000E | 1 | |
| | | | | | | 08 | Security code for Level 3 | 0010 | 1 | |
| | | | | | | 09 | Minimum time on battery w/o malfunction | 0012 | 1 | Minutes |
| | | | | | | 10 | Interrupter duty 100% value | 0014 | 10^^5 | I ^^1.5 |
| | | | | | | 11 | Number of close re-try attempts | 0016 | 1 | |
| | | | | | | 12 | Minimum trip - Phase | 0018 | 1 | Amps |
| | | | | | | 13 | Minimum trip - Ground | 001A | 1 | Amps |
| | | | | | | 14 | 1st TCC - Phase | 001C | 1 | |
| | | | | | | 15 | 1st TCC - Ground | 001E | 1 | |
| | | | | | | 16 | 2nd TCC - Phase | 0020 | 1 | |
| | | | | | | 17 | 2nd TCC - Ground | 0022 | 1 | |
| | | | | | | 18 | Operations on 1st TCC - Phase | 0024 | 1 | |
| | | | | | | 19 | Operations on 1st TCC - Ground | 0026 | 1 | |
| | | | | | | 20 | Operations to lockout - Phase | 0028 | 1 | |
| | | | | | | 21 | Operations to lockout - Ground | 002A | 1 | |
| | | | | | | 22 | Sequence reset time | 002C | 1 | Seconds |
| | | | | | | 23 | Reclose interval 1 | 002E | 10 | Seconds |
| | | | | | | 24 | Reclose interval 2 | 0030 | 10 | Seconds |
| | | | | | | 25 | Reclose interval 3 | 0032 | 10 | Seconds |
| | | | | | | 26 | Alternate minimum trip - Phase | 0034 | 1 | Amps |
| | | | | | | 27 | Alternate minimum trip - Ground | 0036 | 1 | Amps |
| | | | | | | 28 | Remote/supervisory close reset time | 0038 | 1 | Seconds |
| | | | | | | 29 | Set integration interval - Phase (15 min or 5 min) | 003A | 1 | Minutes |
| | | | | | | 30 | Set integration interval - Ground (5 min or 1 min) | 003C | 1 | Minutes |
| | | | | | | 31 | Complex TCC #1 selection - Phase | 003E | 1 | |
| | | | | | | 32 | Complex TCC #1 selection - Ground | 0040 | 1 | |
| | | | | | | 33 | Complex TCC #1 constant time adder - Phase | 0042 | 100 | Seconds |
| | | | | | | 34 | Complex TCC #1 constant time adder - Ground | 0044 | 100 | Seconds |
| | | | | | | 35 | Complex TCC #1 multiplier - Phase | 0046 | 100 | |
| | | | | | | 36 | Complex TCC #1 multiplier - Ground | 0048 | 100 | |
| | | | | | | 37 | Complex TCC #1 minimum response time - Phase | 004A | 1 | Cycles |

| | | Static | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor | Units |
| File Identifier | | 70 | 1 | | CFG | | | Ordinal Block 6, Offset xxxx | | |
| | | | | | | 38 | Complex TCC #1 minimum response time - Ground | 004C | 1 | Cycles |
| | | | | | | 39 | Complex TCC #2 selection - Phase | 004E | 1 | |
| | | | | | | 40 | Complex TCC #2 selection - Ground | 0050 | 1 | |
| | | | | | | 41 | Complex TCC #2 constant time adder - Phase | 0052 | 100 | Seconds |
| | | | | | | 42 | Complex TCC #2 constant time adder - Ground | 0054 | 100 | Seconds |
| | | | | | | 43 | Complex TCC #2 multiplier - Phase | 0056 | 100 | |
| | | | | | | 44 | Complex TCC #2 multiplier - Ground | 0058 | 100 | |
| | | | | | | 45 | Complex TCC #2 minimum response time - Phase | 005A | 1 | Cycles |
| | | | | | | 46 | Complex TCC #2 minimum response time - Ground | 005C | 1 | Cycles |
| | | | | | | 47 | HCT multiples of minimum trip - Phase (HCT = High Current Trip) | 005E | 1 | |
| | | | | | | 48 | HCT multiples of minimum trip - Ground | 0060 | 1 | |
| | | | | | | 49 | HCT trip delay time - Phase | 0062 | 1 | Cycles |
| | | | | | | 50 | HCT trip delay time - Ground | 0064 | 1 | Cycles |
| | | | | | | 51 | HCT active shot number - Phase | 0066 | 1 | |
| | | | | | | 52 | HCT active shot number - Ground | 0068 | 1 | |
| | | | | | | 53 | HCLO multiples of minimum trip - Phase (HCLO = High Current Lockout) | 006A | 1 | |
| | | | | | | 54 | HCLO multiples of minimum trip - Ground | 006C | 1 | |
| | | | | | | 55 | HCLO active shot number - Phase | 006E | 1 | |
| | | | | | | 56 | HCLO active shot number - Ground | 0070 | 1 | |
| | | | | | | 57 | Phase 1-2 Interrupter duty | 0072 | 10 | % |
| | | | | | | 58 | Phase 3-4 Interrupter duty | 0074 | 10 | % |
| | | | | | | 59 | Phase 5-6 Interrupter duty | 0076 | 10 | % |
| | | | | | | 60 | Comm channel 1 (front panel) baud rate code | 0078 | 1 | BPS |
| | | | | | | 61 | Comm channel 2 (realtime port) baud rate code (not modifiable remotely in DNP) | 007A | 1 | BPS |
| | | | | | | 62 | Comm channel 2 handshake mode code (not modifiable remotely in DNP) | 007C | 1 | |
| | | | | | | 63 | Comm channel 2 number of dead-line sync characters (not used in DNP) | 007E | 1 | |
| | | | | | | 64 | Comm channel 2 transmit enable delay (not modifiable remotely in DNP) | 0080 | 1 | mSec |
| | | | | | | 65 | Control remote address (not modifiable remotely in DNP) | 0082 | 1 | |
| | | | | | | 66 | Real time clock year (not used in DNP) | 0084 | 1 | |
| | | | | | | 67 | SGF Minimum trip % | 0086 | 1 | %of Ground MT |
| | | | | | | 68 | SGF Alternate minimum trip | 0088 | 1 | %of Ground MT |
| | | | | | | 69 | SGF trip time | 008A | 1 | Seconds |

| | | Static | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor | Units |
| File Identifier | | 70 | 1 | | CFG | | | Ordinal Block 6, Offset xxxx | | |
| | | | | | | 70 | SGF operations to lockout | 008C | 1 | |
| | | | | | | 71 | Phase 1-2 target identifier | 008E | 1 | |
| | | | | | | 72 | Phase 3-4 target identifier | 0090 | 1 | |
| | | | | | | 73 | Phase 5-6 target identifier | 0092 | 1 | |
| | | | | | | 74 | UDP switch timing mode TCC (1 or 2) | 0094 | 1 | |
| | | | | | | 75 | UDP minimum target sensing - Phase | 0096 | 1 | Amps |
| | | | | | | 76 | UDP minimum target sensing - Ground | 0098 | 1 | Amps |
| | | | | | | 77 | UDP alternate minimum target sensing - Phase | 009A | 1 | Amps |
| | | | | | | 78 | UDP alternate minimum target sensing - Ground | 009C | 1 | Amps |
| | | | | | | | | | | |
| File Identifier | | 70 | 1 | | PCCFG | | Protocol converter configuration | | | |
| | | | | | | 00 | Control unit type | | | |
| | | | | | | 01 | Control Address | | | |
| | | | | | | 02 | Control Baud Rate | | | |
| | | | | | | 03 | Ordinal Block 0 size | | | |
| | | | | | | 04 | Ordinal Block 5 size | | | |
| | | | | | | 05 | Ordinal Block 6 size | | | |
| | | | | | | 06 | Ordinal Block B size | | | |
| | | | | | | 07 | Communication mode status | | | |
| | | | | | | 08 | Communication baud rate | | | |
| | | | | | | 09 | Master Station Address | | | |
| | | | | | | 10 | Remote IED (my) Address | | | |
| | | | | | | 11 | Unsolicited Minimum Quantity per Class | | | |
| | | | | | | 12 | Unsolicited notification delay | | 1 | mSec |
| | | | | | | 13 | Unsolicited supported | | | |
| | | | | | | 14 | Dead Line Sync | | 1 | mSec |
| | | | | | | 15 | Handshake mode | | | |
| | | | | | | 16 | Transmit Enable Delay | | 1 | mSec |
| | | | | | | 17 | Transmit Disable Delay | | 1 | mSec |
| | | | | | | 18 | Channel Timeout | | 1 | mSec |
| | | | | | | 19 | Data Link Confirm | | | |
| | | | | | | 20 | Data Link Retries | | | |
| | | | | | | 21 | Data Link Timeout | | 10 | mSec |
| | | | | | | 22 | Application Retries | | | |
| | | | | | | 23 | Application Timeout | | 10 | mSec |
| | | | | | | 24 | Arm time | | 1 | mSec |
| | | | | | | 25 | Protocol converter address to controller | | | |
| | | | | | | 26 | Standard request timeout | | 1 | mSec |
| | | | | | | 27 | Retries for all requests (excpet time tagged) | | | |
| | | | | | | 28 | Retries for time tagged requests | | | |
| | | | | | | 29 | Ordinal Block write set-up time | | 1 | mSec |

| | | Static | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor | Units |
| File Identifier | | 70 | 1 | | CFG | | | Ordinal Block 6, Offset xxxx | | |
| | | | | | | 30 | NOP back off time | | 1 | mSec |
| | | | | | | 31 | Ordinal Block Read Request timeout | | 1 | mSec |
| | | | | | | 32 | Interpoll Delay | | 1 | mSec |
| | | | | | | 33 | Protocol mode on start up | | | |
| | | | | | | 34 | Transparent mode timeout | | 1 | Sec |
| | | | | | | 35 | Delivery Attempts before back off | | | |
| | | | | | | 36 | Flush Events After Attempts Exhausted | | | |
| | | | | | | 37 | Backoff Terminates After Time Period | | 1 | Sec |
| | | | | | | 38 | Backoff Terminates On 'Enable USR' | | | |
| | | | | | | 39 | Backoff Terminates On Any Message | | | |
| | | | | | | 40 | Backoff Increment On Timeout | | 1 | Sec |
| | | | | | | 41 | Absolute Max Backoff Time | | 1 | Sec |
| | | | | | | 42 | Modem TX Idle Disconnect Time Out | | 1 | Sec |
| | | | | | | 43 | Modem RX Idle Disconnect Time Out | | 1 | Sec |
| | | | | | | 44 | Allow obsolete 0x1B qualifier for files | | | |

| PSEUDO REGISTERS (Read/Write) | | | | These are MIN/MAX registers. Write to these points ignore data "written", present value of register is written instead. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (All data size is 16 bits) | | | | | | | |
| | | Static | | | | | | | | | |
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Cooper 2180 Cross Reference | Scale Factor | Units | |
| File Identifier | | 70 | 1 | | PSEUDO | | | Ordinal Block B, Offset xxxx | | | |
| | | | | | | 0 | Max demand ground current | 0000 | 1 | Amps | |
| | | | | | | 1 | Max demand current through bushing 1-2 | 0002 | 1 | Amps | |
| | | | | | | 2 | Max demand current through bushing 3-4 | 0004 | 1 | Amps | |
| | | | | | | 3 | Max demand current through bushing 5-6 | 0006 | 1 | Amps | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| TIME-TAGGED DATA (Read-only) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (All data size is 16 bits) | | | | | | |
| | | Static | | | | | | | | |
| Description | Index | Obj | Var | Desc | File Name | Record Number | Comments | Data Size (in bytes) | Start Offset in Record (Hex) | Cooper 2180 Cross Reference |
| | | | | | | | | | | |
| File Identifier | | 70 | 1 | | TT000 | | Event recorder information | | | Time-Tagged Type 0, Record xx |
| | | | | | | 0 | Event type ID code | 2 | 0000 | 00 |
| | | | | | | | Date that event occurred | 2 | 0002 | |
| | | | | | | | Time that event occurred | 4 | 0004 | |
| | | | | | | | Ground current | 2 | 0008 | |
| | | | | | | | Phase 1-2 current | 2 | 000A | |
| | | | | | | | Phase 3-4 current | 2 | 000C | |
| | | | | | | | Phase 5-6 current | 2 | 000E | |
| | | | | | | | | | | |
| | | | | | | nn | Event type ID code | 2 | 0000 | nn |
| | | | | | | | Date that event occurred | 2 | 0002 | |
| | | | | | | | Time that event occurred | 4 | 0004 | |
| | | | | | | | Ground current | 2 | 0008 | |
| | | | | | | | Phase 1-2 current | 2 | 000A | |
| | | | | | | | Phase 3-4 current | 2 | 000C | |
| | | | | | | | Phase 5-6 current | 2 | 000E | |
| | | | | | | | | | | |
| File Identifier | | 70 | 1 | | TT001 | | Profile recorder information | | | Time-Tagged Type 1, Record xx |
| | | | | | | 0 | Event type ID code | 2 | 0000 | 00 |
| | | | | | | | Date that event occurred | 2 | 0002 | |
| | | | | | | | Time that event occurred | 4 | 0004 | |
| | | | | | | | Ground current | 2 | 0008 | |
| | | | | | | | Phase 1-2 current | 2 | 000A | |
| | | | | | | | Phase 3-4 current | 2 | 000C | |
| | | | | | | | Phase 5-6 current | 2 | 000E | |
| | | | | | | | | | | |
| | | | | | | nn | Event type ID code | 2 | 0000 | nn |
| | | | | | | | Date that event occurred | 2 | 0002 | |
| | | | | | | | Time that event occurred | 4 | 0004 | |
| | | | | | | | Ground current | 2 | 0008 | |
| | | | | | | | Phase 1-2 current | 2 | 000A | |
| | | | | | | | Phase 3-4 current | 2 | 000C | |
| | | | | | | | Phase 5-6 current | 2 | 000E | |


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