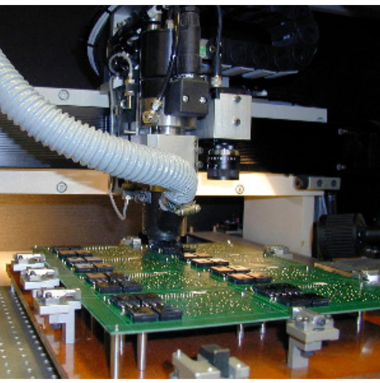
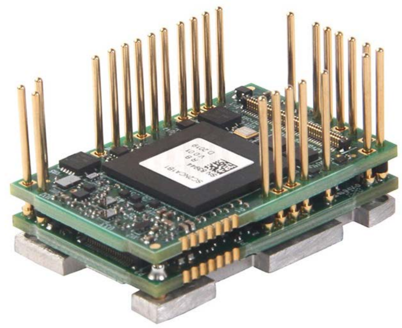
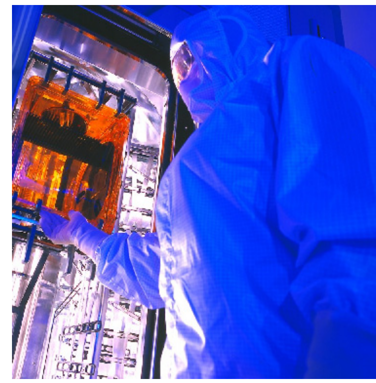


Everything's possible.

CANopen® Communication

Reference Manual

FlexPro® Servo Drives

www.a-m-c.com
MNCMCNFP-08

Preface

ADVANCED Motion Controls constantly strives to improve all of its products. We review the information in this document regularly and we welcome any suggestions for improvement. We reserve the right to modify equipment and documentation without prior notice.

For the most recent software, the latest revisions of this manual, and copies of compliance and declarations of conformity, visit the company's website at *www.a-m-c.com*. Otherwise, contact the company directly at:

ADVANCED Motion Controls • 3805 Calle Tecate Camarillo, CA • 93012-5068 USA

Agency Compliances

The company holds original documents for the following:

- UL/IEC 61800-5-1, file number E140173
- Electromagnetic Compatibility, EMC Directive - 2014/30/EU
  EN61000-6-2:2005
  EN61000-6-4:2007/A1:2011
- Electrical Safety, Low Voltage Directive - 2014/35/EU
  EN 60204-1:2019
- Reduction of Hazardous Substances (RoHS III), 2015/863/EU

Trademarks

ADVANCED Motion Controls®, the combined isosceles trapezoid/right triangle logo, **FLEXPRO®, AMC Configuration Environment™**(ACE) are either registered trademarks or trademarks of *ADVANCED* Motion Controls in the United States and/or other countries. All other trademarks are the property of their respective owners.

Related Documentation

- Product datasheet specific for your drive, available for download at www.a-m-c.com.

Attention Symbols

The following symbols are used throughout this document to draw attention to important operating information, special instructions, and cautionary warnings. The section below outlines the overall directive of each symbol and what type of information the accompanying text is relaying.

Note	Note - Pertinent information that clarifies a process, operation, or ease-of-use preparations regarding the product.
Notice	Notice - Required instruction necessary to ensure successful completion of a task or procedure.
Caution	Caution - Instructs and directs you to avoid damaging equipment.
Warning	Warning - Instructs and directs you to avoid harming yourself.
DANGER	Danger - Presents information you must heed to avoid serious injury or death.

Revision History

Document ID	Revision #	Date	Changes
MNCMCNFP-01	1.0	2/2020	First Draft
MNCMCNFP-02	2.0	10/2021	Updated scaling factors and conversion units in Appendix A
MNCMCNFP-03	3.0	2/2023	Removed the following sub-indexes from section 2.4 Drive Configurations: 2032h, 2032.02h - 2032.09h, 2034.08h, 2034.09h, 2034.0Ah - 2034.0Ch Removed the following sub-indexes from section 2037h Velocity Limits: 2037.06h, 2037.07h Removed the following sub-indexes from section 2039h Position Limits: 2039.09h, 2039.0Ah, 2039.0Bh Removed section 200Bh Stored User Parameters Removed the following sub-indexes from section 2043h Capture Configuration Parameters: 2043.01h - 2043.09h, 2043.0Ah - 2043.0Ch Removed the following sub-indexes from section 205Ch: Analog Output Parameters: 205C.01h - 205C.09h Removed section 208Dh Firmware Information Removed section 2010h Current Values Removed K_I from Table A.2 Drive dependent conversion constants Added section 1010h: Store All Parameters Added section 1011h: Restore All Parameters Added section 2021h: Drive Operating Temperature Added sub-indexes to 2023h Removed section 2024h Added sub-indexes to 202Fh Added section 203Bh: Biquad Configuration Parameters Added section 2069h: Event History Reset Values Added section 2051h: Drive PWM and Servo Period Removed section 2019h Removed section 2043h Added section 2052h: Capture Configuration Parameters Added section 2053h: Capture Values Added section 2090h: Firmware Information Added section 20C2h: Dynamic Current Target Values Added sub-index 20CA.10h: Dynamic Index Confirmation Code Added section 20F1h: High Speed Capture Control Added sections 60B8h - 60D8h: Touch Probe Functions Added section 60FDh: Digital Inputs Added section 60FEh: Digital Outputs Added sub-indexes to 2035h: Current Loop Control Parameters Added Drive Signal Enum information to the Appendix Shifted sub-indices in 2064h: Event Response Time Shifted sub-indices in 2039h: Position Limits Added object 2200h: File Transfer System
MNCMCNFP-04	4.0	3/2023	Updated object descriptions in 2235h: Velocity Loop Gain Parameters Added object 2238h: Position Loop Control Parameters Removed object 2038h Added sub-index 2028.35h: Log Counter: Current Monitor Fault Added sub-index 2064.22h: Event Response Time: Current Monitor Fault Added sub-index 2065.32h: Event Action: Current Monitor Fault Added sub-index 2066.24h: Event Recovery Time: Current Monitor Fault Added sub-index 2067.23h: Event Time-out Window: Current Monitor Fault Added sub-index 2068.2Ch: Event Maximum Recoveries: Current Monitor Fault Added object 2230h: Current Monitor Configuration Added object 2115h: Thermal Monitor Configuration Removed object 2054h Changed object 205A.52h to Digital Output Mask: Thermal Monitor Fault Changed object 205B.51h to Programmable Status Mask: Thermal Monitor Fault Shifted sub-indices 205B.58h-205B-5Fh

MNCMCNFP-05	4.1	4/2023	Added ACE Shared Storage info to object 2200h: File Transfer System

MNCMCNFP-07	4.3	2/2024	Added section 2010h Current Values to Object Dictionary
MNCMCNFP-07	4.3.1	4/2024	Updated Section 20D8h: Power Board Values in Object Dictionary
MNCMCNFP-08	4.4	9/2024	Added sub-index 201D.04: PVT Quick Status Added sub-index 2021.01h: External Thermal Sense Value Added sub-index 2201.02h: Thermistor Resistance Added sub-index 2024.01h: Digital Outputs (Pre Active Level) Added sub-index 2035.09h: Application Current Limit - Config 1 Added sub-index 2035.0Bh: User Current Slew Rate Added sub-index: 2053.04h - 2053.0Fh Added sub-indexes 205A.67h - 205A.68h Added sub-index: 205B.62h - Programmable Status Mask: Current Monitor Warning Added sub-index 205B.63h: Programmable Status Mask: Current Monitor Fault Added sub-indexes 2070.11h - 7070.13h Added sub-index 2070.1h: Incremental Encoder #1 - Motor Rated Current Added sub-index 2070.12h: NTADFF Start Angle Added sub-index 2070.13h: Velocity Sense Configuration Added sub-index 2074.0Ah: BiSS - C Encoder - Motor Rated Current Added sub-index 2075.02h: Absolute Encoder #1 - Monitored Encoder Position Added sub-index 2075.03h: Absolute Encoder #1 - Position Index Capture Value Added sub-index Added sub-index 2076.0Dh: Motor Rated Current Added sub-index 20D8.0Ch: Current Slew Rate Added sub-index 2243.01h: Jerking Limit - Config 0 Added sub-index 2243-02h: Maximum Acceleration Limit - Config 0 Added sub-index 2243.03h: Maximum Decelration Limit Config - 0 Added sub-index 2243.04h: Maximum Velocity Limit - Config 0 Added sub-index 2243.05h: Jerk Limiting - Config 1 Added sub-index 2243.06h: Maximum Acceleration Limit - Config 1 Added sub-index 2243.07h: Maximum Deceleration Limit - Config 1 Added sub-index 2243.08h: Maximum Velocity Limit - Config 1 Added sub-index 6068h: Position At Command Time Added sub-index 6078h: Current Monitor Added sub-index 60B0h: Position Offset Removed Object 201Bh: PWM and Direction Input Values Removed Object 201Eh: Aux Encoder Value Removed Object 20E3h: Jogging Object 2120h Replaced with Object 20E8.01h Object 2121h Replaced with Object 20E8.02h Object 2123h Replaced with Object 30E8.03h Object 2124h Replaced with Object 30E8.04h Object 2130h Replaced with Object 20E7.01h Object 2131h Replaced with Object 20E7.02h Object 2132h Replaced with Object 20E7.03h Object 2140h Replaced with Object 20E7.04h Object 2141h Replaced with Object 20E7.05h Object 2142h Replaced with Object 20E7.06h Object 2144h Replaced with Object 20E7.07h Object 2145h Replaced with Object 20E7.08h Object 2146h Replaced with Object 20E7.09h Object 2150h Replaced with Object 20E7.0Ah Object 2151h Replaced with Object 20E7.0Bh Object 2152h Replaced with Object 20E7.0Ch Object 2153h Replaced with Object 20E7.0Dh Object 203E.01h Replaced with Object 2253.02h Object 203E.02h Replaced with Object 2253.03h Object 203E.03h Replaced with Object 2253.05h Object 203E.04h Replaced with Object 2253.06h Object 203E.05h Replaced with Object 2053.07h Object 203E.06h Replaced with Object 2053.08h Updated Objects 205A.67h & 205B.62h to reflect Sustained Current Indicator Addition Updated Objects 205A.68h, 2064.22h, 2065.32h, 2066.24h, 2067.23h, 2068.2Ch, 2028.35h to reflect High Current Indicator Addition Updated Table 2.8 to Reflect High Current Indicator Added Section 1.75 Hard Stop Homing Removed Objects 200Ah and 2009h Updated Instances of “Current Overshoot” to “Over Current”

Contents

1 Communication Manual 1

A Appendix 337

1 Communication Manual

1.1 Introduction

1.1.1 Purpose of this manual

This manual will provide all information necessary to communicate with and operate *ADVANCED* Motion Controls' CANopen drives. Further information regarding the physical CAN layer and CANopen protocol is attainable through the DS402 and DS301 documentation.

The CAN interface for *ADVANCED* Motion Controls' digital drives follows the CiA DS301 communications profile and the CiA DS402 device profile (device profile for drives and motion control). CiA (CAN in Automation) is the non-profit organization that governs the CANopen standard. They can be contacted at http://www.can-cia.org.

CANopen is an open standard embedded machine control protocol. CAN is a serial communication interface. The CANopen protocol is developed for the CAN physical layer. In this document, CAN is reserved for physical layer descriptions, while CANopen refers to the communication protocol.

1.1.2 Differences between this manual and DS301 & DS402

This manual provides all information necessary to properly communicate with the drive via the CANopen interface. The DS301 and DS402 documents are complimentary and can be used if more detailed information is required on specific standard CANopen features.

1.2 CANopen Objects

Every AMC CANopen drive function is defined by groups of objects. An object is roughly equivalent to a memory location that holds a value. The values stored in the drive's objects are used to perform the drive functions (current loop, velocity loop, position loop, I/O functions).

The drive has a unique object for every parameter that needs to be stored or used. Access to the objects varies depending on what the object is used for. Objects may be writable, readable, or both. Some objects are state dependant such that they may only be written to if the drive is in a certain state (e.g. disabled state). The list of objects that AMC CANopen servo drives use is found in the "Object Dictionary" on page 70. Each table in the object dictionary describes the important information regarding that object including: object index, sub-indices, units, and accessibility.

Each object is accessible with a 16-bit address called the object index. Some objects contain sub components with 8-bit addresses called sub-indices. Reading and writing to objects is accomplished via CANopen Messages. Specific types of messages are designed to access specific objects. Details about CANopen message types are found in "CANopen Messages" on page 5.

1.2.1 Types of CANopen Objects

There are 3 main object categories:

Communication Objects 1000h – 1FFFh These objects relate to CANopen communication; more specifically, they relate to objects defined by the DS301 communication profile. Objects in this range are used to configure CANopen messages (see "CANopen Message Structure" on page 3) and general CANopen network settings (e.g. network watchdog).

Manufacturer Specific Objects 2000h – 5FFFh These objects are manufacturer specific. Detailed information about the AMC manufacturer specific objects can be found in the "Object Dictionary" on page 70.

Standard Servo Drive Objects 6000h – 9FFFh These objects are the standardized device profile objects. Objects in this range relate to the device profile of the CANopen device. The applicable device profile for AMC CANopen drives is DS402 (CANopen profile for servo drives). Other device profiles exist also, but they are not discussed here; examples include: DS401 (CANopen profile for I/O modules), and DS405 (CANopen profile for PLC). Detailed information about AMC supported DS402 objects can be found in the "Object Dictionary" on page 70.

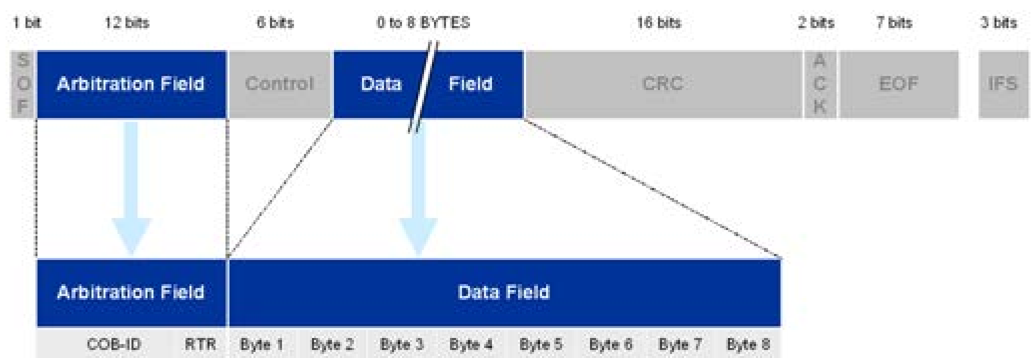
1.2.2 CANopen Object Data

Every CANopen object index - and sub-index if available - is an address pointer to a data location. The 16-bit index and 8-bit sub index make it effectively a 24-bit address space. The data type can be any type typically found in digital systems, such as 8-bit, 16-bit, 32-bit, or string. The data type can also be a record (in the case of an index with sub-indices), with multiple record entries, and each entry can be of the above mentioned data type.

1.3 CANopen Message Structure

CANopen messages exchange information between the CANopen host (master) and the CANopen nodes (slave). When collecting information, a host may either poll, or simply wait, for important messages in the network. Although the host may gather information through "polling" (i.e. the host continuously requesting information updates from each node), a more effective method is to exchange information in an interrupt driven fashion (i.e. information is exchanged only when there is new information available). Both mechanisms are possible within the CANopen framework, but the interrupt driven exchange method requires much less overhead, thus allowing higher data throughput. Most messages either read or write data to objects contained in the network nodes. There are 8 types of messages used in a CANopen system. Each message type gets a detailed explanation in CANopen Messages. Regardless of message type, the general structure of a CANopen message is the same. CANopen messages fit within one CAN frame where there are only two parts of the CAN frame the user needs to access, namely the Arbitration, and Data fields. All other fields are automatically configured by the CAN hardware.

FIGURE 1.1 CANopen frame bit sequence



1.3.1 The Arbitration Field

The values in the arbitration field set the priority of the message. The closer the value is to 0h, the higher the priority of the message. Higher priority messages will dominate, or take precedence, over other messages on the CAN bus. Arbitration of the CAN bus is done at the CAN hardware level, thus ensuring that the highest priority message is transmitted first. CANopen message priority is determined by the message COB-ID bits and the RTR (Remote Transmit Request) bit. Within the CANopen framework, there are 7 COB-ID ranges. One COB-ID range is used twice, resulting in 8 message types. Each message type is described in detail in CANopen Messages.

TABLE 1.1 Arbitration field values.

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
11-bit Identifier	1 or 0	xx	xx	xx	xx	xx	xx	xx	xx

COB-ID Every CANopen message has a unique COB-ID that identifies the message type and in case of node specific messages, the node number. Table 1.2 contains the COB-ID or COB-ID range for each message type. In the case of a range of COB-IDs, the actual COB-ID for a message will depend on which node receives or transmits the message. These COB-IDs begin with a base number (assigned in CiA's DS301 specification) and the addition of the NODE-ID completes the COB-ID. If the COB-ID field base is 600h, for example, a COB-ID of 605h pertains to a message (of type SDO as per table 2 below) to/from node 5 in the CANopen network. Each message type is described in detail in CANopen Messages.

TABLE 1.2 CANopen message types

Message Type	Description	COB-ID
NMT	Network Management (broadcast)	0h
NMT Error Control	Network management error control	701h – 77Fh
BOOT-UP	Boot-Up message	701h – 77Fh
SYNC	Synchronization message (broadcast)	80h
EMERGENCY	Emergency messages	81h - FFh
TIME STAMP	Time stamp (broadcast)	100h
PDO	Process Data Objects	181h - 57Fh
SDO	Service Data Objects	581h – 67Fh

RTR Bit The remote transmission request (RTR) bit is used in some specific cases when the host would like to request information from a node. In particular, the RTR bit is used for node guard and TPDO requests. With the exception of these two cases, the RTR bit is always set to 0.

Node-ID Every node on the CANopen network must have a unique node-ID, between 1 and 127. Node 0 is always considered the host. See the hardware manual for configuration of the drive node-ID.

1.3.2 The Data Field

The content of the Data field depends on the CANopen message type. Detailed information about the CANopen message data is found under the appropriate message type in "CANopen Messages" on page 5 while details on each object are found in the "Object Dictionary" on page 70.

Little Endian Format Numerical data larger than 1 byte must be organized into "Little Endian" format. This means that the data is broken into its individual bytes and sent Least-Significant-Byte-First. The 24-bit number 102315h, for example, must be transmitted LSB (Least Significant Byte) first as 15h 23h 10h (as shown in Table 1.3 below).

TABLE 1.3 Sending 102315h in Little Endian format

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
XXXh	X	15h	23h	10h	00h	00h	00h	00h	00h

1.3.3 CAN Bus Traffic Concerns

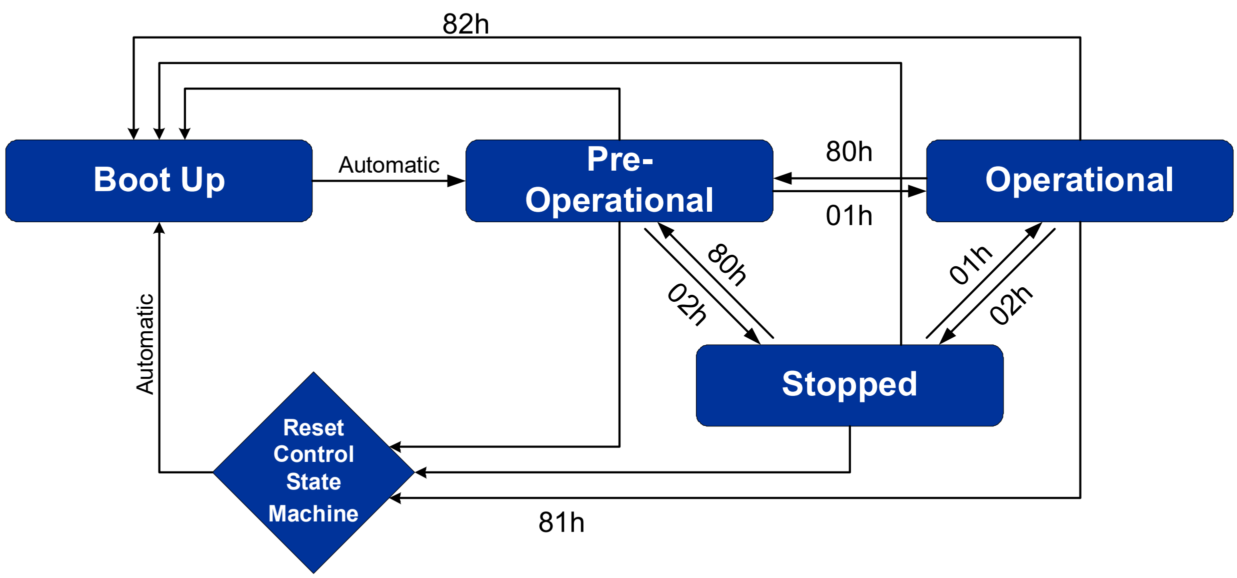
It is best to keep the network idle for at least 50% of the time (50% bus load). Busload will depend on CAN bus bit rate and CANopen message rates.

1.4 CANopen Messages

AMC CANopen drives support 8 message types. Each message type fits within the defined structure of a CAN frame. The data field of each message type can vary, but all messages require the arbitration field to be populated with the appropriate COB-ID. NMT service, SYNC, and TIME STAMP messages have fixed COB-ID's while the other message types use a range of values.

1.4.1 NMT Messages

FIGURE 1.2 Communication State Machine Operation



Every CANopen device contains an internal Network Management server that communicates with an external NMT master. One device in a network, generally the host, may act as the NMT master. Through NMT messages, each CANopen device's network management server controls state changes within its built-in Communication State Machine. This is independent from each node's operational state machine, which is device dependant and described in Control State Machine. It is important to distinguish a CANopen device's operational state machine from its Communication State Machine. CANopen sensors and I/O modules, for example, have completely different operational state machines than servo drives. The Communication State Machine in all CANopen devices, however, is identical as specified by the DS301.

NMT messages have the highest priority. The 5 NMT messages that control the Communication State Machine each contain 2 data bytes that identify the node number and a command to that node's state machine. Table 1.5 shows the 5 NMT messages supported by AMC, and Table 1.4 shows the correct message construction for sending these messages.

TABLE 1.4 NMT message construction

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
000h	0	See Table 1.5	See Table 1.5	These bytes not sent					

TABLE 1.5 NMT messages supported by AMC CANopen servo drives.

NMT Message	COB-ID	Data Bytes		Description
		1	2	
Start Remote Node	0	01h	Node-ID*	Sets the CANopen communication state machine on the designated node to Operational.
Stop Remote Node	0	02h	Node-ID*	Sets the CANopen communication state machine on the designated node to Stopped.
Pre-Operational State	0	80h	Node-ID*	Sets the CANopen communication state machine on the designated node to Pre-Operational. In the pre-operational state, only NMT and SDO messages are allowed.
Reset Node	0	81h	Node-ID*	Resets the designated node (same as power cycle). Results in a Boot Up message sent by the node.
Reset Communication	0	82h	Node-ID*	Resets CANopen communication state machine on the designated node. Results in a Boot Up message sent by the node.

*Node-ID = Drive address (1…7Fh)

Boot-Up State Upon power-up, each drive initializes by going through the Reset Node and Reset Communication states. If the initialization process succeeds, the drive sends out a Boot-Up message and goes into the Pre-Operational state.

Pre-Operational State Communication is limited to all message types except PDO messages. In this state, the NMT master can command the communication state machine to enter any of the states listed in Table 1.9 below. Generally, the host keeps a node in pre-operational state during setup and configuration.

Operational State Enables all message types including PDO messages. In this state, the NMT master can command the communication state machine to enter any of the states listed in Table 1.5.

Stopped State Disables all message types except NMT messages; Node Guarding / Life Guarding (see below) remains active.

NMT Message Examples

TABLE 1.6 NMT Message Examples

COB-ID	Number of Bytes	Message / Data	Description
000	2	80 01	Host: NMT Host commands node 1 into Pre-Operational state
000	2	01 01	Host: NMT Host commands node 1 into Operational state
000	2	02 01	Host: NMT Host commands node 1 into Stopped state
000	2	81 01	Host: NMT Host commands a Reset to Node 1
701	1	00	Node 1 response: Cycles through the standard boot-up states stopping in the Pre-operational state. The control state machine is also reset. This is the same as a power cycle
000	2	82 01	Host: NMT Host commands Communication Reset
701	1	00	Node 1 response: Cycles through the standard boot-up states stopping in the Pre-operational state. The control state machine does not reset and retains full motion control.

1.4.2 NMT Error Control

AMC CANopen drives support Node Guarding, Life Guarding, and Heartbeat protocol as NMT error controls.

Node Guarding The NMT Master can monitor the communication status of each node using the Node Guarding protocol. During node guarding, a drive is polled periodically and is expected to respond with its communication state within a pre-defined time frame. Acceptable states are shown in Table 1.9. Note that responses indicating an acceptable state will alternate between two different values due to a toggle bit in the returned value. If there is no response, or an unacceptable state occurs, the NMT master reports an error to its host application. The Node Guard message is sent at time intervals, determined by the Guard Time (object 100Ch). The NMT slave (node) must reply to this message before the end of this time interval. Table 1.7 and Table 1.8 show the message format for an NMT master request and the correct NMT slave response. Note that the slave always responds with a toggle bit in byte 1, therefore the response will toggle between the two values shown in Table 1.9.

Life Guarding Similarly, the NMT slave monitors the status of the NMT master (Life Guarding). This event utilizes the Guard Time (object 100Ch) and Life Time Factor (object 100Dh) to determine a “Lifetime” for each NMT slave (Lifetime = Guard Time X Life Time Factor). If a node does not receive a Node Guard message within its Lifetime, the node assumes communication with the host is lost and triggers a communication error event. Each node may have a different Lifetime.

TABLE 1.7 NMT master Node Guard request (host to node).

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
700h + Node-ID	1	These bytes not sent							

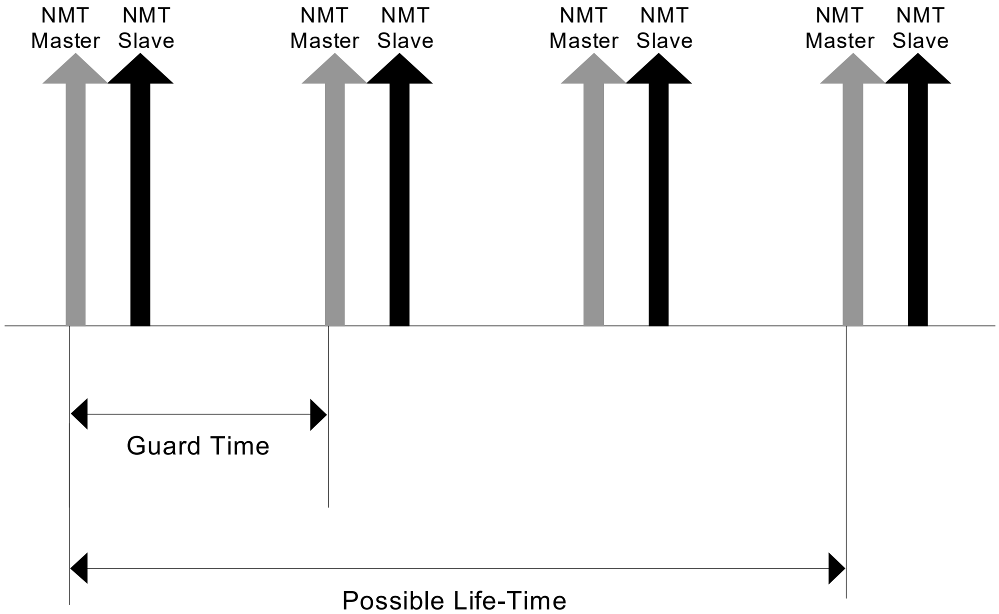
TABLE 1.8 **NMT slave Node Guard reply (node to host).**

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
700h + Node-ID	See Table 1.9	These bytes not sent						

TABLE 1.9 **Acceptable NMT slave return values.**

Return Value	Communication Status
4h or 84h	STOPPED
5h or 85h	OPERATIONAL
7Fh or FFh	PRE-OPERATIONAL

FIGURE 1.3 **Guard Time and Life Time**



Example of Guard Time and Life Time. The first grey arrow represents an NMT request from the master and the second black arrow represents an NMT response from the slave. In this case, the Life Time is a factor of 3X greater than the Guard Time.

Node Guard / Life Guard Example

In this example, NMT messages are used to transition the Communication states of the drive while NodeGuarding is active. The shaded rows indicate how the node will respond to a given host command.

TABLE 1.10 Node Guard/ Life Guard Example

COB-ID	Number of Bytes	Message / Data	Description
701	0	RTR set	Host sends first node guard message within GuardTime
701	1	04	Node replies in STOP state
701	0	RTR set	Host sends next node guard message within GuardTime
701	1	84	Node replies in STOP state, Toggle Bit alternates
701	0	RTR set	Host sends next node guard message within GuardTime
701	1	04	Node replies in STOP state, Toggle Bit alternates
000	2	80 01	NMT host changes node communication state machine to Pre-Operational
701	0	RTR set	Host sends next node guard message within GuardTime
701	1	FF	Node replies in PRE-Operational state, Toggle Bit alternates
701	0	RTR set	Host sends next node guard message within GuardTime
701	1	7F	Node replies in PRE-Operational state, Toggle Bit alternates
000	2	01 01	NMT host changes node communication state machine to Operational
701	1	RTR set	Host sends next node guard message within GuardTime
701	0	85	Node replies in Operational state, Toggle Bit alternates
701	1	RTR set	Host sends next node guard message within GuardTime
701	0	05	Node replies in Operational state, Toggle Bit alternates

Heartbeat

The heartbeat error control method uses a producer to generate a periodic message. One or more consumer devices on the network listen for this message. If the producer fails to generate a message within a specified time frame, the consumer acts accordingly. Any drive on the network can be configured to be a producer or a consumer. The producer heartbeat time (object 1017h) represents the time in milliseconds between successive heartbeat messages. It can be any integer value between 1 and 65535. When set to zero, the producer heartbeat is disabled. The consumer heartbeat time (object 1016h) represents the time in milliseconds in which the consumer should expect to receive a heartbeat message. If a heartbeat is not detected within this time frame, the drive will flag a communication error. The action taken during a communication error is configurable. The consumer heartbeat time can be any integer value between 1 and 65535. When set to zero, the consumer heartbeat detection is disabled. See Table 1.11 below for the bit assignment definitions.

TABLE 1.11 Consumer Heartbeat Time (Object 1016) bit descriptions

Bits 31 – 24	Bits 23 – 16	Bits 15 – 0
Reserved (value: 0x 00h)	Producer Node-ID (1 - FF)	Heartbeat Time

Generally, when a host sends a heartbeat message to a node, the message sent is this:

COB-ID	Number of Bytes	Message / Data
700 + Node-ID	1	00

When a drive is set to produce a heartbeat, the byte echoed out is the NMT state of the drive. The possible NMT states are:

Message / Data	NMT State
0 (0 hex)	Bootup
4 (4 hex)	Stopped
5 (5 hex)	Operational
127 (7F hex)	Pre-operational

TABLE 1.12 Heartbeat Example 1 - set up node 3 to consume heartbeats every 2 seconds

COB-ID	Number of Bytes	Message / Data	Description
603	8	22 16 10 01 D0 07 01 00	set consumer time (0x1016) for 2sec (0x07D0 = 2000ms), monitor Node-ID 1
701	1	00	heartbeat message from host
			no response is seen from drive

TABLE 1.13 Heartbeat Example 2 - set up node 3 to produce heartbeats every 3 seconds

COB-ID	Number of Bytes	Message / Data	Description
603	8	22 17 10 00 B8 0B 00 00	set producer time (0x1017) for 3sec (0x0BB8 = 3000ms)
583	8	60 17 10 00 00 00 00 00	
703	1	7F	heartbeats from drive (pre-operational state)
703	1	7F	
703	1	7F	

TABLE 1.14 Heartbeat Example 3 - set up node 2 to consume heartbeats from node 3

COB-ID	Number of Bytes	Message / Data	Description
602	8	22 16 10 01 D0 07 03 00	set up consumer time (0x1016) for 2sec (0x07D0 = 2000ms) and node ID 3
582	8	60 17 10 00 00 00 00 00	
603	8	22 17 10 00 E8 03 00 00	set producer time (0x1017) for 1sec (0x03E8 = 1000ms)
583	8	60 17 10 00 00 00 00 00	
703	1	7F	node 3 sends out heartbeats
703	1	7F	
			no response is seen from node #2

1.4.3 BOOT-UP Message

The drive transmits a boot-up message after power up, communication reset, or application reset events. The CANopen master can monitor the drive and report an error if no boot-up message was received. The boot-up message of an AMC CANopen drive uses the same COB-ID as a Node Guard reply.

TABLE 1.15 Boot-up message from AMC CANopen drives.

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
700h + Node-ID	00	These bytes not sent						

Boot-Up Example These are messages sent from three drives powered up in random order. Data is always 00h for boot up messages.

TABLE 1.16 Boot-up Example

COB-ID	Number of Bytes	Message / Data	Description
701	1	00	Node 1 boots up
703	1	00	Node 3 boots up
702	1	00	Node 2 boots up

1.4.4 SYNC Message

The SYNC message serves as a network “trigger” and is used to coordinate events across multiple CANopen nodes. For example, the CANopen host may need to obtain the actual motor position at a specific time, for several nodes. An AMC CANopen drive can be pre-configured to read and broadcast its actual position the instant a SYNC message is received. SYNC messages carry no data. AMC drives receive SYNC messages, but cannot produce them. For more information on the SYNC message, see (DS301).

TABLE 1.17 Sync message format (host to node).

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
80h	0	These bytes not sent							

SYNC Message Example In this example TPDO1 (1800.02h) is configured to report the StatusWord every second Sync message the host broadcasts. This example starts with the host setting Node 1 into the Operational state so PDOs may be processed by the drive.

TABLE 1.18 SYNC Message Example

COB-ID	Number of Bytes	Message / Data	Description
000	2	01 01	Host: NMT command puts Node 1 into Operational state.
80	0	None	Host: 1st Sync message
80	0	None	Host: 2nd Sync message
231	2	60 06	Node 1 response: TPDO1 (1A00.01h) sends data containing StatusWord
80	0	None	Host: 3rd Sync message
80	0	None	Host: 4th Sync message
231	2	60 06	Node 1 response: TPDO1 (1A00.01h) sends data containing StatusWord

1.4.5 EMERGENCY Messages

EMERGENCY messages are sent by the CANopen nodes to provide important status information to the CANopen host controller. An emergency object is transmitted only once per error event by the drive, and uses the same COB-ID as the sync message plus the node ID. AMC servo drives utilize EMERGENCY messages to indicate PVT buffer status information to the CANopen host controller. The following tables describe the error codes supported by AMC CANopen drives.

TABLE 1.19 Emergency Object Data

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
80h + Node-ID	00	00	00	Error Code. See (Table 1.20).	See (Table 1.20)			

EMERGENCY Error Codes

TABLE 1.20 Emergency Error Codes supported by AMC CANopen drives.

Error Code	Description	Bytes 5 – 8
00h	PVT Sequence Counter Error	Required counter value
01h	PVT Cannot be started	Internal use only
02h	PVT Buffer Underflow	0h
80h - FFh	RPDO Cannot be Processed Bit Definitions are defined as follows when Bit 7 = 1 Bits 4 - 6 = Subtract 1 from the value read in these bits to get the Sub-index of the RPDO Mapping Parameter that caused the error. Bits 0 - 3 = Error Description Values (1h - 7h) where:	COB-ID of RPDO

Value	Description
0	RPDO cannot be processed
1	General Error
2	Object does not exist
3	Not writable or Not readable
4	Access unsupported in present state
5	Not enough space in the PDO for object data
6	Data integrity error
7	Internal write error

EMERGENCY Message Examples

These examples demonstrate several emergency messages and what the data will look like coming from the drive.

TABLE 1.21 EMERGENCY Message Examples

COB-ID	Number of Bytes	Message / Data	Description
81	8	00 00 00 00 03 00 00 00	The 3rd counter value was skipped when filling the PVT buffer of Node 1.
83	8	00 00 00 01 00 00 00 00	PVT cannot be started on node 3. It happens to be in the wrong state here.
81	8	00 00 00 84 01 05 00 00	84 indicates an RPDO that cannot be processed because access is not supported in the present state. 0501 indicates the COB-ID of the RPDO. This message occurred because write access to the drive was disabled before attempting to write.

1.4.6 TIME STAMP Message

The TIME STAMP message provides a “global clock” for all the nodes on the CANopen network. The TIME STAMP message data field contains the host controller time. It is used for synchronization between nodes. This can be very important for applications that require long-term time synchronization.

Each drive uses not only the time data contained in the time stamp messages, but also the time between each time stamp message to synchronize to both host timing and frequency. If there is jitter in the host’s time stamp messages, there will be some jitter in the drive timing.

The data field uses a 6 byte “Time Of Day” field defined in CiA’s DS301. Time Of Day contains two components: the number of milliseconds after midnight (4 bytes), and the present day since January 1, 1984 (2 bytes).

TABLE 1.22 Time stamp message data.

Arbitration Field		Data Field							
COB-ID	RTR	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
100h	0	Time, after Midnight in Milliseconds (LSB first)				Current day since 01/01/84		N/A	N/A

Time Stamp Tips

- Once activated, time stamps can only be turned off with a drive-reset or CAN NMT reset message.
- A communications error will be flagged in the drive if time between time stamps exceeds 2^{31} µs (about 35 minutes).
- Time stamps may occur non-periodically.
- The drive will not detect a missing time stamp.

TIME STAMP Example

This example starts the drive at midnight on the 1st day of January 1984 as dictated by the CiA’sDS301. Generally the current time and day would be filled in and sent automatically. AMC CANopen servo drives do not respond to time stamps with messages, therefore there is no node response shown.

TABLE 1.23

COB-ID	Number of Bytes	Message / Data	Description
100	8	00 00 00 00 00 00 00 00	Very first timestamp Resets timers on all nodes to the value contained in bytes 1 – 6
Wait 500 ms			
100	8	F4 01 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later
Wait 500 ms			
100	8	E8 03 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later
Wait 500 ms			
100	8	DC 05 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later
Wait 500 ms			
100	8	D0 07 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later
Wait 500 ms			
100	8	C4 09 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later
Wait 500 ms			
100	8	B8 0B 00 00 00 00 00 00	Broadcast message reporting time is now 500 ms later

1.5 SDO vs. PDO Messages

There are two methods for reading and writing data to objects: Service Data Object (SDO) and Process Data Object (PDO) messages. An SDO consists of an outgoing message from host to node, possibly some intermediate messages between host and node, and a reply message from node to host; this is referred to as confirmed messaging. A PDO consists of a single unconfirmed message that requires less bus traffic relative to its SDO counterpart. Although PDOs make more efficient use of the CAN bus than do SDOs, PDO messages must be configured prior to using (see PDO Configuration). Furthermore, PDOs are restricted to the transmission of no more than 8 bytes whereas there is no limitation to the number of bytes SDOs can transfer. SDO messages may be used any time but are generally used before actual drive operation for set-up and configuration. PDO messages are generally used during drive operation, such as for setting target commands.

1.5.1 SDO Messages

AMC CANopen servo drives support read and write SDO messages that can be divided into 4 categories:

- Reading objects that contain 4 or less data bytes (expedited read)
- Writing to objects that contain 4 or less data bytes (expedited write)
- Reading objects that contain more than 4 data bytes (segmented read)
- Writing to objects that contain more than 4 data bytes (segmented write)

The first data byte in the Data field, called the 'command' byte, is used to determine any of the above possible cases. Then, depending upon the particular case, the next 3 bytes may be used to specify an object index with 4 bytes left for object data or all 7 remaining bytes may be used purely for object data. It is important to distinguish between the data bytes of the Data field and the data bytes of an object. The data bytes of the Data field are the 8 bytes of a CAN frame whereas the object data bytes refer to the information stored in an object. Of the bytes used for object data, only some may be used with the others left empty (equal to zero). For example, if an SDO message is used to read an object with only 2 bytes of information, then only two of the data bytes in the returned message will contain the relevant data while the others will be left equal to zero. However, there may be cases where the relevant data is also equal to zero. In this case, there must be a way to distinguish relevant data bytes from empty data bytes. If the message recipient knows how many bytes to expect, then there is no issue. Otherwise, size indication is needed. Although size indication is specified in DS301 it is also not required. To comply with this, AMC CANopen drives offer an SDO Size Indicated Answer (20E6.04h) for enabling and disabling size indication as defined by DS301.

Expedited SDO Messages

This is a 1-step process and applies only when reading / writing objects with 4 or less data bytes (e.g. 8-bit, 16-bit, 32-bit data types). Expedited messages are simple read / write commands where the complete set of data is included in the last four bytes of the message (write command), or the last 4 bytes of the reply (read command). Whether the host is reading or writing to a node, the process requires only one command and one reply.

Segmented SDO Messages

This is a multi-step process that applies when reading / writing messages larger than 4 bytes (e.g. string). Step 1, called "initiation," is merely handshaking between the host and node. To initialize communication, the host gives a command, and the node responds confirming that it is ready for data exchange. No data is exchanged during the initiation step. The next steps are the actual data exchange. This can include many messages between the host and the node. The command byte, in these steps, contains a "Toggle Bit" and "Last Segment" bit. In these steps, every message the host sends to the drive must alternate the toggle bit (this is done automatically by following the procedures for message construction below). The last segment bit is only set to 1 when the current message contains the last of the data to transfer; this indicates that the process is finished. Only one SDO message can be transmitted at a time. That is, you cannot request an expedited SDO mid-way through a segmented SDO and then continue the segmented SDO.

TABLE 1.24 Expedited SDO Read (4 or less data bytes)

SDO READ, EXPEDITED (4 or less bytes)								
Step 1a: Host initiates Read command								
Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID*	40h	Object Index (LSB)	Object Index (MSB)	Sub-Index	Use 00h for all 4 bytes			
Step 1b: Node Replies to host with all data								
Arbitration Field	Data Field							

COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
580h + Node-ID*	42h, 4Fh, 4Bh, or 43h See Table 1.26	Object Index (LSB)	Object Index (MSB)	Sub-Index	Data, LSB first			

*Node-ID is node address (0…7Fh)

TABLE 1.25 Host to node Initiate read, more than 4 bytes

SDO READ, SEGMENTED (more than 4 bytes)								
STEP 1a. Host request for data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
600h + Node-ID*	40h	Object Index (LSB)	Object Index (MSB)	Sub-Index	Use 00h for all 4 bytes			
STEP 1b. Node reply, ready to transmit data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
580h + Node-ID*	40h or 41h See Table 1.26 STEP 1	Object Index (LSB)	Object Index (MSB)	Sub-Index	00h or Number of bytes to transfer			
STEP 2a. Host confirms, ready for data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
600h + Node-ID*	60h See Table 1.26 STEP 2	Use 00h for all 7 bytes						
STEP 2b. Node replies with data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
580h + Node-ID*	See Table 1.26 STEP 2	Data, LSB first						

*Node-ID is node address (0…7Fh)

TABLE 1.26 READ Command (Byte 1) values and their meaning

Usage	Command Byte values	Meaning
Read SDO Step 1	40h	Always used by host when initiating read process. Does not include size indication. Used by node when replying to hosts' initiate read command, but only when object 20E6.04h = 0 and there are more than 4 bytes to transfer.
	41h	Used by node only when replying to read initiation and there are more than 4 bytes to transfer. Bytes 5 – 8 will indicate number of bytes the node has to transfer (LSB first). Only occurs if object 20E6.04h ≠ 0, otherwise node will reply with 40h instead.
	42h	Used by node when replying to read command with 4 or less data bytes in 5 – 8 (LSB first). Actual number of valid bytes is not indicated. Only occurs if object 20E6.04h = 0.
	4Fh	Used by node when replying to read command with exactly 1 data byte, i.e. reading an 8-bit object. Use only byte 5 (ignore 6 - 8). Only occurs if object 20E6.04h ≠ 0, otherwise node will use 42h.
	4Bh	Used by node when replying to read command with exactly 2 data bytes in bytes 5 and 6, i.e. reading a 16-bit object (ignore 7 and 8). Only occurs if object 20E6.04h ≠ 0, otherwise node will use 42h.
	43h	Used by node when replying to read command with exactly 4 data bytes in bytes 5 – 8, i.e. reading a 32-bit object. Only occurs if object 20E6.04h ≠ 0, otherwise node will use 42h.
Read SDO Step 2 Only data transfers larger than 4 bytes	60h	Used by host. Second step to "Segmented" read process always begins with 60h. Each time the node replies with data, the host must toggle between 60h and 70h. If the host does not toggle between two consecutive messages, the node will abort transfer with 80h.
	70h	
	0h	Reply from node. Will only occur if host used 60h in the previous command and there is more data to transmit. In this case the host should send another message using 70h in byte 1 and 00h for all other bytes to retrieve more data.
	1h	Reply from node. Will only occur if host used 60h in the previous command and this message contains the last of the data.
	10h	Reply from node. Will only occur if host used 70h in the previous command and there is more data to transmit. In this case the host should send another message using 60h in byte 1 and 00h for all other bytes to retrieve more data.
	11h	Reply from node. Will only occur if host used 70h in the previous command and this message contains the last of the data.
	3h, 5h, 7h, 9h, Bh, Dh	Same as 1h except the number of bytes not containing data is specified. 3h if only the last byte contains no data, 5h if only the last two bytes do not contain data, and onwards up to Dh if the last 6 bytes do not contain data. Only occurs if object 20E6.04h ≠ 0, otherwise node will reply with 1h.
	13h, 15h, 17h, 19h, 1Bh, 1Dh	Same as 11h except the number of bytes not containing data is specified. 13h if only the last byte contains no data, 15h if only the last two bytes do not contain data, and onwards up to 1Dh if the last 6 bytes do not contain data. Only occurs if object 20E6.04h ≠ 0, otherwise node will reply with 11h.

TABLE 1.27 Expedited SDO Write (4 or less data bytes)

SDO WRITE, EXPEDITED (4 or less data bytes)								
Step 1a: Host initiates write command with data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
600h + Node-ID*	22h, 2Fh, 2Bh, or 23h See Table 1.29	Object Index (LSB)	Object Index (MSB)	Sub-Index	Data, LSB first			
Step 1b: Node Replies to host with all data								
Arbitration Field	**Data Field**							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
580h + Node-ID*	60h See Table 1.29	Object Index (LSB)	Object Index (MSB)	Sub-Index	Ignore			

*Node-ID is node address (0…7Fh)

TABLE 1.28 Host to node Initiate write, more than 4 bytes

SDO WRITE, SEGMENTED (more than 4 data bytes)								
STEP 1a. Host initiates data transfer								
Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID*	20h or 21h See Table 1.29	Object Index (LSB)	Object Index (MSB)	Sub-Index	00h or Number of bytes to transfer			
STEP 1b. Node reply, ready to accept data								
Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
580h + Node-ID*	60h See Table 1.29	Object Index (LSB)	Object Index (MSB)	Sub-Index	00h			
STEP 2a. Host begins data transfer								
Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID*	0h, 1h, 10h, 11h See Table 1.29	Data, LSB first						
STEP 2b. Node replies								
Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
580h + Node-ID*	20h, or 30h See Table 1.29	Ignore						

*Node-ID is node address (0…7Fh)

TABLE 1.29 WRITE Command (Byte 1) values and their meaning

Usage	Command Byte values	Meaning
Host Initiates Write SDO more than 4 data bytes	20h	Used by host when initiating a write process of more than 4 data bytes. Total number of bytes is not indicated. Node replies with 60h, confirming that it is ready to receive data.
	21h	Used by host when initiating a write process of more than 4 data bytes. Total number of bytes is indicated using bytes 5 – 8 (LSB first). Node replies with 60h, confirming that it is ready to receive data. Only use if object 20E6.04h ≠ 0, otherwise use 20h.
Host Initiates Write SDO 4 or less data bytes	22h	Used by host when writing 4 or less data bytes. Total number of data bytes not indicated. Node replies with confirmation 60h.
	2Fh	Used by host when writing exactly 1 data byte. Byte 5 contains data. Node replies with confirmation 60h. Only use if object 20E6.04h ≠ 0, otherwise use 22h.
	2Bh	Used by host when writing exactly 2 data bytes. Byte 5 and 6 contain data. Node replies with confirmation 60h. Only use if object 20E6.04h ≠ 0, otherwise use 22h.
	23h	Used by host when writing exactly 4 data bytes. Bytes 5 – 8 contain data. Node replies with confirmation 60h. Only use if object 20E6.04h ≠ 0, otherwise use 22h.
Data transfer commands	60h	Reply from node. 60h only occurs once during the initiate write process, after that each consecutive reply to a message containing data will toggle between 20h and 30h. 20h always occurs first after 60h.
	20h	
	30h	
	00h	Used by host if the nodes previous reply contained 60h or 30h in byte 1 and there is still data left to transmit.
	1h	Used by host if the nodes previous reply contained 60h or 30h in byte 1 and this message contains the last data to transfer.
	10h	Used by host if the nodes previous reply contained 20h in byte 1 and there is still data left to transmit.
	11h	Used by host if the nodes previous reply contained 20h in byte 1 and this message contains the last data to transfer.
	3h, 5h, 7h, 9h, Bh, Dh	Same as 1h except the number of bytes not containing data is specified. 3h if only the last byte contains no data, 5h if only the last two bytes do not contain data, and onwards up to Dh if the last 6 bytes do not contain data. Only use if object 20E6.04h ≠ 0, otherwise use 1h.
	13h, 15h, 17h, 19h, 1Bh, 1Dh	Same as 11h except the number of bytes not containing data is specified. 13h if only the last byte contains no data, 15h if only the last two bytes do not contain data, and onwards up to 1Dh if the last 6 bytes do not contain data. Only use if object 20E6.04h ≠ 0, otherwise use 11h.

SDO Abort Transfer Messages When an error occurs during reading or writing an object, the node sends an abort transfer message to the host.

TABLE 1.30 Node indicates error in communication.

Arbitration Field	Data Field							
COB-ID	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**	**Byte 8**
580h + Node-ID	80h	Object Index (LSB)	Object Index (MSB)	Sub-Index	See Table 1.31 (LSB first)			

TABLE 1.31 Abort Code Descriptions

Abort Code	Description
0503 0000h	Toggle bit not alternated
0504 0000h	SDO protocol timed out
0504 0001h	Command specifier not valid
0504 0002h	Invalid block size (block mode only, see DS301)
0504 0003h	Invalid sequence number (block mode only, see DS301)
0504 0004h	CRC error (block mode only, see DS301)
0504 0005h	Out of memory
0601 0000h	Unsupported access to an object
0601 0001h	Attempt to read a write only object
0601 0002h	Attempt to write a read only object
0602 0000h	Object does not exist in the object dictionary
0604 0041h	Object cannot be mapped to the PDO
0604 0042h	The number and length of the objects to be mapped would exceed PDO length
0604 0043h	General parameter incompatibility reason
0604 0047h	General internal incompatibility in the device
0606 0000h	Access failed due to a hardware error
0607 0010h	Data type does not match, length of service parameter does not match
0607 0012h	Data type does not match, length of service parameter too high
0607 0013h	Data type does not match, length of service parameter too low
0609 0011h	Sub-index does not exist
0609 0030h	Value range of parameter exceeded (only for write access)
0609 0031h	Value of parameter written too high
0609 0032h	Value of parameter written too low
0609 0036h	Maximum value is less than minimum value
0800 0000h	General error
0800 0020h	Data cannot be transferred or stored to the application
0800 0021h	Data cannot be transferred or stored to the application because of local control
0800 0022h	Data cannot be transferred or stored to the application because of present device state*
0800 0023h	Object dictionary dynamic generation fails or no object dictionary is present (object dictionary loads from file and file error occurred)

*May result from write access conflict with ACE. Connect to drive in Read Only mode while accessing the communications channel.

SDO Read and Write Examples

Expedited SDO Read Example

In this example, Size indication (object 20E6.04h) is turned off so that the drive will not indicate, in any message, how many valid bytes are contained in the message. In this case the user is responsible for knowing the message size.

TABLE 1.32 Expedited SDO Read Example

COB-ID	Number of Bytes	Message / Data	Description
601	8	40 64 60 00 00 00 00 00	Host uses 40 in the command byte (see Table 1.26) to read object 6064h, the 3rd data byte is zero because this object has no sub-indices and the last 4 data bytes are don't care's when reading
581	8	42 64 60 00 34 33 00 00	Node replies with 42 because size indication is off (see Table 1.26) and message was received as an expedited data transfer. Bytes 5 – 8 will contain the data from the object. In this case object 6064h (Actual Position) contains 00 00 33 34h (13,108 in decimal).

Expedited SDO Write Example

In this example, Size indication (object 20E6.04h) is turned off so that the drive will not indicate, in any message, how many valid bytes are contained in the message. When writing data to a node, it is not required for the host to use size indications in the messages to the node. In this case the user is responsible for knowing the message size and for using the command byte 22h.

TABLE 1.33 Expedited SDO Write Example

COB-ID	Number of Bytes	Message / Data	Description
601	8	22 40 60 00 0F 00 00 00	Host uses 22 in the command byte (see Table 1.29) to write object 6040h, the 3rd data byte is zero because this object has no sub-indices. The last 4 data bytes contain the data to write to the object.
581	8	60 40 60 00 00 00 00 00	Node replies with 60 (see Table 1.29) indicating message was received. Bytes 1-3 contain the object index and sub-index. Bytes 4 – 7 will always be zero in this case

Segmented SDO Read Example

In this example, the firmware version of the drive is read from object 208D.01. Furthermore, it will be assumed that size indication (see object 20E6.04h) is turned on so that the drive will indicate, in any message that contains less than 7 data bytes, how many valid bytes are contained in the message. Node replies to each host message are shaded. When the applicable data bytes from the last 5 shaded rows is concatenated and converted to ASCII, the data reads "ABCDEFG-1.2.3.4".

TABLE 1.34 Segmented SDO Read Example

COB-ID	Number of Bytes	Message / Data	Description
601	8	40 8D 20 01 00 00 00 00	Host begins data transfer Initialization
581	8	41 8D 20 01 20 00 00 00	Node replies with 41 indicating there are more than 4 bytes to transfer. Bytes 4 – 7 indicate the number of bytes necessary to transfer. In this case 20h = 32 bytes. The drive now waits for the host to begin data transfer confirmation.
601	8	60 00 00 00 00 00 00 00	Host uses 60 to confirm ready for first segment. All other bytes are zero
581	8	00 41 42 43 44 45 46 47	Node responds to host with 00h and 7 data bytes.
601	8	70 00 00 00 00 00 00 00	Host uses 70 to confirm ready for next segment. All other bytes are zero
581	8	10 2D 31 2E 32 2E 33 2E	Node responds to host with 10h and 7 data bytes.
601	8	60 00 00 00 00 00 00 00	Host uses 60 to confirm ready for next segment. All other bytes are zero
581	8	00 34 00 00 00 00 00 00	Node responds to host with 00h and 7 data bytes.
601	8	70 00 00 00 00 00 00 00	Host uses 70 to confirm ready for next segment. All other bytes are zero
581	8	10 00 00 00 00 00 00 00	Node responds to host with 10h and 7 data bytes.
601	8	60 00 00 00 00 00 00 00	Host uses 60 to confirm ready for next segment. All other bytes are zero
581	8	07 00 00 00 00 00 00 00	Node responds to host with 07h and 7 data bytes. The 07h indicates that the last three bytes are to be ignored.

Segmented SDO Write Example

In this example, Size indication (object 20E6.04h) is turned **on** so that the drive **will indicate**, in any message that contains less than 7 data bytes, how many valid bytes are contained in the message. When writing data to a node, it is not required for the host to use size indications in the messages to the node. Node replies to each host message are shaded. Data must be sent to the node according to each objects required format. See the Object dictionary for more information on writing to a specific object.

TABLE 1.35 Segmented SDO Write Example

COB-ID	Number of Bytes	Message / Data	Description
601	8	20 0B 20 01 00 00 00 00	Host begins data transfer Initialization
581	8	60 0B 20 01 00 00 00 00	Node replies with 60 confirming message receipt and ready for first segment.
601	8	00 57 69 6C 6C 20 45 6C	Host uses 00 to begin data transfer protocol. Last 7 bytes contain data.
581	8	20 57 69 6C 00 00 00 00	Node responds to host with 20h. Ignore Last 7 bytes.
601	8	11 6B 69 6E 73 20 45 6C	Host uses 11 to indicate "Last Segment". Any bytes that are more than an objects length will no be written.
581	8	30 6B 69 6E 00 00 00 00	Node responds to host with 30h. Ignore last 7 bytes.

1.5.2 PDO Messages

PDO messages exchange information between the host and nodes without the overhead of SDO messages. PDO messages have no reply, (i.e. they are unconfirmed messages) which allows for fast, efficient data transfer of up to 8 bytes. As a result, PDOs are ideal for transferring information during device operation whereas SDOs are generally used for configuring the drive. PDO messages, unlike SDO messages, are configured prior to use. Once configured, PDO messages can be enabled or disabled according to whether or not they are needed. There are two types of PDO messages: a transmit PDO (TPDO) message and a receive PDO (RPDO) message.

Transmit Process Data Objects (TPDO) TPDOs are configured to send data from node to host according to a configurable trigger mechanism or when requested by an RTR. Before data is transmitted by a TPDO, it must be configured, and enabled, with the "Communication Parameter Object" related to that TPDO. TPDOs do not alter any object data; they only read and transmit data to the CAN bus. AMC CANopen drives offer ten different TPDOs (all are disabled by default). Nine have fixed pre-defined configurations and one (TPDO 26) is available for user specification.

Receive Process Data Objects (RPDO) The host uses RPDOs to write data to objects in one or more nodes. Before data is received by an RPDO, it must be configured, and enabled, with a "Communication Parameter Object" related to that RPDO. Since RPDOs write to object data, it is important to ensure that the data sent is in agreement with the objects mapped to the PDO (PDO object mapping is discussed below). AMC CANopen drives offer eleven different RPDOs where all are disabled by default.

PDO Configuration Configuration of a particular PDO is accomplished by setting the appropriate PDO "Communication Parameter Object" and PDO Mapping Parameter object "Mapping Parameter Object" for that PDO. It is the user's responsibility to decide which of the PDOs in Table 1.36 are applicable to the application and configure/enable them. As specified by DS301, the PDO Communication Parameter objects are found over the range 1400h-15FFh and 1800h-19FFh for RPDOs and TPDOs, respectively. PDO Mapping Parameter objects are specified over the range 1600h-17FFh and 1A00h-1BFFh for RPDOs and TPDOs, respectively. Although the full range allows for over 500 different RPDOs and TPDOs, only a fraction of that range is needed for AMC CANopen drives. The PDOs used by AMC CANopen drives are given in Table 1.36 along with the names of objects mapped to them. Only one TPDO (26th) can be mapped; all other TPDOs and RPDOs have fixed mapping parameters.

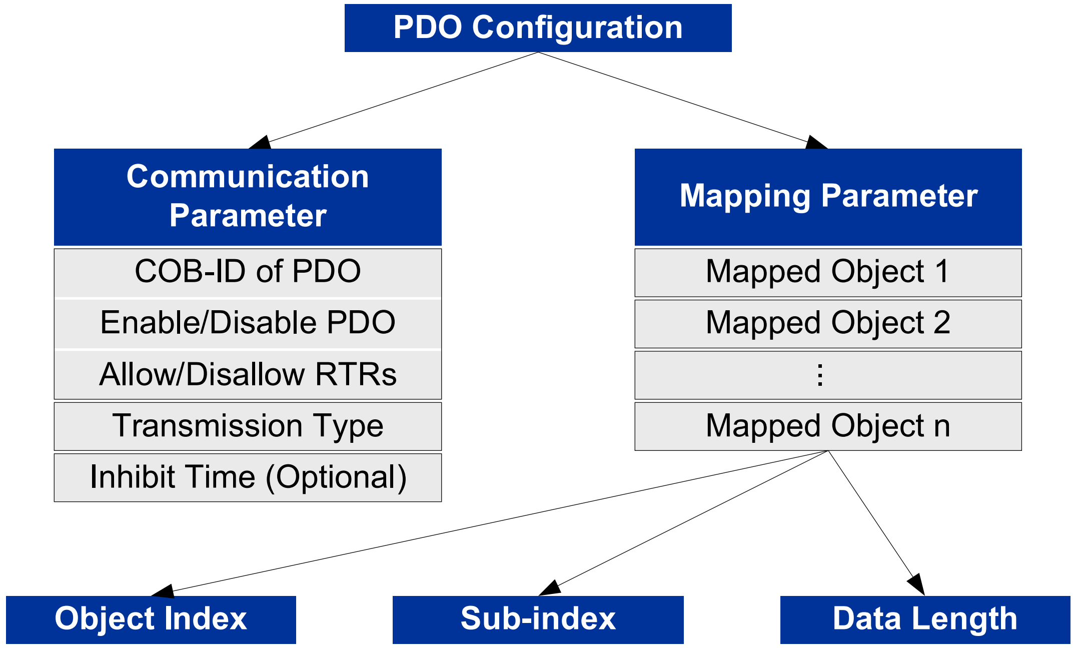
TABLE 1.36 PDO's

PDO	PDO Communication Parameter	PDO Mapping Parameter	1st Object Mapping	2nd Object Mapping
1st RPDO	1400h	1600h	ControlWord	-
2nd RPDO	1401h	1601h	ControlWord	Modes of Operation
3rd RPDO	1402h	1602h	ControlWord	Target Position
4th RPDO	1403h	1603h	ControlWord	Target Velocity
5th RPDO	1404h	1604h	ControlWord	Target Current
21st RPDO	1414h	1614h	Target Position	-
22nd RPDO	1415h	1615h	Target Velocity	-
23rd RPDO	1416h	1616h	Target Current	-
24th RPDO	1417h	1617h	PVT Buffer	-
27th RPDO*	1420h	1620h	Command Limiter Velocity	-
28th RPDO*	1421h	1621h	Command Limiter Accel	Command Limiter Decel
1st TPDO	1800h	1A00h	StatusWord	-
3rd TPDO	1802h	1A02h	StatusWord	Actual Position
4th TPDO	1803h	1A03h	StatusWord	Actual Velocity
5th TPDO	1804h	1A04h	StatusWord	Actual Current
21st TPDO	1814h	1A14h	Actual Position	-
22nd TPDO	1815h	1A15h	Actual Velocity	-
23rd TPDO	1816h	1A16h	Actual Current	-
24th TPDO	1817h	1A17h	PVT Buffer Position	-
25th TPDO	1818h	1A18h	Prog. Digital Inputs	-
26th TPDO	1819h	1A19h	Configurable. Contains 8 locations available for mapping objects. (See 1A19.01-1A19.08)	

*RPDO 27 and RPDO 28 are not supported in the following firmware: DPCANTA.ABS, DPCANTA.SIN, DPCANIA.ABS, DPCANIA.SIN.

The relationship between a PDO Mapping parameter and Communication parameter is illustrated in Figure 1.4. The fact that PDO parameter objects are configured prior to any PDO messages being sent is what allows for all eight bytes of the PDO message to be used for data. The overall result is faster, more efficient data transfer and no additional bus usage for confirmation.

FIGURE 1.4 PDO Configuration Parameters



Communication Parameter Object The Communication Parameter object contains information regarding the COB-ID and transmission type of the PDO. The COB-ID and other settings are stored in sub-index 01h while the transmission type is stored in sub-index 02h. For example, the COB-ID of the 1^{st} TPDO would be found at sub-index 1800.01h while the transmission type would be defined by sub-index 1800.02h. The details of choosing a COB-ID and setting the transmission type are explained below.

Setting COB-ID's for each PDO

A unique COB-ID (unique with respect to the entire CANopen network, not just the node) must be assigned to each PDO which will be used over the CAN network. It is the system designer's responsibility to ensure that all PDOs have a unique COB-ID. It is best to assign the COB-IDs in a logical order, with the most important PDOs assigned to the lowest COB-IDs. The range of possible values is 181h-57Fh.

Sub-index 01h of each PDO's Communication Parameter object contains the COB-ID and is a 32-bit data field partitioned into five components as shown in Table 1.37. Table 1.38 summarizes how these partitions are defined and Table 1.36 lists the object index for each PDO's Communication Parameter object.

TABLE 1.37 PDO COB-ID structure

Bit 31	Bit 30	Bit 29	Bits 28 – 11	Bits 10 – 0
0/1	0/1	0	000000000000000000	COB-ID

TABLE 1.38 COB-ID bit definitions

Bit Number	Value	Description
31(msb)	0	PDO message is enabled and will respond to the assigned trigger mechanism.
	1	PDO message is disabled and will not respond to the assigned trigger mechanism. This is the default state for all PDOs.
30	0	RTR allowed on this PDO.
	1	No RTR allowed on this PDO.
29	0	Use 0 for AMC drives (selects CAN 2.0A).
28-11	0	Use 0 for AMC drives (non-zero values reserved for CAN 2.0B).
10-0 (lsb)	11-bit Identifier	Holds the 11-bit identifier (COB-ID) of the PDO. Use the default value or set-up the priority for each PDO by setting this value closer to the value 181h, which has the highest PDO priority on a CAN network.

Transmission Type

Sub-index 02h of each PDO's Communication Parameter object is an 8-bit data field that defines the transmission type. Setting the value of this sub-index to an appropriate value, as given in Table 1.39, sets the transmission type. Note that there is a range of valid values for some transmission types. The "asynchronous" transmission type, for example, is set using a value of 254 or 255 (FEh or FFh).

TABLE 1.39 PDO Transmission Type selection table

PDO Transmission Description			
Value	**Transmission Type**	**TPDO**	**RPDO**
00h	Synchronous Acyclic	PDO is transmitted on the next Sync message following an internal event. In addition, the PDO can be transmitted immediately following an RTR request.	The received data is held until the next Sync message. When the Sync message is received the data is applied
01h – F0h	Synchronous Cyclic	PDO's are transmitted with relation to the Sync object. The number (01h-F0h) represents the number of Sync pulses between consecutive PDO transmissions. In addition, the PDO can be transmitted immediately following an RTR request or internal event.	
F1h - FBh	N/A	Reserved	Reserved
FCh	Synchronous RTR	PDO's are only transmitted following the first Sync message after a remote request or immediately following an internal event.	Reserved
FDh	Asynchronous	PDO's are transmitted immediately following an internal event or RTR request.	Reserved
FEh - FFh			The received data is applied to its mapped objects immediately

Mapping Parameter Object

The mapping parameter object contains information about each object mapped to a PDO. Each object that is mapped is represented by a sub-index in the Mapping Parameter object. So if, for example, a PDO has *n* number of mapped objects then the PDO's mapping parameter object will have sub-indices 1 through *n*. Each sub-index contains a 32-bit field partitioned into 3 components as shown in Table 1.40.

TABLE 1.40 Mapping Parameter bit descriptions

Bits 31 – 16	Bits 15 – 8	Bits 7 – 0
Index	Sub Index	Object Length

The three components that represent a mapped object are described below:

- **Index:** The index of the object mapped to the PDO (zero if no object is mapped).
- **Sub-index:** The sub-index of the mapped object and the location of the data to be transmitted (zero if the object has no sub-indices).
- **Object Length:** The bit length (in hex) of the data to be transmitted. For example, 20h = 32 bits.

By placing information about an object in the Mapping Parameter, that object becomes mapped to the associated PDO. Mapping allows PDOs to know where they should read their data prior to transmission (in the case of TPDOs) or where they should write their data upon reception (in the case of RPDOs). Although DS301 allows up to 64 objects to be mapped to a single PDO, the number that can actually be mapped is ultimately determined by the total amount of the data mapped to the PDO. If, for example, a single object with an 8-byte (64-bit) data length is mapped to a PDO, then no other objects can be mapped to that same PDO since all 8-bytes of the data field will already be consumed. Mapped data is inserted into the data field of the PDO according to the order of mapping. That is, the data from the first mapped object consumes the first available byte (or bytes), and then data from the second mapped object consumes the next available byte (or bytes), and so on until all data bytes have been consumed or there is no more object data to map.

RTR bit and TPDOs

Once a PDO has been configured and enabled, the host can use the RTR bit to request a TPDO from a node. This supplies the host with a fast and efficient on-demand method of retrieving information from a node. To request a TPDO, the host must send a message with the RTR bit set to 1 and a COB-ID that corresponds to the desired TPDO.

AMC PDO Assignment and Mapping

AMC CANopen drives support 11 RPDOs and 10 TPDOs, all of which can be assigned to a user-specified COB-ID. All 11 RPDOs are mapped to fixed, pre-defined objects and, as a result, only the Communication Parameter of an RPDO can be changed.

Similarly, all TPDOs, with the exception of TPDO 26, are mapped to fixed pre-defined objects and, again, only their Communication Parameters can be changed. The single exception, TPDO 26, is available for mapping up to 8 user specified application objects. All TPDOs can be assigned user-specified trigger mechanisms based on either timing or object data changes as explained in the following section. Some TPDOs, however, have fixed predefined trigger mechanisms. To know if a TPDO has a predefined trigger, check the description of that TPDO in the Object Dictionary.

AMC Asynchronous Transmission Events

AMC CANopen drives support 3 basic asynchronous event types:

- Time based: the drive transmits the selected TPDOs when a certain amount of time has elapsed. There are 2 internal timer objects available. Any of the TPDOs can be mapped to either or both timers.
- Value based: the drive monitors a certain object (presumably of a numerical type), and when the object has changed by a certain amount, the selected TPDOs will be transmitted. Two value counters exist, one watches for the mapped object to change by a specified amount, the other watches for the mapped object to reach a specific value. Any of the TPDOs can be mapped to either or both of the Value Counters.

- Bit based: the drive monitors a certain object (presumably of a bit-pattern type), and when a bit in that object changes (from 0 to 1 or 1 to 0), the selected TPDOs will be transmitted. Any of the TPDOs can be mapped to either or both of the Bit Watch processes.

The objects used to configure these asynchronous events, as well as some objects supplied for reading information about these events, are summarized in Table 1.41.

TABLE 1.41 Asynchronous TPDO Transmission Events

Event Type	Event	Object Name	Object Index	Object Type
Time Based	Timer1	TPDO Timer1 Cycle Time	2120h	Configurable
		TPDO Timer1 Assigned TPDOs	2121h	Configurable
		TPDO Timer1 Next Processing Time	2122h	Informational
	Timer2	TPDO Timer2 Cycle Time	2123h	Configurable
		TPDO Timer2 Assigned TPDOs	2124h	Configurable
		TPDO Timer2 Next Processing Time	2125h	Informational
Value Based	Value-Changed	TPDO Value-Changed Object ID	2130h	Configurable
		TPDO Value-Changed Delta Value	2131h	Configurable
		TPDO Value-Changed Assigned TPDOs	2132h	Configurable
		TPDO Value-Changed Object Last Value	2133h	Informational
	Value-Reached	TPDO Value-Reached Object ID	2150h	Configurable
		TPDO Value-Reached	2151h	Configurable
		TPDO Value-Reached Assigned TPDOs	2152h	Configurable
		TPDO Value-Reached Direction	2153h	Configurable
Bit Based	Bits-Changed1	TPDO Bits-Changed1 Object ID	2140h	Configurable
		TPDO Bits-Changed1 Object Bit Mask	2141h	Configurable
		TPDO Bits-Changed1 Assigned TPDOs	2142h	Configurable
		TPDO Bits-Changed1 Object Last Value	2143h	Informational
	Bits-Changed2	TPDO Bits-Changed1 Object ID	2144h	Configurable
		TPDO Bits-Changed1 Object Bit Mask	2145h	Configurable
		TPDO Bits-Changed1 Assigned TPDOs	2146h	Configurable
		TPDO Bits-Changed1 Object Last Value	2147h	Informational

Please refer to the Object Dictionary section for more details on these objects.

PDO Message Examples

PDO Configuration Example

This example demonstrates using expedited SDO messages to configure two PDOs (there is no need to use segmented SDO's in this case because data is less than 4 bytes). Each PDO is enabled, assigned a COB-ID, and the trigger mechanisms set to an arbitrary mechanism.

TABLE 1.42 PDO Configuration Example

COB-ID	Number of Bytes	Message / Data	Description
601	8	22 01 14 01 81 01 00 00	Writing COB-ID 181 to 2nd RPDO (1401.01). Setting bit 32 here to 0 enables the PDO to be processed
601	8	22 01 14 02 FE 00 00 00	Setting trigger mechanism of 2nd RPDO (1401.02) to respond Immediately upon receipt of data. (See Table 1.39)
601	8	22 14 18 01 85 01 00 00	Writing COB-ID 185 to 21st TPDO (1814.01) Setting bit 32 here to 0 enables the PDO to be processed
601	8	22 14 18 02 01 00 00 00	Setting trigger mechanism of 21st TPDO (1814.01) to respond only upon receipt of a SYNC message. (See Table 1.39)
000	2	01 01	Sending NMT message to start node 1 communication state machine so that PDO messages may be processed.
181	4	06 00 01 00	Using 2nd RPDO to set the drive into Profile Position Mode and the Shutdown control state
181	4	07 00 01 00	Using 2nd RPDO to keep the drive in Profile Position Mode and set the Operation Disabled control state
181	4	0F 00 01 00	Using 2nd RPDO to keep the drive in Profile Position Mode and set the Operational Enabled control state
80	1	00	Start sending SYNC messages to cause the SYNC triggered TPDOs to send data to the host.
185		FF FF FF FF	21st TPDO response to SYNC message containing actual position = -1 counts
80	1	00	Next SYNC message from host
185		02 00 00 00	21st TPDO response to SYNC message containing actual position = 2 counts
80	1	00	Next SYNC message from host
185		05 00 00 00	21st TPDO response to SYNC message containing actual position = 5 counts

Asynchronous TPDO Transmission Example # 1

This example sets the timer1 event to 1000ms and assigns three TPDOs to transmit on every timer1 event. Prior to this example TPDOs have been assigned valid COB-IDs and are enabled.

TABLE 1.43 Asynchronous TPDO Transmission Example #1

COB-ID	Number of Bytes	Message / Data	Description
000	2	01 01	Sending NMT message to start node 1 communication state machine so that PDO messages may be processed.
601	8	22 20 21 00 E8 03 00 00	Writing 1000 to object 2120.00. This sets the event timer to 1s intervals
601	8	22 21 21 00 23 00 00 00	Writing to bit-mask such that TPDOs 1, 3, and 22 are assigned to transmit according to the timer object
Wait 1000 ms			
181	2	21 06	1st TPDO transmits after 1 second with it's data
281	6	21 06 FE FF FF FF	3rd TPDO transmits the same time as the 1st TPDO
2C1	4	00 00 00 00	22nd TPDO transmits the same time as the 1st TPDO
601	8	40 22 21 00 00 00 00 00	Host sends SDO message to read 2122.00 for next timer1 event occurrence.
581	8	42 22 21 00 B2 ED 97 02	Node indicates next event occurs at 43511218 ms
Wait 1000 ms			
181	2	21 06	1st TPDO transmits after 1 second with it's data
281	6	21 06 FE FF FF FF	3rd TPDO transmits the same time as the 1st TPDO
2C1	4	00 00 00 00	22nd TPDO transmits the same time as the 1st TPDO
601	8	40 22 21 00 00 00 00 00	Host sends SDO message to read 2122.00 for next timer1 event occurrence.
581	8	42 22 21 00 B2 ED 97 02	Node indicates next event occurs at 43512218 ms
…			
601	8	22 21 21 00 00 00 00 00	Host writes to bit-mask such that no TPDOs are assigned to transmit. This stops the Timer1 event.

Asynchronous TPDO Transmission Example # 2

This example uses the bit based transmission events to monitor specific bits in the Actual Position object (6064h). Prior to this example TPDOs have been assigned valid COB-IDs and are enabled

TABLE 1.44 Asynchronous TPDO Transmission Example #2

COB-ID	Number of Bytes	Message / Data	Description
000	2	01 01	Sending NMT message to start node 1 communication state machine so that PDO messages may be processed
601	8	22 40 21 00 00 64 60 00	Writing 60 64 00 to object 2140.00. This sets the Bit-Watch1 event to monitor object 6064h. Byte 8 is always 00
601	8	22 41 21 00 00 02 00 00	Writing the exact bits to watch such that TPDOs will transmit when these/ this bit changes. This example watches bit 10
601	8	22 42 21 00 23 00 00 00	Writing the Bit-mask to assign TPDOs 1, 3, and 22 to transmit on the bit change event
Wait until Bit 10 toggles			
181	2	21 06	1st TPDO transmits after bit 10 toggle
281	6	21 06 FE FF FF FF	3rd TPDO transmits the same time as the 1st TPDO
2C1	4	00 00 00 00	22nd TPDO transmits the same time as the 1st TPDO
601	8	40 43 21 00 00 00 00 00	Host sends SDO message to read 2143.00 for last value of monitored object. This is optional
581	8	42 22 21 00 FE FF FF FF	Node indicates the last value contained -2
Wait until Bit 10 toggles			
181	2	21 02	1st TPDO transmits after bit 10 toggle
281	6	21 02 00 00 00 00	3rd TPDO transmits the same time as the 1st TPDO
2C1	4	4D 34 00 00	22nd TPDO transmits the same time as the 1st TPDO
601	8	40 43 21 00 00 00 00 00	Host sends SDO message to read 2143.00 for last value of monitored object. This is optional
581	8	42 22 21 00 00 00 00 00	Node indicates the last value contained 0
…			
601	8	22 42 21 00 00 00 00 00	Host writes to bit-mask such that no TPDOs are assigned to transmit. This stops the Bit-Watch1 event

PDO Mappable Objects Only a subset of objects in the object dictionary may be mapped to TPDO 26. Table 1.45 lists all PDO mappable objects. Data exchange with objects not listed in the table require an SDO.

TABLE 1.45 PDO Mappable Objects

Type	Object Index	Sub-Index	Object Name	Mapping Access	PDO Allocation (bits)
Drive Operation	2001	03	User Bits	TPDO	16
	6040	00	ControlWord	TPDO	16
Command Objects	6071	00	Target Current	TPDO	16
	607A	00	Target Position	TPDO	32
	60B1	00	Velocity Offset	TPDO	32
	60B2	00	Torque Offset	TPDO	16

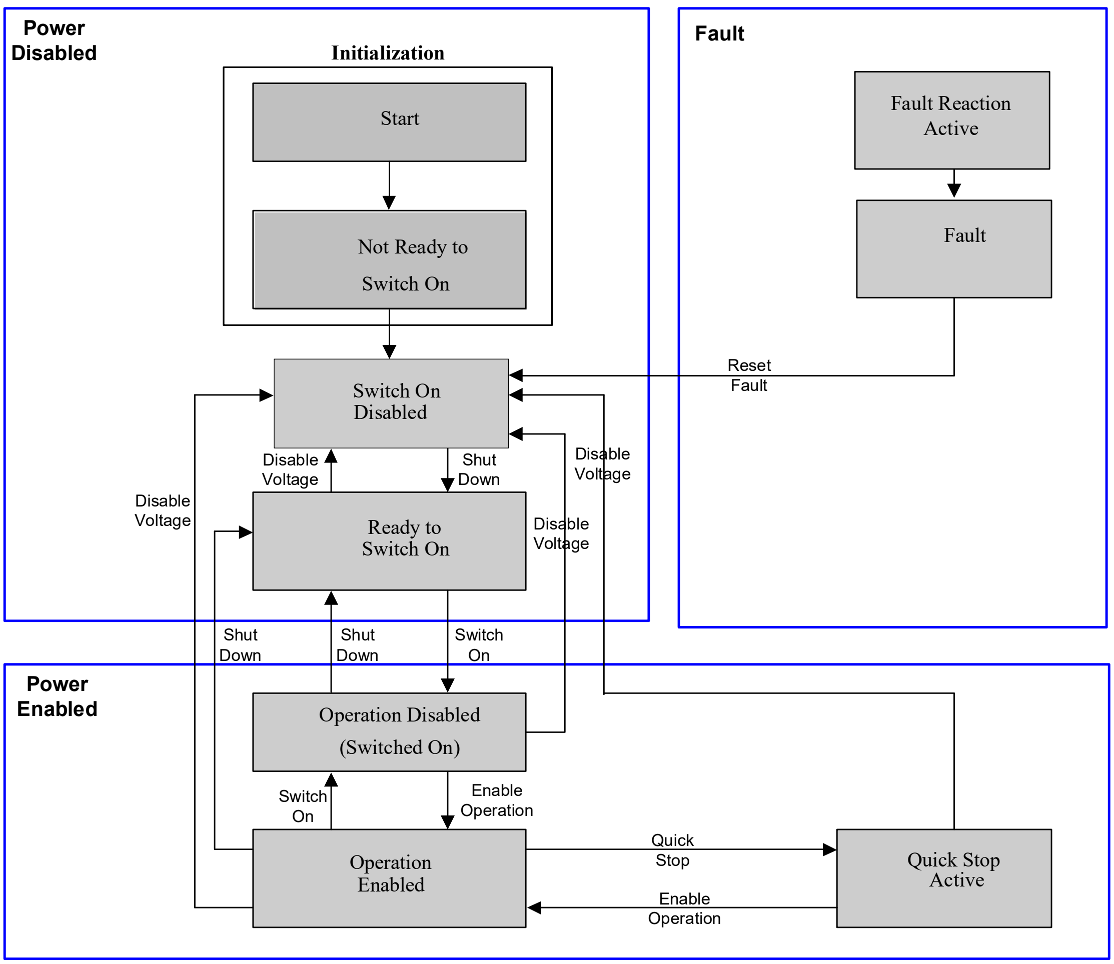
Command Objects	60FF	00	Target Velocity	TPDO	32
Monitor Objects	2002	01	Drive Bridge Status	TPDO	16
	2002	02	Drive Protection Status	TPDO	16
	2002	03	System Protection Status	TPDO	16
	2002	04	Drive/System Status 1	TPDO	16
	2002	05	Drive/System Status 2	TPDO	16
	2002	06	Drive/System Status 3	TPDO	16
	2002	07	Active Configuration Status	TPDO	16
	2003	01	Drive Bridge Status History	TPDO	16
	2003	02	Drive Protection Status History	TPDO	16
	2003	03	System Protection Status History	TPDO	16
	2003	04	Drive/System Status 1 History	TPDO	16
	2003	05	Drive/System Status 2 History	TPDO	16
	2003	06	Drive/System Status 3 History	TPDO	16
	200F	01	DC Bus Voltage	TPDO	16
	2010	02	Current Demand - Torque	TPDO	16
	2010	12	Torque Summation Input	TPDO	32
	2010	13	Torque Summation Offset	TPDO	32
	2011	05	Velocity Error	TPDO	32
	2011	06	Velocity Summation Input	TPDO	32
	2011	07	Velocity Summation Offset	TPDO	32
	2012	03	Position Demand	TPDO	32
	2012	05	Position Summation Input	TPDO	32
	2012	06	Position Summation Offset	TPDO	32
	2012	07	Position Index Capture Value	TPDO	32
	2018	01	PLS Input Value	TPDO	32
	2018	02	PLS 1 State	TPDO	32
	2018	03	PLS 2 State	TPDO	32
	201A	02	Analog Input 1 Raw ADC Value	TPDO	16
	201A	06	Analog Input 2 Raw ADC Value	TPDO	16
	201A	0A	Analog Input 3 Raw ADC Value	TPDO	16
	201A	0E	Analog Input 4 Raw ADC Value	TPDO	16
	201D	01	PVT Status Values	TPDO	16
	2021	01	External Thermal Sense Value	TPDO	32
	2021	02	Thermistor Resistance	TPDO	16
	2023	01	Digital Input Values	TPDO	16
	2025	01	Analog Output 1 Value	TPDO	16
	2025	02	Analog Output 2 Value	TPDO	16
	6041	00	Status Word	TPDO	16
	6061	00	Modes of Operation Display	TPDO	16
	6064	00	Actual Position	TPDO	32
Monitor Objects	606B	00	Velocity Demand	TPDO	32
	606C	00	Actual Velocity	TPDO	32
	6077	00	Actual Current	TPDO	16
	60F4	00	Position Error	TPDO	32

1.6 Control State Machine

1.6.1 State Machine Overview

CANopen drives operate based on a control state machine where each state has a defined behavior. The drive can be controlled to transition from one state to another in a particular order using the ControlWord object (6040h). This is a write only object used specifically to transition the drive's control state machine between states. Below is a graphical overview of the state machine. The grey boxes represent the states. The arrows represent the one-way path between states. The small text along the path of the arrow represents the command necessary to make each transition.

FIGURE 1.5 ControlWord State Machine Block Diagram



Upon power-up, the drive will automatically step through the 'Start' and 'Not Ready to Switch On' states, arriving at the 'Switch On Disabled' state. Further advancement to other states is accomplished by setting the ControlWord (Object index 6040h) to the proper value. The commands that cause the state transitions in the state machine correspond to certain bit settings within the ControlWord. For example, to transfer from the ‘Ready to Switch On’ state to the ‘Switched On State’, one would use the Switch On command, by setting the ControlWord to the appropriate value (and hence bit pattern). The drive state may be queried by using StatusWord (Object index 6041h). If the drive senses a fault, it will automatically move into the Fault Reaction Active state, then transition to the Fault state. The ControlWord can once again be used to move from the Fault state to the Switch On Disabled state.

1.6.2 Drive States

The following tables provide details on each of the CANopen states supported by AMC drives.

TABLE 1.46

Not Ready to Switch On	
Function	Part of drive initialization
Status	Logic Supply has been applied to the drive. The drive is being initialized. Drive functionality is disabled during this time.
Transitions	Transition to ‘Switch On Disabled’ is automatic when initialization complete.

TABLE 1.47

Switch On Disabled	
Function	Drive initialization is complete. If a fatal error exists, the processor executes a Reset Fault command automatically. The drive is still disabled.
Status	Drive parameters have been set up. Only logic supply voltage is necessary at this time. Drive process monitoring may begin.
Transitions	Transition to the **Ready to Switch On** state is possible by a *Shut Down* command.

TABLE 1.48

Ready to Switch On	
Function	Last state before Bridge enabled
Status	No energy is supplied to the motor. Control loops do not work. The drive function is still disabled. Bus power may be applied.
Transitions	Transition to **Operation Disabled (Switched ON)** state is possible via the *Switch On* command. Transition back to the **Switch On Disabled** state is possible via the *Disable Voltage* command, or by a *Quick Stop* command.

TABLE 1.49

Operation Disabled (Switched On)	
Function	The bridge is turned on and a mode-dependent zero command is issued.
Status	The control loops are operational. Bus power is applied. The power section is switched on (if not already on). The target signal is not processed. The drive function is disabled.
Transitions	Transition to the **Operation Enabled** state is possible via the *Enable Operation* command. Transition back to the **Ready to Switch On** state is equally possible via the *Shut Down* command. Transition back to the **Switch On Disabled** state is possible via the *Disable Voltage* command or via a *Quick Stop* command.

TABLE 1.50

Operation Enabled	
Function	This is the normal operation state of the drive.
Status	Power is supplied to the motor. Control loops are operational and target signals are processed.
Transitions	A *Quick Stop* command transfers the drive to the **Quick Stop Active** state. Transition back to the **Ready to Switch On** state is possible via the *Shut Down* command. Transition back to the **Switch On Disabled** state is possible via the *Disable Voltage* command or the *Drive Enable Input*. Transition back to the **Operation Disabled** state is possible via the *Switch On* command.

TABLE 1.51

Quick Stop Active	
Function	The motor (shaft) is brought to a stop using the Stop Deceleration Limit.
Status	Control loops are operational. Power is applied to the motor. The motor shaft is held in position in position mode or zero velocity in velocity mode.
Transitions	Transition back to the Operation Enabled state is possible via the *Enable Operation (7)* command. Transition back to the Switch On Disabled state is possible via *the Disable Voltage (4)* command, or via the *Drive Enable Input (2)* (both include the “Power Disable Delay” process).

TABLE 1.52

Fault Reaction Active	
Function	The event reaction for the incident fault state will occur.
Status	Power is supplied to the motor. Control loops are operational and target signals are processed.
Transitions	Fault Reaction Active will automatically transition to the Fault state. Time in Fault Reaction Active state is dependent on background tasks, but could be anywhere between 100µs and 2ms.

TABLE 1.53

Fault	
Function	A fault has occurred and has not yet been reset
Status	The power output stage is disabled; no energy is supplied to the motor.
Transitions	Transition to the Switch On Disabled state is possible via the *Reset Fault* command.

1.6.3 ControlWord (6040h)

The following table shows the values used with object 6040h to cause transitions shown in Figure 1.5 above. An example hexadecimal value is provided on the right.

TABLE 1.54 ControlWord values

State Transition Command	Bit 7	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Example Value
Reset Fault	0→1	X	X	X	X	X	XX 80
Disable Voltage	0	X	X	X	0	X	XX 00
Shutdown	0	X	X	1	1	0	XX 06
Switch On	0	X	0	1	1	1	XX 07
Enable Operation	0	X	1	1	1	1	XX 0F
Quick Stop	0	X	X	0	1	X	XX 02
Begin Homing (Homing mode only)	0	1	1	1	1	1	XX 1F
End Homing (Homing mode only)	0	0	1	1	1	1	XX 0F
0 = OFF, 1 = ON, X = don't care							

TABLE 1.55 Additional ControlWord values

State Transition Command	Bit 13	Bit 12	Description
Inhibit Negative Motion	X	1	enable *commanded* * [*negative stop* OR *negative torque inhibit*]
Inhibit Positive Motion	1	X	enable *commanded* * [*positive stop* OR *positive torque inhibit*]
0 = disable, 1 = enable, X = don't care,			* see Event Action Configuration command (2065h)

For additional information on object 6040h, see "6040h: ControlWord" on page 279.

1.6.4 StatusWord (6041h)

The StatusWord reports exactly which state the drive is in. Table 1.56 defines each bit in the StatusWord and Table 1.57 shows how to interpret what state the drive is in via the combination of bits 0-3, 5 and 6. Each drive state is described in detail in “Drive States”.

TABLE 1.56 StatusWord bit descriptions

Bits	Name	Descriptions
0	Ready to Switch On	See Table 1.57 to see how this bit relates to the control state machine.
1	Switched On	See Table 1.57 to see how this bit relates to the control state machine
2	Operation Enabled	See Table 1.57 to see how this bit relates to the control state machine
3	Fault	See Table 1.57 to see how this bit relates to the control state machine
4	Voltage Enabled	1 when power is applied to the motor
5	Quick Stop	See Table 1.57 to see how this bit relates to the control state machine
6	Switch On disabled	See Table 1.57 to see how this bit relates to the control state machine
7	Warning	Object 205B can be used to configure which internal drive events will set this bit.
8	Manufacture specific	Object 205B can be used to configure which internal drive events will set this bit.
9	Remote	0 when read/write access has been seized by the service channel (i.e. configuration software). 1 when control over the network is allowed.
10	Target Reached	1 Under the following conditions: - Home reached if the CAN operational-mode is homing. - Home reached if the CAN operational-mode is custom and homing is active. - End of motion in PVT mode. - At command for all other conditions.
11	Internal Limit Active	Object 205B can be used to configure which internal drive events will set this bit.
12	Homing complete	1 when Homing completes, otherwise 0.
13	-	-
14	-	-
15	-	-

TABLE 1.57 StatusWord drive states

Drive State	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	StatusWord
Not Ready to Switch On	0	X	X	0	0	0	0	xxxx xxxx x0xx 0000
Switch On Disabled	1	X	X	0	0	0	0	xxxx xxxx x1xx 0000
Ready to Switch On	0	1	X	0	0	0	1	xxxx xxxx x01x 0001
Switched On	0	1	X	0	0	1	1	xxxx xxxx x01x 0011
Operation Enabled	0	1	X	0	1	1	1	xxxx xxxx x01x 0111
Fault Reaction Active	0	X	X	1	1	1	1	xxxx xxxx x0xx 1111
Fault	0	X	X	1	0	0	0	xxxx xxxx x0xx 1000
Quick Stop Active	0	0	X	0	1	1	1	xxxx xxxx x00x 0111
0 = OFF, 1 = ON, X = don’t care								

1.7 Homing

AMC CANopen drives support a wide variety of homing routines. These routines rely on signals such as limit switch, home switch, and encoder index signals to achieve precise starting positions. Four objects define the offset, speed, acceleration, and the particular homing method used. These objects are listed in the table below.

TABLE 1.58 Homing Objects

Object Index	Description
607Ch	Home Offset
6099h	Homing Speeds
609Ah	Homing Acceleration
6098h	Homing Method
2008.04h	Hard Stop Detection Method (Only applicable to Methods -1 & -2)

1.7.1 Home Offset

The home offset specifies the difference between the home position and the zero position. The home position is the position of the motor when the home switch or encoder index is toggled during a homing routine. The zero position is the position defined to be zero as seen by the CAN master. If the home offset is set to zero, the home position will be equal to the zero position.

1.7.2 Homing Speeds

There are two homing speeds to take into consideration: the speed during the search for home switch, and the speed during the search for the index. Typically, the speed during the search for the home switch is set to be faster than the speed during the search for the index.

1.7.3 Homing Acceleration

A single value is used to define the acceleration and deceleration of all moves during the homing routine.

1.7.4 Homing Methods

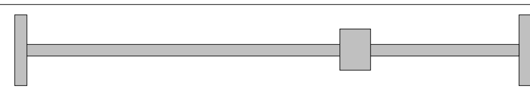
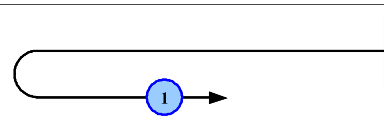
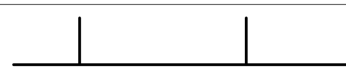
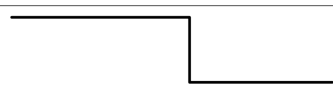
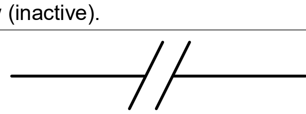
AMC CANopen homing methods depend on the presence of up to three different system components: an index pulse, a home switch, and a limit switch. The simplest homing methods require just one or none of these components, whereas the more complex methods require two or all of these components. All homing methods have been summarized in Table 1.59, along with their necessary components, and have been named according to [DSP402] which states that there are a total of 35 possible homing methods, some of which are reserved and not currently specified.

TABLE 1.59 Homing Methods Summary

Homing Method	Index Pulse	Home Switch	Limit Switch
Methods 1 & 2	✓		✓
Methods 3 to 6	✓	✓	
Methods 7 to 14	✓	✓	✓
Methods 15 & 16		Reserved	
Methods 17 & 18			✓
Methods 19 to 22		✓	
Methods 23 to 30		✓	✓
Methods 31 & 32		Reserved	
Methods 33 & 34	✓		
Method 35			
Method -1 & -2		Home to Hard Stop (Refer to Section 1.7.5)	

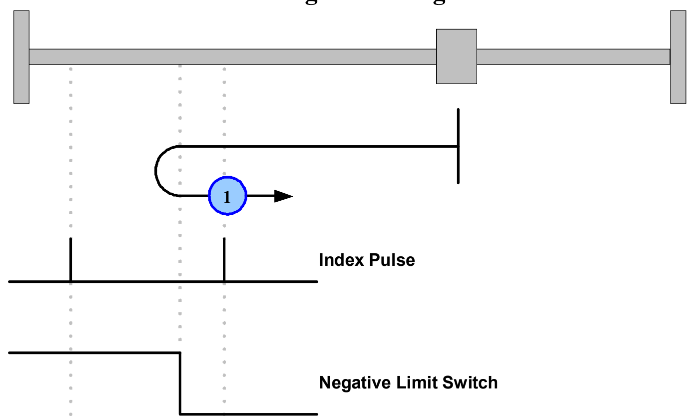
Because these homing methods can become fairly complex, they are best described visually. As a result, *homing diagrams* are utilized to illustrate the behavior of each method. Homing diagrams consist of multiple components each of which is described in Figure 1.6.

FIGURE 1.6 Homing Diagrams

Load and physical limits	
The square near the middle of the illustration shows the load object that is to be moved. The endpoints represent physical limitations or barriers, which the load cannot travel past. The left side is in the negative direction while the right side is in the positive direction.	
Direction of travel	
The vertical line on the right side represents the starting position. The load travels in the direction of the arrow. In the illustration shown, the load begins traveling in the negative direction and then switches directions to move in the positive direction. The circle represents the home position at which point the (actual) measured position is reset to zero. The small section of arrow following the circle represents the distance traveled, past the home position, during deceleration of the load. Lastly, the number in the circle represents the number designated to that particular homing method.	
Index Pulse	
Each vertical line represents one index pulse.	
Limit/Home Switch	
A label in the actual homing diagram will be used to label a switch as either a limit/home switch. As shown, there are only two positions for a switch: high (active) or low (inactive).	
Break	
Represents a break in the diagram. This is used for representing a length of distance too large to properly scale on the diagram.	

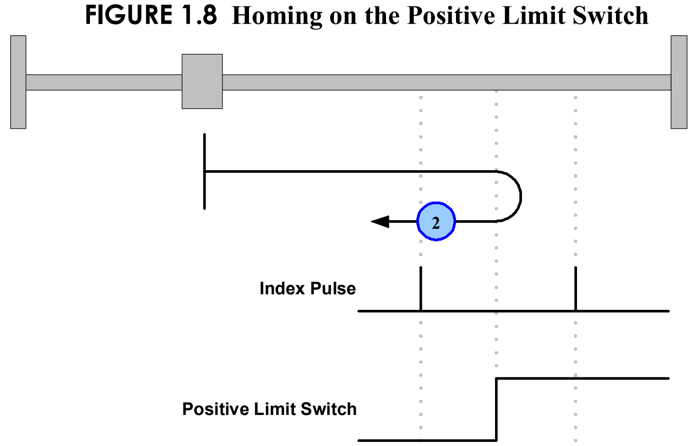
Method 1: Homing on the Negative Limit Switch This method uses the negative limit switch and index to home the load. If the negative limit switch is off, the motor moves in the negative direction. Once the limit switch toggles, the motor changes direction and moves until the next encoder index. Homing is complete at this point. Figure 1.7 illustrates the homing diagram for this method.

FIGURE 1.7 Homing on the Negative Limit Switch



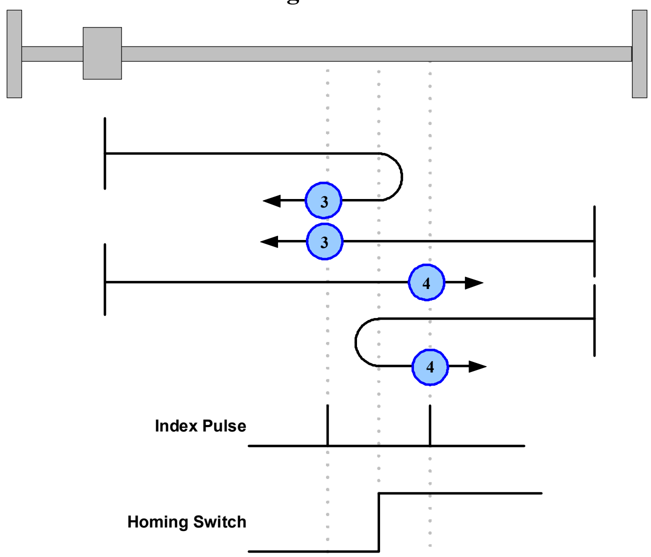
Method 2: Homing on the Positive Limit Switch This method uses the positive limit switch and index to home the load. If the positive limit switch is off, the motor moves in the positive direction. Once the limit switch toggles, the motor changes direction and moves until the next encoder index. Homing is complete at this point. Figure 1.8 illustrates the homing diagram for this method.

FIGURE 1.8 Homing on the Positive Limit Switch



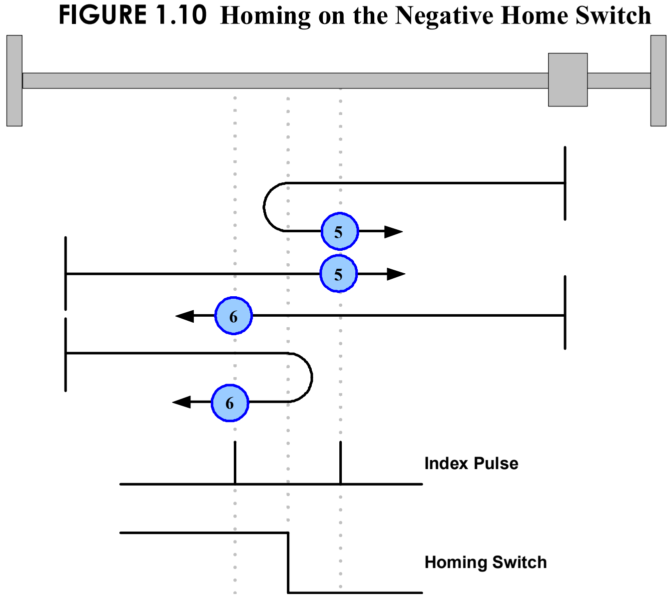
Methods 3 and 4: Homing on the Positive Home Switch These methods use the positive home switch and index to home the load. The initial direction of movement for a given routine method is dependent on the home switch position. However, the final position is always in the same direction. Homing methods 3 and four perform the same operations, but in opposite directions with opposite home switch polarity. Figure 1.9 illustrates the homing diagram for these methods.

FIGURE 1.9 Homing on the Positive Home Switch



Methods 5 and 6: Homing on the Negative Home Switch This is literally a mirror image of the homing routines used by methods 3 and 4. Figure 1.10 illustrates the homing diagram for these methods.

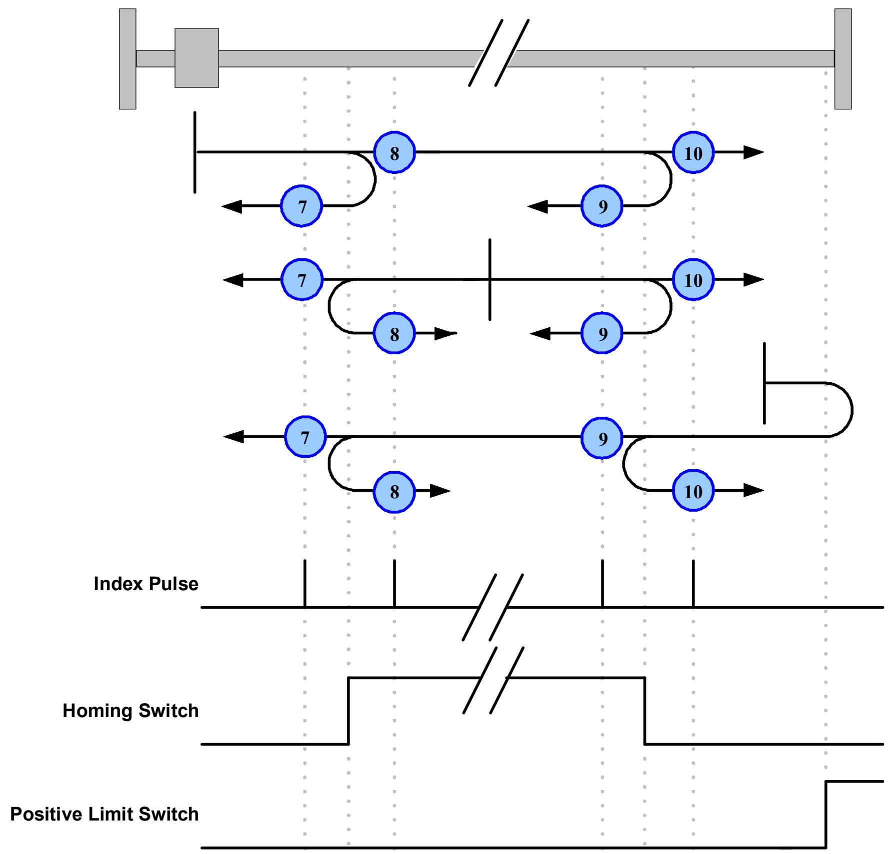
FIGURE 1.10 Homing on the Negative Home Switch



Methods 7-14: Homing on the Home Switch

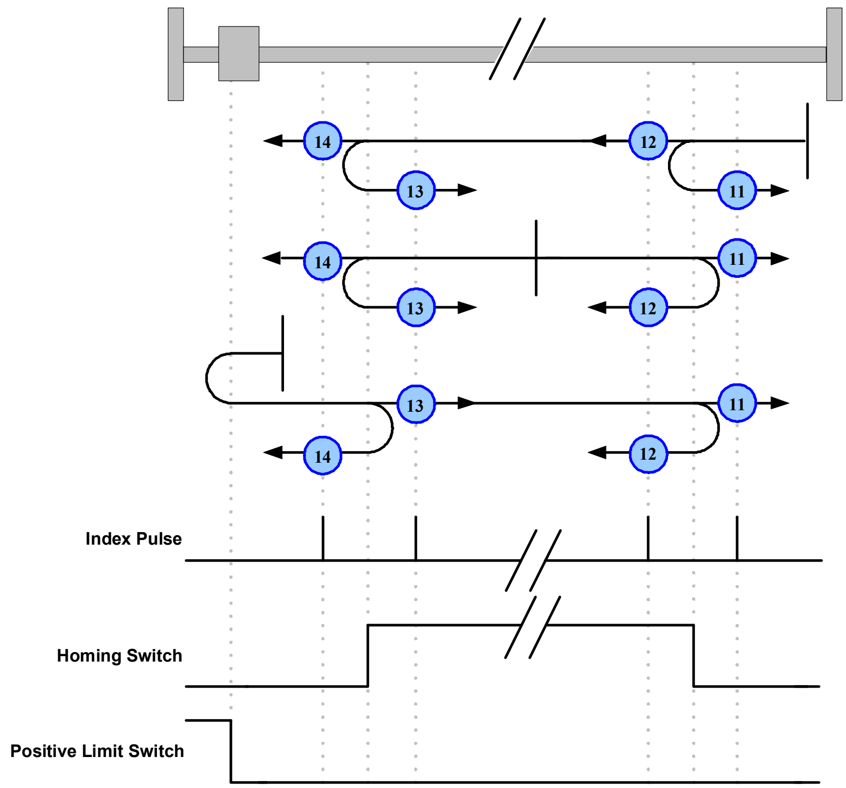
These methods use all three possible homing components (index pulse, home switch, and limit switch) with the index pulse to the nearest right or left of the home switch always being the sought after home position. Methods 7 to 10 use a positive limit switch and if the starting position is outside the active home switch region the initial direction of travel is always positive. For cases where the starting position is inside the active home switch region the initial direction will depend upon the index pulse being sought after: methods 7 & 8 home towards the left home switch edge so the initial direction will be left, whereas methods 9 & 10 home towards the right home switch edge so the initial direction will be right. Note that the only difference between methods 7 & 8 is that one homes to the index pulse left of the home switch edge whereas the other homes to the index pulse to the right; the same difference holds true for methods 9 & 10. Figure 1.11 illustrates the homing diagram for methods 7 to 10.

FIGURE 1.11



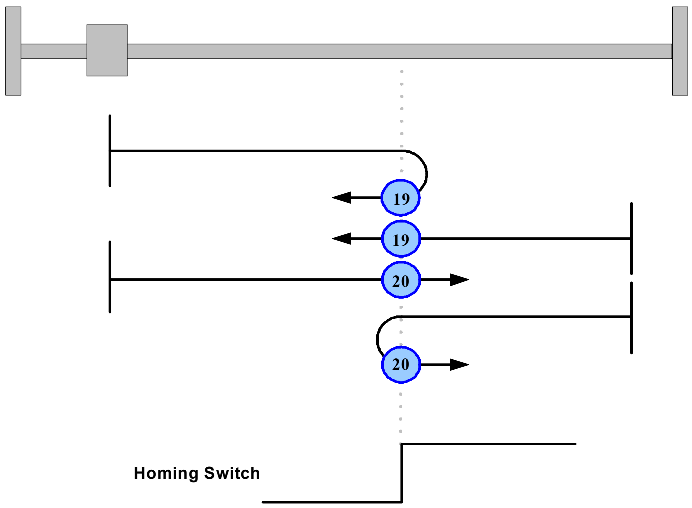
Methods 11 to 14 use a negative limit switch instead of a positive limit switch. As a result, the initial direction will be left, instead of right, whenever the starting point is outside of the active home switch region. Outside of this difference, methods 11 to 14 are identical to methods 7 to 10. Figure 1.12 illustrates the homing diagram for methods 11 to 14.

FIGURE 1.12



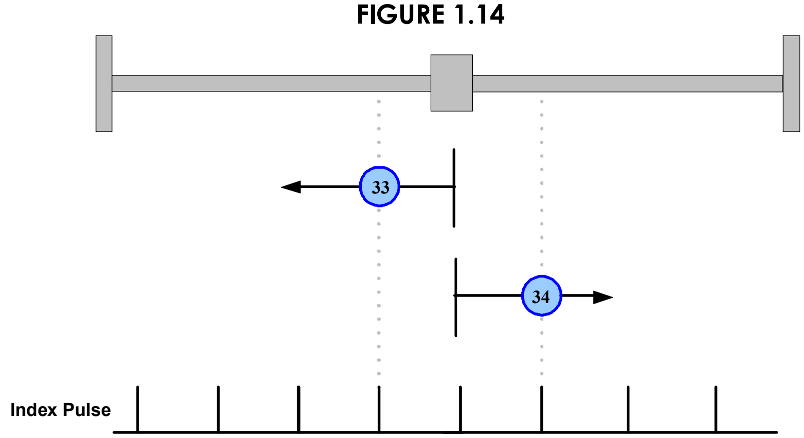
Methods 17-30: Homing without an Index Pulse These homing routines use the same methods as 1 to 14, except the index pulse is not used. Instead, the home position is dependant on the edge of the relevant home or limit switch. To illustrate this difference, Figure 1.13 shows the homing diagram for methods 19 and 20, which are equivalent to methods 3 and 4 without the index pulse.

FIGURE 1.13



Methods 33 and 34: Homing on the Index Pulse These homing methods home to the nearest index pulse. Method 33 homes in the negative directions and method 34 homes in the positive direction.

FIGURE 1.14



Method 35 This homing method requires no index pulse or switches and involves nothing more than using object "607Ch: Home Offset" to set a desired home position.

Homing Example This example assumes the drive starts in Shutdown control state and Pre-Operational communication state. The 1st TPDO is setup to send upon any change in the StatusWord. The 13th bit of the StatusWord is the "Homing Complete" bit that will indicate when homing has completed and the drive mode may be changed.

TABLE 1.60

COB-ID	Number of Bytes	Message / Data	Description
601	8	22 00 18 01 81 01 00 00	Set 1st TPDO COB-ID to 181h
601	8	22 00 18 02 FF 00 00 00	Set 1st TPDO Trigger mechanism to "immediate"
601	8	22 7C 60 00 00 00 00 00	Write 0 to home offset object
601	8	22 99 60 01 55 55 00 00	Write 50 RPM to the Search For Home Switch speed
601	8	22 99 60 02 55 55 00 00	Write 50 RPM to the Search For Index Speed
601	8	22 9A 60 00 37 89 41 00	Write 10^5 Cnts/s^2 to Homing Acceleration
601	8	22 98 60 00 22 00 00 00	Set Homing to method 34, "home to index in positive direction"
601	8	22 60 60 00 06 00 00 00	Set the drive in Homing Mode
000	2	01 01	Start communication state machine so PDOs can be processed
601	8	22 40 60 00 07 00 00 00	Set node 1 to Operation Disabled
601	8	22 40 60 00 0F 00 00 00	Set node 1 to Operation Enabled
601	8	22 40 60 00 1F 00 00 00	Start Homing on node 1
Wait for TPDO 1 to send a message containing 1 in the 13th bit.			
601	8	22 40 60 00 0F 00 00 00	Stop Homing on node 1
601	8	22 60 60 00 07 00 00 00	Set node 1 in PVT mode

1.7.5 Hard Stop Homing

Hard Stop Homing can be used to determine the home position when there are no available sensors such as a Limit Switch or Home Switch. The motor will move at the configured velocity until it detects the end of travel by colliding with the hard limit of the system, such as the end of a linear track. The method of detection can be configured to be based on one or more of the events Sustained Current Indicator, Zero Velocity, and Position Following Error.

Method -1 & -2: Hard Stop Homing

FIGURE 1.15

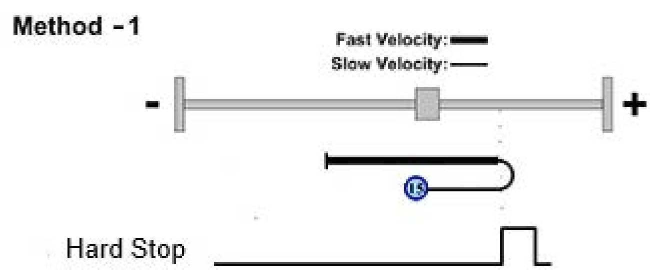
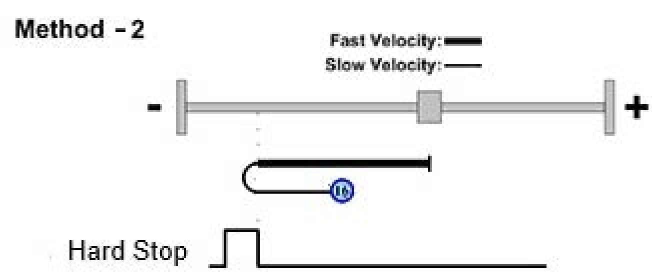


FIGURE 1.16



1.8 Modes of Operation

AMC CANopen drives close position, velocity, and torque (current) loops that are configurable via the CAN bus. There are 8 modes of operation available with object 6060h. Other modes of operation are achievable using ACE. When changing loop configurations using object 6060h, velocity and position loop feedback sources are not touched. This means changing loop configurations assumes the feedback wiring and project parameters are configured properly for both the present loop and the one the drive is moving to.

Follow the formula for Expedited SDO messages in the "SDO" section of this manual when writing to object 6060h. More information on object 6060h is found in the "Object Dictionary" on page 70.

FIGURE 1.17 **Available loop configurations via CANopen messaging.**

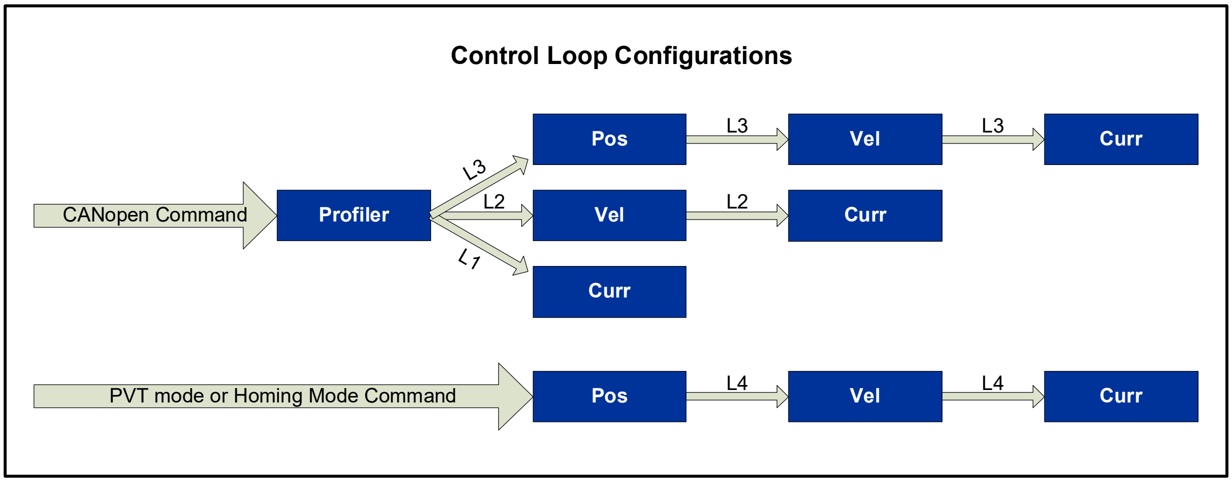


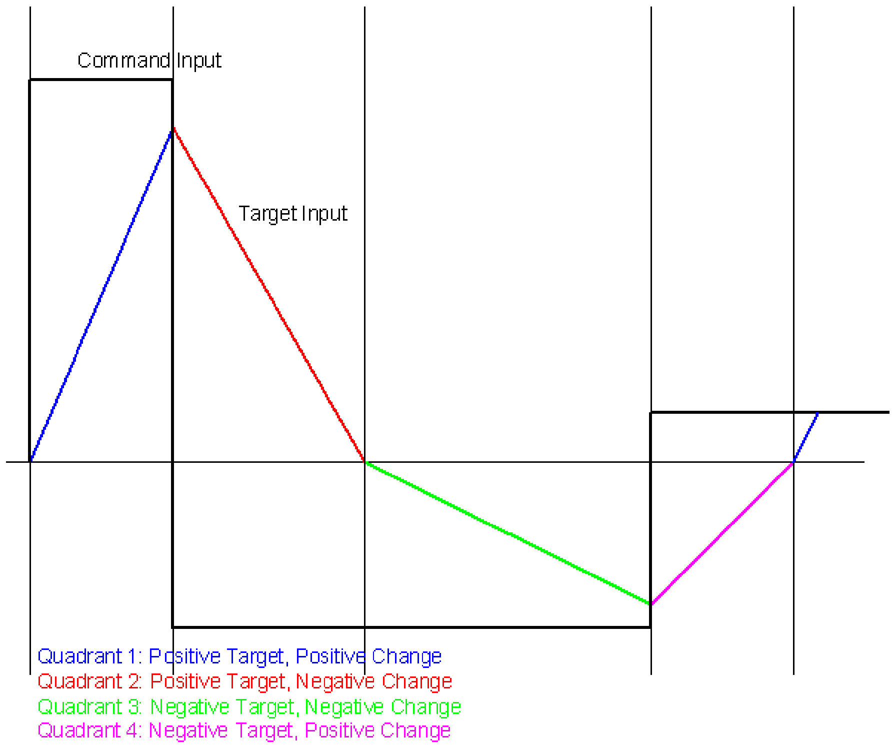
TABLE 1.61 **Modes of Operation**

Modes of Operation
Profile Position Mode
Profile Velocity Mode
Profile Torque Mode (current mode)
Homing Mode
Interpolated Position Mode (PVT)
Cyclic Synchronous Position Mode
Cyclic Synchronous Velocity Mode
Cyclic Synchronous Torque Mode
Custom Configured Modes

1.8.1 Profile Modes

In a profile mode of operation, the trajectory is limited by the drive. Profile modes use the command limiter values (object 203C) to limit the maximum command rate. If the host sends a large command step, the drive spreads the demand over some period of time to stay equal to or below the maximum defined rate. The command limiter is configurable to supply up to 4 different slopes depending on the input, as shown in Figure 1.18 below.

FIGURE 1.18



Profile Position Mode: (L3 from Figure 1.17) The AMC Position control loop is a fully de-coupled PID with velocity and acceleration feedforward terms. In Profile Position Mode, the drive closes three control loops, position, velocity, and current. The velocity loop provides additional "stiffness," keeping the dynamic position errors minimal because the drive now reacts not only to position errors, but also to velocity errors (which can be interpreted as position error changes). The Command Limiter is enabled in this mode. The Profiler sets limits on the rate of change of the target position command, otherwise called velocity. When commanding point-to-point moves, the velocity between points is limited to the maximum value set in the profiler. When tuning the position loop for profile position mode, proportional gain is typically all that is needed. It is important, however, to start with a stable, yet responsive velocity loop. Feedforward gain can be added to improve tracking performance, if needed. More information on tuning is found in the ACE application help files.

The following objects define how the drive will behave in Position mode.

TABLE 1.62

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation.
203Ch	Command Limiter Parameters	Sets the values used by the command limiter to limit the target command.
6086h	Motion Profile Type	Sets profiling to linear ramp. Currently this is fixed and read only.
2238h	Position Loop Control Parameters	Sets the tuning values associated with the position loop
2039h	Position Limits	Sets the trip points for various position events such as Max Measured Position Limit.
2012h	Position Values	Read instantaneous values such as Position demand and Position Target. This object is read only.
6064h	Actual Position	Same as 2012.01h, reads measured position value.
607Ah	Target Position	Sets the target position command.

Profile Velocity Mode: (L2 from Figure 1.17) The AMC Velocity control loop is a fully de-coupled PID with an acceleration feedforward term, and a low speed estimator. In Profile Velocity Mode, the drive closes two control loops, velocity, and current. Velocity feedback may be derived from a motor mounted encoder or analog source with a 10V maximum. The low speed estimator is most useful when necessarily tight velocity loops can cause audible noise during low speed moves (less than 1 count per velocity update).

The Command Limiter is enabled in this mode. The Limiter sets limits on the rate of change of the velocity command. When commanding large velocity transients, the resulting acceleration between points is limited to the maximum value set in the profiler.

When tuning the velocity loop it is important to start with a stable, yet responsive current loop. Feedforward gain can be added to improve tracking performance, if needed. More information on tuning is found in the ACE help files.

TABLE 1.63

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation.
203Ch	Command Limiter Parameters	Sets the values used by the command limiter to limit the target command.
6086h	Motion Profile Type	Sets profiling to linear ramp. Currently this is fixed and read only.
2236h	Velocity Indicators and Limits	Sets the trip points for various velocity events such as Over Speed.
2235h	Velocity Loop Gain Parameters	Sets the tuning values associated with the velocity loop
2011h	Velocity Values	Read instantaneous values such as Velocity demand and Velocity Target. This object is read only.
6069h	Velocity Sensor Actual Value	Same as 2011.01h, reads pre-filtered measured velocity value.
606Bh	Velocity Demand	Same as 2011.04h, reads Velocity Demand value.
606Ch	Actual Velocity	Same as 2011.02h, reads post-filtered measured velocity value.
60FFh	Target Velocity	Sets the target velocity command.

Profile Current Mode: (L1 from Figure 1.17) Presently AMC CANopen servo drives support Profile Current Mode, which is the basic building block of any CANopen servo system. The drive's current loop consists of a PI loop. Because torque is merely a constant Kt multiplied by a magnitude of current, it is the programmer's responsibility to convert current values into torque values in the software environment.

The Command Limiter is enabled in this mode and sets limits on the rate of change of the current command. During a step acceleration command, the change in commanded torque, known as Jerk, is limited to the maximum value set in the profiler.

Tune this loop according to "current loop tuning" instructions in the ACE Software Guide. The following objects are used to setup and operate the Current Mode:

TABLE 1.64

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation
203Ch	Command Limiter Parameters	Sets the values used by the command limiter to limit the target command.
6086h	Motion Profile Type	Sets profiling to linear ramp. Currently this is fixed and read only.
2231h	Current Loop and Commutation Values	Sets the tuning and commutation values associated with the current loop.
6071h	Target Current	Sets the target current command.
6077h	Actual Current	Reads the actual motor current (in case of 3-phase motors, this is a composite, equivalent single phase current).

1.8.2 Homing Mode: (L4 from Figure 1.17)

See "Homing" on page 40 for detailed information about methods and hardware involved in homing.

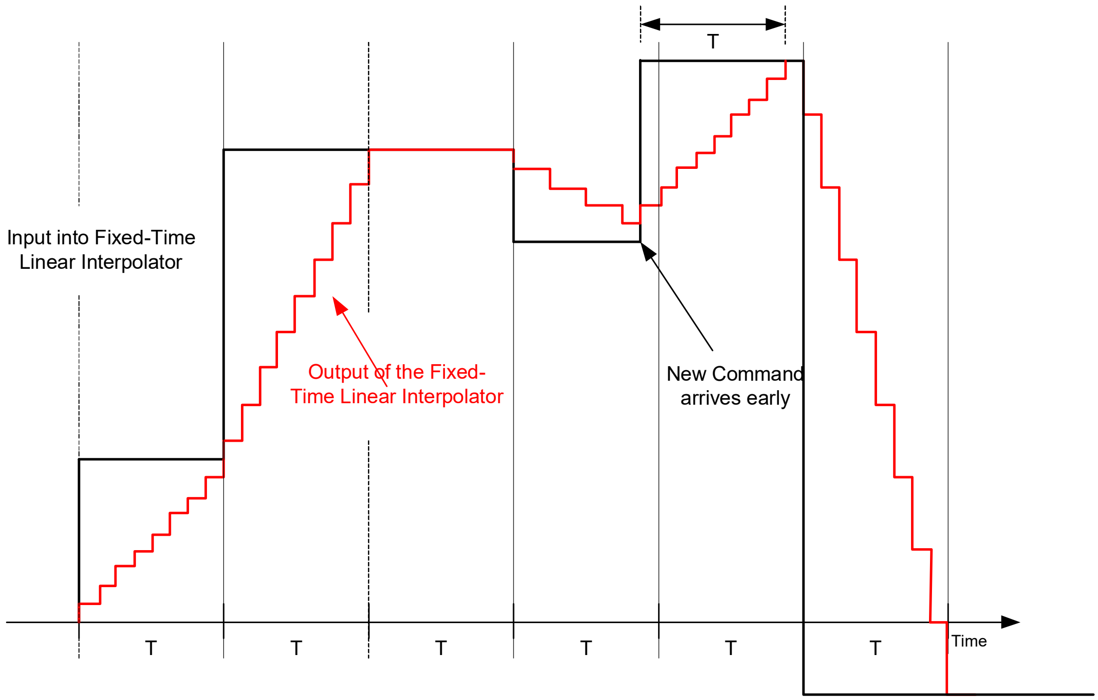
1.8.3 PVT (Interpolated Position Mode): (L4 from Figure 1.17)

PVT mode allows for synchronized multi axis move profiles using interpolated position and velocity. The three control loops, position, velocity, and current, are enabled while the profiler is disabled. The process for setting up and controlling motion using PVT Mode is explained in detail in "PVT Mode" on page 55.

1.8.4 Cyclic Synchronous Modes

Cyclic Synchronous Modes give responsibility of trajectory control to the host. There is no command limiter. Instead, the drive interpolates between command points, defining the rate by dividing the change in command by the interpolation time period (object 60C2). This allows the drive to respond smoothly to each step in command. Figure 1.19 below shows how the drive interpolates different commands, with T representing the interpolation time. In each case, the drive arrives at the commanded value at precisely T seconds after the command changed.

FIGURE 1.19



Cyclic Synchronous Position Mode In Cyclic Synchronous Position Mode, the drive closes three control loops: position, velocity, and current. The host can send target position, velocity feedforward, and current feedforward values to the drive. This allows for gain compensation in applications with varying loads. The Command Limiter is disabled in this mode, giving the host more control over the motion profile.

The following objects define how the drive will behave in Cyclic Synchronous Position Mode.

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation.
60B1h	Velocity Offset	Contains the input value for velocity feed forward.
60B2h	Current Offset	Contains the input value for current feed forward.
60C2h	Interpolation Time Period Value	Contatins the period used for the linear interpolation algorithm. Used with Cyclic synchronous modes of operation.
2238h	Position Loop Control Parameters	Sets the tuning values associated with the position loop.
2039h	Position Limits	Sets the trip points for various position events such as Max Measured Position Limit.
2012h	Position Values	Reads instantaneous values such as Position demand and Position Target. This object is read only.
6064h	Actual Position	Same as 2012.01h, reads measured position value.
607Ah	Target Position	Sets the target position command.

Cyclic Synchronous Velocity Mode

In Cyclic Synchronous Velocity Mode, the drive closes the velocity loop around the current loop. The host can send target velocity, velocity offset, and current feedforward values to the drive. This allows for gain compensation in applications with varying loads. The Command Limiter is disabled in this mode, giving the host more control over the motion profile.

The following objects define how the drive will behave in Cyclic Synchronous Velocity Mode.

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation.
60B1h	Velocity Offset	Contains the input value for velocity feed forward.
60B2h	Current Offset	Contains the input value for current feed forward.
60C2h	Interpolation Time Period Value	Contatins the period used for the linear interpolation algorithm. Used with Cyclic synchronous modes of operation.
2235h	Velocity Loop Gain Parameters	Sets the tuning values associated with the velocity loop.
2236h	Velocity Indicators and Limits	Sets the trip points for various velocity events such as Over Speed.
2011h	Velocity Values	Read instantaneous values such as Velocity Demand and Velocity Target. This object is read only.
6069h	Velocity Sensor Actual Value	Same as 2011.01h, reads pre-filtered measured velocity value.
606Bh	Velocity Demand	Same as 2011.04h, reads Velocity Demand value.
606Ch	Actual Velocity	Same as 2011.02h, reads post-filtered measured velocity value.
60FFh	Target Velocity	Sets the target velocity command.

Cyclic Synchronous Current Mode

In Cyclic Synchronous Current Mode, the drive closes the current loop. The host can send target current and current offset values to the drive. The Command Limiter is disabled in this mode, giving the host more control over the motion profile.

The following objects define how the drive will behave in Cyclic Synchronous Current Mode.

Object index	Name	Description
6060h	Modes Of Operation	Sends a request to change the drive's mode of operation.
6061h	Modes of Operation Display	Displays the actual mode of operation.
60B2h	Current Offset	Contains the input value for current offset.
60C2h	Interpolation Time Period Value	Contatins the period used for the linear interpolation algorithm. Used with Cyclic synchronous modes of operation.
2231h	Current Loop & Commutation Control Parameters	Sets the tuning values and commutation values associated with the current loop.
6071h	Target Current	Sets the target current command.
6077h	Actual Current	Reads the actual motor current (in case of 3-phase motors, this is a composite, equivalent single phase current)

1.8.5 Custom Defined Modes Of Operation

ADVANCED Motion Controls digital servo drives provide flexibility beyond the CANopen defined standard modes of operation. For a case where a drive configuration is desired that is not available via object 6060h, contact *ADVANCED* Motion Controls directly for technical support.

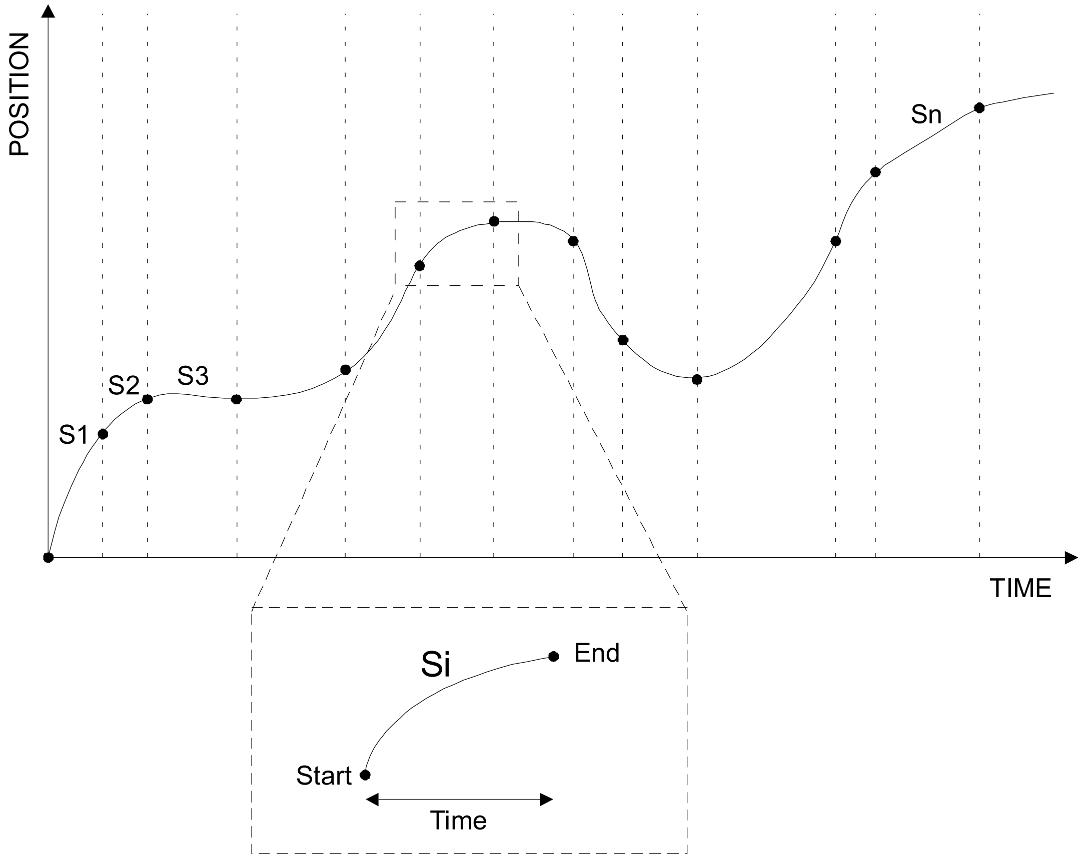
1.9 PVT Mode

1.9.1 PVT Overview

PVT mode is a position data-streaming mode that allows coordinated motion between multiple axes. Arbitrary position and velocity profiles can be executed on each axis. This is achieved via a so-called PVT command. A PVT command contains the position, velocity, and time information of profile segment end points. The servo drive performs a third order interpolation between segment end points. This results in a kind of partial trajectory generation where both host controller and servo drive generate a specific portion of the overall move profile trajectory. The host controller calculates position and velocity of intermittent points on the overall trajectory, while the servo drive interpolates between these intermittent points to ensure smooth motion. The actual position loop is closed within the drive. This reduces the amount of commands that need to be sent from host controller to drive, which is critical in distributed control systems. The number of segments and the time duration of each segment need to be selected based upon required accuracy and network bandwidth.

An arbitrary position profile can be split in multiple consecutive segments as follows:

FIGURE 1.20



Each segment has a start point and an end point. The end point of one segment is the start point of the next segment. Each segment end point (start or end) has a position and velocity value. The segment time can be variable depending on curvature (smaller time for rapidly changing positions).

PVT mode operates through PVT commands. A PVT command is an unconfirmed message (manufacturer specific RPDO 24). The PVT command contains segment end point position and velocity information, and segment time. A 15 level FIFO buffer alleviates host controller timing requirements. The buffer can be cleared and the buffer pointer can be re-positioned. The drive will also send the following PVT related error messages: buffer empty, buffer full, counter error, or message length error. The Time Stamp message can be used to maintain time synchronization of nodes involved in PVT motion.

1.9.2 PVT Messages

Enable PVT Since PVT commands are PDO messages, RPDO 24 must be enabled for PVT to work. To enable this PVT Buffer RPDO, configure its PDO Communication Parameter (1417.01h) to set bit 31 to 0 (enable PDO). In addition, the COB-ID for this PDO is selectable. Note that the following example assigns the COB-ID for this node to 531h.

TABLE 1.65

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID	22	17	14	01	31	05	00	00

Mode Selection To use PVT, the drive must be set for PVT Mode through Object 6060h (Modes of Operation). The message may look like this one where it is writing (without size indication) the value 07h for PVT mode into Object 6060h.

TABLE 1.66

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID	22	60	60	00	07	00	00	00

Configuration The following objects are useful for configuring the drive's behaviors in PVT mode. Set digital outputs to indicate PVT status or specify warning messages for minimum number of buffer points. When errors occur in PVT mode, select from multiple event actions to configure the drive to react appropriately.

TABLE 1.67

Object index	Sub-index Range	Name	Description
2048h	01h	PVT Parameters	Specifies the minimum number of buffered PVT end points before a warning message is sent
205Ah	31h – 35h	Digital Output Parameters	Assign digital outputs to indicate specific PVT status
2064h	1Ch – 20h	Fault Response Time Parameters	Sets the wait time before reacting to an occurrence of a PVT event
2065h	1Bh – 1Fh	Fault Event Action Parameters	Selects the event action when a PVT event occurs. Possible event actions include Disable Power Bridge, Dynamic Brake, and many others.
2066h	22h – 26h	Fault Recovery Time Parameters	Sets the amount of time after the cause of the PVT fault no longer exists before drive fault condition is cleared
2067h	1Fh – 23h	Fault Time-Out Window Parameters	Time after drive fault condition is cleared before a new occurrence is considered a new fault
2068h	27h – 2Bh	Fault Maximum Recoveries Parameters	Max number of faults before a permanent action is taken

PVT Message Protocol Once the drive is configured, it is ready to receive PVT segment end points into its 15 level FIFO buffer. The construction of the PVT message is made up of the COB-ID and eight data bytes, which are made up of the segment end point position, velocity, segment time, and integrity counter. The COB-ID can be any unique user-selectable value within the range of 181h-57Fh over the entire CANopen network. Note that both the Position and Velocity data bytes (three bytes each) are arranged in Little Endian format.

TABLE 1.68 PVT message construction

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Unique ID: XXXh	(LSB) Position Values (MSB)			(LSB) Velocity Values (MSB)			Time	Counter

TABLE 1.69 PVT message description

Data Bytes	Name	Description
Byte 1 Byte 2 Byte 3	Position Segment End Point	The segment end point position is a 24-bit value in counts (absolute or incremental position). The data are entered as hexadecimal, where Byte 3 is the Most Significant Byte (MSB) and Byte 1 is the Least Significant Byte (LSB). For more information refer to "2048h: PVT Parameters" on page 145.
Byte 4 Byte 5 Byte 6	Velocity Segment End Point	The segment end point velocity is a 24-bit value in counts per second. The data are entered as hexadecimal, where Byte 6 is the Most Significant Byte (MSB) and Byte 4 is the Least Significant Byte (LSB).
Byte 7	Segment Time Duration	Time duration in milliseconds. Minimum 2 (02h) milliseconds for 16kHz drives, 4 (04h) milliseconds for 10kHz drives. Maximum of 255 (FFh) milliseconds.
Byte 8	Integrity Counter	The integrity counter is an incremental counter that starts at zero and wraps around after 255 (FFh). PVT commands with non-consecutive counter values will result in an error message.

Clear Buffer If for any reason the PVT buffer should be cleared, writing the value 00h to Object 60C4.06h will remove all the points previously loaded in the buffer. Byte 8, the counter, will need to start at 00 when loading the next buffer point. This will cause the "PVT Buffer Empty" and "PVT Buffer Threshold" drive events to become active.

TABLE 1.70

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID	22	C4	60	06	01	00	00	00

End of Motion To end a PVT sequence, first insert a PVT point with a specified position, zero velocity, a specified time duration, and an Integrity Counter value incremented from the previous point. The next PVT point should have the same specified position, but with zero specified for both velocity and time. The Integrity Counter, however, continues to increment. Tables 1.71 and 1.72 give an example of the last two PVT messages to end the motion sequence.

TABLE 1.71

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Unique ID: XXXh	P	P	P	00	00	00	T	C

TABLE 1.72

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Unique ID: XXXh	P	P	P	00	00	00	00	C + 1

Start Motion Once there are enough PVT end points in the PVT buffer, motion may begin. With the drive in Operation Enabled state, sending a broadcast message with COB-ID 500h (no data bytes required) will start motion on all axes. Note that this command can be sent as soon as the nodes involved have received at least one PVT command. To ensure smooth motion, new PVT commands must be sent in a timely fashion.

Note

Note that the Zero Velocity event must be active prior to sending the PVT start command, or motion will not occur.

TABLE 1.73

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
500h	-	-	-	-	-	-	-	-

Stop Motion When the drive executes the final PVT end sequence command, motion will stop. However as with any other modes, the ControlWord (Object 6040h) may stop the motion with a state change from the Operation Enabled state, to a disabled state such as Switch On Disabled.

TABLE 1.74

Arbitration Field	Data Field							
COB-ID	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node-ID	22	40	60	00	04	00	00	00

1.9.3 PVT Status

The following objects display the PVT status of the drive.

TABLE 1.75

Object index	Sub-index range	Name	Description
2002h	06h	Drive Status	The bits in this sub-index provide status on the PVT buffer
201Dh	01h	PVT Status	Same as bits 0 – 5 of object 2002.06h
201Dh	02h	PVT Points Remaining	Remaining number of points in the buffer to be executed
201Dh	03h	PVT Sequence Number	The current PVT point in the buffer

1.9.4 Buffer Characteristics

Object 60C4h is the Interpolation Data Configuration. It provides information regarding the PVT buffer and also allows modifications to the buffer, such as removing all the PVT end points already in the buffer.

TABLE 1.76

Object index	Sub-index range	Name	Description
60C4h	01h	Max Buffer Size	Maximum size of PVT buffer
60C4h	02h	Actual Buffer Size	Shows the actual size of the PVT buffer
60C4h	03H	Buffer Organization	Specifies that it is a FIFO buffer
60C4h	04H	Buffer Position	Indicates the position of the buffer
60C4h	05h	Size of Data Record	Indicates the length of a PVT point (8 bytes)
60C4h	06h	Buffer Clear	Clears all segment end points in the PVT buffer

Error Messages The drive will generate error messages in PVT mode. The emergency message protocol (COB-ID 80h + Node-ID) is used to transmit the error message. Refer to EMERGENCY Messages for decoding emergency messages.

1.9.5 PVT Example

This example shows how to configure and use PVT Mode to command a simple position move with a trapezoidal velocity profile. The motor is commanded from 0 to a position of 80,000 counts in 12 seconds, where the accel and decel is limited to 2500 counts/s and the max velocity during the move is 10,000 counts/s. A scope plot of the move, along with the PVT points is shown as well. This example can be extended to any position trajectory by using different PVT points. SDO size indication is disabled in this example.

Transition to the Switch On Disabled State

Read 6041.h to verify which state the drive is in.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	40 41 60 00 00 00 00 00	704	704
581	8	42 41 60 00 37 06 00 00	705	1

Write the appropriate data to the Control Word 6040h to place the drive in Switch on Disabled State.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 40 60 00 04 00 00 00	705	0
581	8	60 40 60 00 00 00 00 00	706	1

Configure the 24th RPDO

First transition the drive into the pre-operational NMT state to allow for PDO configuration.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
000	8	80 01 00 00 00 00 00 00	706	0

The 24th RPDO is used to write PVT points to the PVT buffer. To configure the 24th RPDO, set the COB-ID of the 24th RPDO (COB-ID is 501h in this example) and set bit 31 to 0 to turn the RPDO on.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 17 14 01 01 05 00 00	707	0
581	8	60 17 14 01 00 00 00 00	708	1

Set Mode of Operation to PVT Mode

Write a 7h to 6060h to put the drive in PVT Mode.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 60 60 00 07 00 00 00	708	0
581	8	60 60 60 00 00 00 00 00	709	1

Set Buffer Threshold Warning Level

A buffer threshold warning will occur when the number of PVT points in the PVT buffer is less than the value in the Buffer Threshold Warning object 2048.01h. The value is 10 (Ah) in this example.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 48 20 01 0A 00 00 00	709	0
581	8	60 48 20 01 00 00 00 00	710	1

Configure the 24th TPDO

The 24th TPDO is transmitted when a buffer threshold warning occurs, that is when the number of PVT points in the buffer is less than the value in the Buffer Threshold Warning object 2048.01h. The data in the TPDO is the number of points currently in the buffer..

To configure the 24th TPDO, set the COB-ID of the 24th TPDO (COB-ID is 381h in this example) and set bit 31 to 0 to turn the TPDO on.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 17 18 01 81 03 00 00	710	0
581	8	60 17 18 01 00 00 00 00	711	1

Other PVT Setup

Transition the drive into the operational NMT state to allow use of PDOs.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
000	8	01 01 00 00 00 00 00 00	711	0

Write a 0 to the PVT Input Method object 2048.02 if the PVT points are absolute. Write a 1 for incremental PVT points. This example uses absolute PVT points.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 48 20 02 00 00 00 00	711	0
581	8	60 48 20 02 00 00 00 00	712	1

Clear the PVT buffer by writing a 0 to the Buffer Clear object 60C4.06h.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 C4 60 06 00 00 00 00	712	0
581	8	60 C4 60 06 00 00 00 00	713	1

Enable the Drive

The following frames alternately write to the control word and read the Status word until the drive is in the Operation Enabled state.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	22 40 60 00 06 00 00 00	713	0
581	8	60 40 60 00 00 00 00 00	714	1
601	8	40 41 60 00 00 00 00 00	764	50
581	8	42 41 60 00 21 06 00 00	765	1
601	8	22 40 60 00 0F 00 00 00	815	50
581	8	60 40 60 00 00 00 00 00	816	1

The following message checks to see if the drive is in the fault state.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
601	8	40 41 60 00 00 00 00 00	866	50
581	8	42 41 60 00 37 06 00 00	866	0

Load the PVT Buffer

The PVT buffer is a FIFO buffer that can contain up to 15 PVT points. The first 15 PVT points are written to the buffer using the 24th RPDO.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
501	8	4E 00 00 71 02 00 FA 00	866	0
501	8	38 01 00 E2 04 00 FA 01	867	1
501	8	BF 02 00 53 07 00 FA 02	867	0
501	8	E2 04 00 C4 09 00 FA 03	867	0
501	8	A1 07 00 35 0C 00 FA 04	867	0
501	8	FC 0A 00 A6 0E 00 FA 05	867	0
501	8	F4 0E 00 17 11 00 FA 06	867	0
501	8	88 13 00 88 13 00 FA 07	867	0
501	8	B8 18 00 F9 15 00 FA 08	868	1
501	8	84 1E 00 6A 18 00 FA 09	868	0
501	8	ED 24 00 DB 1A 00 FA 0A	868	0
501	8	F2 2B 00 4C 1D 00 FA 0B	868	0
501	8	93 33 00 BD 1F 00 FA 0C	868	0
501	8	D0 3B 00 2E 22 00 FA 0D	868	0
501	8	AA 44 00 9F 24 00 FA 0E	868	0

Start PVT

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
500	8	00 00 00 00 00 00 00 00	868	0

The 24th TPDO transmits everytime the number of points in the PVT buffer is less than the buffer threshold warning value. In this example, the buffer threshold is 10 which means when the 10th PVT point is consumed, the 24th TPDO transmits and tells you there are 9 points left in the buffer. When this occurs, we know to send 6 more PVT points to fill the (15 point) buffer. This continues until all of the PVT points are consumed and the PVT stop point is sent.

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	2375	1507
501	8	20 4E 00 10 27 00 FA 0F	2375	0
501	8	E4 57 00 10 27 00 FA 10	2376	1
501	8	A8 61 00 10 27 00 FA 11	2376	0
501	8	6C 6B 00 10 27 00 FA 12	2376	0
501	8	30 75 00 10 27 00 FA 13	2376	0
501	8	F4 7E 00 10 27 00 FA 14	2376	0

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	3875	1499
501	8	B8 88 00 10 27 00 FA 15	3875	0
501	8	7C 92 00 10 27 00 FA 16	3876	1
501	8	40 9C 00 10 27 00 FA 17	3876	0
501	8	04 A6 00 10 27 00 FA 18	3876	0
501	8	C8 AF 00 10 27 00 FA 19	3876	0
501	8	8C B9 00 10 27 00 FA 1A	3876	0

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	5375	1499
501	8	50 C3 00 10 27 00 FA 1B	5376	1
501	8	14 CD 00 10 27 00 FA 1C	5376	0
501	8	D8 D6 00 10 27 00 FA 1D	5376	0
501	8	9C E0 00 10 27 00 FA 1E	5376	0
501	8	60 EA 00 10 27 00 FA 1F	5376	0
501	8	D5 F3 00 9F 24 00 FA 20	5376	0

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	6875	1499
501	8	AF FC 00 2E 22 00 FA 21	6875	0
501	8	EC 04 01 BD 1F 00 FA 22	6875	1
501	8	8E 0C 01 4C 1D 00 FA 23	6875	0
501	8	92 13 01 DB 1A 00 FA 24	6875	0
501	8	FB 19 01 6A 18 00 FA 25	6876	1
501	8	C7 1F 01 F9 15 00 FA 26	6876	0

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	8375	1499
501	8	F8 24 01 88 13 00 FA 27	8375	0
501	8	8B 29 01 17 11 00 FA 28	8375	0
501	8	83 2D 01 A6 0E 00 FA 29	8375	0
501	8	DE 30 01 35 0C 00 FA 2A	8376	1
501	8	9E 33 01 C4 09 00 FA 2B	8376	0
501	8	C0 35 01 53 07 00 FA 2C	8376	0

COB-ID	# of Bytes	Message / Data	Message Time Stamp (ms)	Time From Previous Message (ms)
381	4	09 00 00 00	9875	1499
501	8	47 37 01 E2 04 00 FA 2D	9875	0
501	8	31 38 01 71 02 00 FA 2E	9875	0
501	8	80 38 01 00 00 00 FA 2F	9875	0
501[1]	**8**	**80 38 01 00 00 00 00 30**	**9876**	**1**
381[2]	**4**	**09 00 00 00**	**10875**	**999**

1. PVT stop point
2. Buffer threshold warning

Raw PVT Points

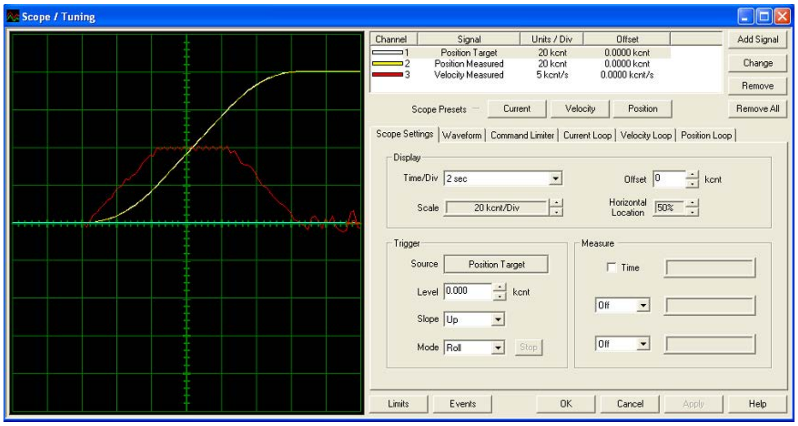
The units for position, velocity, and time are counts, counts/s, and milliseconds, respectively.

#	P	V	T
1	78	625	250
2	312	1250	250
3	703	1875	250
4	1250	2500	250
5	1953	3125	250
6	3812	3750	250
7	3828	4375	250
8	5000	5000	250
9	6328	5625	250
10	7812	6250	250
11	9453	6875	250
12	11250	7500	250
13	13203	8125	250
14	15312	8750	250
15	17578	9375	250
16	20000	10000	250
17	22500	10000	250

#	P	V	T
18	25000	10000	250
19	27500	10000	250
20	30000	10000	250
21	32500	10000	250
22	35000	10000	250
23	37500	10000	250
24	40000	10000	250
25	42500	10000	250
26	45000	10000	250
27	47500	10000	250
28	50000	10000	250
29	52500	10000	250
30	55000	10000	250
31	57500	10000	250
32	60000	10000	250
33	62421	9375	250

#	P	V	T
34	64687	8750	250
35	66796	8125	250
36	68750	7500	250
37	70546	6875	250
38	72187	6250	250
39	73671	5625	250
40	75000	5000	250
41	76171	4375	250
42	77187	3750	250
43	78046	3125	250
44	78750	2500	250
45	79296	1875	250
46	79687	1250	250
47	79921	625	250
48	80000	0	250
49	80000	0	0

Oscilloscope Plot of PVT Move



1.10 Connecting to an AMC CANopen Drive

Connecting to an *ADVANCED* Motion Controls' CANopen drive is possible via two communication interfaces on the drive. One interface is the CANopen communication interface, which is used after the drive is configured for proper operation. The other interface is a RS-232 serial communication interface. This is used when first configuring a drive project file according to the application needs and storing it to the drive's Non Volatile Memory.

1.10.1 RS-232 Interface Setup

All that is needed is a standard serial cable connected from the drive RS-232 port to a computer. If the computer does not have a serial port on it, a converter such as USB to RS-232 may be used. Other converters may be used as long as they can operate between 9600 and 115200 baud. Higher baud rates will achieve better performance for the oscilloscope and other various features. Refer to the hardware manual and software configuration manual for more information about connecting to the RS232 interface.

1.10.2 CAN Interface Setup

Before communication can occur over a CANopen network, each node on the network must be configured for a specific node address, baud rate, and termination setting.

Node Addressing Each node in a CANopen network must have a unique Node-ID. Please refer to the hardware manual and software configuration manual for more information regarding address selection.

Baud Rate Selection Each node in a CANopen network (including the host) must operate at the same CAN bus bit rate. Please refer to the hardware manual for information regarding CAN bus baud rate selection.

Termination Setting The last node in a CANopen network must provide CAN bus termination. Please refer to the drive manual for information regarding termination options.

1.11 Hardware Requirements

1.11.1 CAN Card

AMC CANopen drives communicate with any CAN compatible hardware. CAN hardware is readily available from a variety of vendors. PC based CAN controllers are found in several common forms such as parallel-to-CAN, USB-to-CAN, serial-to-CAN or PCI-to-CAN.

Regardless of manufacturer and type, the CAN controller must be installed along with its appropriate software.

1.11.2 API

Every CAN controller includes an API (application to programmer interface). This is a library of functions that allows a programmer to utilize the CAN card to communicate with nodes on a CANopen network. Documentation for the CAN card's API will be available from the manufacturer.

1.11.3 Mating Connector

AMC CANopen drives use a low-density, male, 9-pin D-SUB mating connector shown in the table below. All of the components can be obtained from Tyco Electronics at www.tycoelectronics.com, or by calling (800-522-6752).

TABLE 1.77

Parts Needed	Description	Part Number
D-SUB plug:	Main body, pins not inserted	205204-4
Shell Kit:	Outer shell, metal plated for shielding. Includes strain relief.	748677-1
Pins:	Insert pins for the Plug body. May be purchased loose or on a strip.	Loose: 5-66507-7 Strip: 3-66507-0

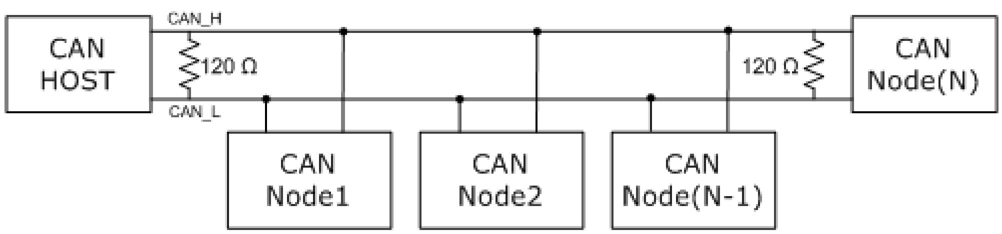
1.11.4 Wiring

Table 1.78 shows the standard AMC drive CANopen interface connector. Please note that the AMC ZDCR series drives have a different interface layout, refer to the drive's manual for a detailed description. Figure 1.21 shows an example of how the bus for an N node CANopen network should be wired.

TABLE 1.78

PIN	NAME	Description	I/O
1	--	Not Connected	NA
2	CAN_L	CAN_L bus line (dominant low)	Input
3	CAN_GND	CAN bus ground	GND
4	--	Not Connected	NA
5	CAN_SHIELD	CAN shield	SHIELD
6	--	Not Connected	NA
7	CAN_H	CAN_H bus line (dominant high)	Input
8	CAN_TERM	Termination. Connect to CAN_H for CAN bus termination via 120 Ohm resistor.	GND
9	CAN_V+	Optional external supply (7.5 – 24 VDC) for communication	Input

FIGURE 1.21



CAN_H, CAN_L, CAN_GND (Pins 7,2,3) These are a differential pair referenced to signal ground; they are considered the CAN bus.

CAN_V+ (Pin 9) Because the CAN interface can be completely isolated, external power may be required for the communication hardware in the drive. Please refer to the drive hardware manual for information regarding CAN interface isolation. The supply voltage common must connect to the CAN_GND, pin-3.

CAN SHIELD (Pin 5) AMC recommends using shielded cable with shielded twisted pairs. Each twisted pair should have one drain wire that must be terminated on one end only.

Proper Cable Shielding Bring all twisted pair shields or drain wires to CAN_SHIELD, pin-5. Do not connect the shield to anything on the other end of the cable.

Bring outer cable shield to the metal D-SUB connector shell that connects to the AMC drive. Do not connect the outer shield on the other end of the cable.

DO NOT TERMINATE SHIELDS ON BOTH ENDS OF ANY CABLE; DOING SO WILL CREATE GROUND LOOPS AND POSSIBLY CREATE NOISE PROBLEMS!

CAN_TERM (Pin 8) The CAN network must be terminated by a 120 Ohm termination resistors on both ends. Generally the host controller will have the first 120-Ohm termination resistor in the network. The only other node to use a 120-Ohm termination resistor is the last node. Each node should branch from the main cable with the shortest possible stub length. This avoids reflections and transmission line effects in the communication line. If long branches are unavoidable, a termination resistor may be required.

2 Object Dictionary

2.1 Dictionary Table Format

The object dictionary provides one entry for each existing object. Since objects may or may not have sub-indices, the following convention is used for each entry:

FIGURE 2.1 Object Table Convention

2002.01h	Sub Index Name			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(15)}$-1]	N/A (SF1)	Read / Write*	No
Description: Detailed description of what this object does and how to use it. * This indicates a note about conditions.				

In the example of Figure 2.1 the object index and sub-index is referenced via the dot (.). 2002h is the object index and .01h is the sub-index. Objects without sub-indices will be referenced without the dot (.). Furthermore, each entry has the following attributes:

- Data Type: This field specifies the data type of the object. Data types can be 8-bit, 16-bit, 32-bit, or string.
- Range: This field specifies the usable range of the values this object can contain.
- Units: This field specifies the units that apply to the value stored in this object. If the value contained in this object has no units, the field will contain "N/A". The appropriate physical unit is only supplied if there is a one-to-one relationship between the physical unit and the drive data type or if a generic scaling factor is used. If a generic scaling factor is used, its abbreviation will be supplied in brackets beside the units (as shown in Figure 2.1). For units that require specific scaling between a physical unit and the drive data type, an abbreviation for a drive unit is supplied. All scaling factors and drive units are described in "Appendix" on page 337 according to their abbreviation.
- Accessibility: This field specifies whether the object can be read or written to. If there is a * in this box, then the object may only be accessible in certain modes. See the Description box for more information about mode dependencies.
- Stored to NVM: This field specifies whether or not the object can be stored to Non Volatile Memory such that it is recalled on power up.
- Description: This field contains detailed information on the object and what it is used for.

2.2 Configuration Objects

Although the following objects are used predominately during drive setup and initialization, they are not restricted to use only during setup. Configuration objects can be divided into the following three categories.

- Administrative Objects: These objects are used for administrative operations such as loading or restoring parameters from non-volatile memory.
- Communication Objects: These objects determine the CANopen communication settings of the drive.
- Drive Objects: These objects define the drive configuration and are largely determined by the ACE setup and configuration software. Objects which contain general drive information are also available.

2.2.1 General Settings

1000h: Device Type

1000h	Device Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – $[2^{(32)} - 1]$	N/A	Read Only	No

Description:

Contains information about the device type. This 32-bit object is split into two 16-bit fields. Bits 0-15 describe the device profile and bits 16-31 supply additional optional information about the device. AMC drives fit under device profile number 402 (Drives and Motion Control), which is represented by 0192h in the first 16-bit field. Servo drives are designated by setting the second bit of the second field (bit 17) to 1.

Bit 0-15	Device Profile Number = 0192h (402 - Drives and Motion Controllers)
Bit 16-23	Type = 02h (Servo Drive
Bit 24-31	Reserved = 00

2100h: Data Acquisition Module Command Overview

2100.01h	Module Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(16)} - 1]$	N/A	Read Only	No

Description:

16-bit Data Acquisition Status Register.

Bits	Name	Description
[7:0]	Runtime Mode	This value indicates what the Module is doing: 0: Not Running 1: Idle Mode 2: Armed for Trigger Mode 3: Waiting for Trigger Mode 4: Capturing Data Mode 5: Post Capture Mode
[11:8]	Buffer 1 Status	This value indicates what each of the two Data Acquisition Buffers are doing: 0: Free/Unused 1: Presently Being filled with data 2: Buffer is full of data and ready to be read out 3: Buffer is busy transferring data out
[15:12]	Buffer 2 Status	

2100.02h	Acquisition Mode Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} – 1]$	N/A	Read / Write	No

Description:
Configures the operation mode of the module.

Bits	Name	Description
[7:0]	Operational Mode	This value specifies the operational mode of the module. Valid values are: O: Off 1: Auto Capture Mode: The specified data channels are constantly capturing data at the specified rate 2: Immediate Capture Mode: Regardless of the trigger configuration, the buffers will begin filling up with captured data 3: Normal Triggered Mode: Data capture will begin every time a valid trigger event occurs 4: Single Trigger Mode: Data will be captured starting from a valid trigger event and will continue until the final buffer is full
[15:8]	Data Decimation Rate	This parameter specifies how much the sample data will be decimated. The valid values are as follows: A sample will be taken: 0: Every servo interrupt, (approx. 50usec) 1: Every 2 Servo interrupt, (approx. 100usec) 2: Every 4 Servo interrupt, (approx. 200usec) 3: Every 10 Servo interrupts, (approx. 500usec) 4: Every 20 Servo interrupts, (approx. 1msec) 5: Every 40 Servo interrupts, (approx. 2msec) 6: Every 100 Servo interrupts, (approx. 5msec) 7: Every 200 Servo interrupts, (approx. 10msec) 8: Every 400 Servo interrupts, (approx. 20msec) 9: Every 1000 Servo interrupts, (approx. 50msec) 10: Every 2000 Servo interrupts, (approx. .1sec) 11: Every 4000 Servo interrupts, (approx. .2sec) 12: Every 10000 Servo interrupts, (approx. .5sec) 13: Every 20000 Servo interrupts, (approx. 1sec) 14: Every 40000 Servo interrupts, (approx. .sec)

2100.03h	Event Trigger Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	No

Description:

Configures what will cause the data capture to begin.

Bits	Name	Description
[0]	Trigger 1 Polarity	This configures the logical polarity of the two trigger sources. Valid values are: 0: Standard polarity 1: Inverted Polarity
[1]	Trigger 2 Polarity	
[6:2]	Combination	This parameter Specifies the source of the Trigger event. Valid values are: 0: No Trigger Specified 1: Trigger 1 only 2: Trigger 2 only 3: Trigger1 OR Trigger 2 4: Trigger1 AND Trigger 2 5: Trigger 1 XOR Trigger 2
[15:7]	Trigger Position	This 9bitU8 number specifies the percentage of the captured data that occurs BEFORE the trigger event. Valid range: 0<= value < 0x100

2100.04h	Trigger 1 Config			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$ –1]	N/A	Read / Write	No

Description:

Specifies what will cause Trigger #1 to go active.

Word	Bits	Name	Description
0	[7-0]	Trigger Type	This value specifies the type of trigger. Valid values are: 0: No Trigger 1: Signal value rising through trigger level: Pre: sig < level => Post: sig > level 2: Signal value rising to/through trigger value: Pre: sig < level => Post: sig >= level 3: Signal Value falling through trigger level: Pre: sig > level => Post: sig < level 4: Signal Value falling to/through trigger level: Pre: sig > level => Post: sig <= level 5: Signal value Greater than the trigger level: sig > level 6: Signal value Greater than or equal to the trigger level: sig >= level 7: Signal value Less than the trigger value: sig < level 8: Signal value Less than or equal to the trigger value: sig <= level
0	[15-8]	Trigger Signal Source Select	This parameter selects the source of the trigger signal. Valid values are contained in the list of signal enums described above.
1	[7-0]	Trigger Delay Count	This 8bit parameter selects the number of triggers that will occur BEFORE the trigger event is generated and the data may be captured.
1	[15-8]	Debounce Count	This 8bit parameter specifies the number of data samples that the trigger condition must be valid before a trigger is signaled.
2	[15-0]	Minimum Active Time	Specifies the minimum number off data samples that the condition must be true (not implemented yet)
3	[15-0]	Maximum Active Time	Specifies the maximum number for data samples that the condition must be true (not implemented yet)
7-4	-	Trigger Threshold Information	The value of this parameter is dependent of the trigger type as described below.

2100.05h	Trigger 2 Config			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	N/A	Read / Write	No

Description:

Specifies what will cause Trigger #2 to go active.

Word	Bits	Name	Description
0	[7-0]	Trigger Type	This value specifies the type of trigger. Valid values are: 0: No Trigger 1: Signal value rising through trigger level: Pre: sig < level => Post: sig > level 2: Signal value rising to/through trigger value: Pre: sig < level => Post: sig >= level 3: Signal Value falling through trigger level: Pre: sig > level => Post: sig < level 4: Signal Value falling to/through trigger level: Pre: sig > level => Post: sig <= level 5: Signal value Greater than the trigger level: sig > level 6: Signal value Greater than or equal to the trigger level: sig >= level 7: Signal value Less than the trigger value: sig < level 8: Signal value Less than or equal to the trigger value: sig <= level
0	[15-8]	Trigger Signal Source Select	This parameter selects the source of the trigger signal. Valid values are contained in the list of signal enums described above.
1	[7-0]	Trigger Delay Count	This 8bit parameter selects the number of trigger events that will occur BEFORE the data is captured.
1	[15-8]	Debounce Count	This 8bit parameter specifies the number of data samples that the trigger condition must be valid before a trigger event is signaled.
2	[15-0]	Minimum Active Time	Specifies the minimum number off data samples that the condition must be true (not implemented yet)
3	[15-0]	Maximum Active Time	Specifies the maximum number for data samples that the condition must be true (not implemented yet)
7-4	-	Trigger Threshold Information	The value of this parameter is dependent of the trigger type as described below.

2100.06h	Trace Table			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	No

Description:

A list of enum values that specifies which drive signals to capture. See Table A.3 in Appendix B for a list of Drive Signal Enums.

Word	Bits	Name	Description
0	[7-0]	Capture Signal Source Select 1	This parameter selects the source of the captured signal. Valid values are contained in the list of signal enums as described above. The size of the selected signals, in words, must not exceed 16. Signals with 16-bits of data consume 1 channel, Signals with 32-bits of data consume 2 channels, etc. A signal is selected from the master list of signals listed above. Any combination of signals may be captured, as long as the total number of channels consumed is less than or equal to 16.
0	[15-8]	Capture Signal Source Select 2	
1	[7-0]	Capture Signal Source Select 3	
1	[15-8]	Capture Signal Source Select 4	
2	[7-0]	Capture Signal Source Select 5	
2	[15-8]	Capture Signal Source Select 6	
3	[7-0]	Capture Signal Source Select 7	
3	[15-8]	Capture Signal Source Select 8	
4	[7-0]	Capture Signal Source Select 9	
4	[15-8]	Capture Signal Source Select 10	
5	[7-0]	Capture Signal Source Select 11	
5	[15-8]	Capture Signal Source Select 12	
6	[7-0]	Capture Signal Source Select 13	
6	[15-8]	Capture Signal Source Select 14	
7	[7-0]	Capture Signal Source Select 15	
7	[15-8]	Capture Signal Source Select 16	

2200h: File Transfer System

2200.01h	File Transfer System Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:
Can be used to read the status of the FTS module and what type of file has been transferred.

Bits	Name	Description
[3:0]	Transfer Status	0 - Idle 1 - Reset Pending 2 - Read in Progress 3 - Read Complete 4 - Write in Progress 5 - Write Complete 6 - Parameter File Load in Progress 7 - Parameter File Store in Progress 8 - Parameter File Load Error 9 - Parameter File Read Error
[7:4]	File Type	0 - No File 1 - User Storage 2 - Data Acquisition File 3 - ACE Storage 4 - Drive Parameter 5 - ACE Shared - Read Only 6 - ACE Shared - Read/Write
[15:8]	Reserved	Read as zero.

2200.02h	File Transfer System Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read/Write	No

Description:
Can be used to read the status of the FTS module and what type of file has been transferred. To store all parameters to NVM the user should first read 2200.01h to confirm the status of the FTS module. The user can proceed with writing 0xA5DE0944 to 2200.02h to store all parameters if the transfer status of the FTS module returns a value of 0, 3, or 5. .

Bits	Name	Description
[3:0]	Command/Action	0 - Reset 1 - Write 2 - Read
[7:4]	File Type	0 - No File 1 - User Storage 3 - ACE Storage 5 - ACE Shared - Read Only 6 - ACE Shared - Read/Write
[15:8]	Transfer Type/Size	The type of file that will be transferred. This will also determine the sub-index the file will be transferred to. Valid Values: 0 - 16 words; sub-index 3 1 - 32 words; sub-index 4 2 - 64 words; sub-index 5 3 - 128 words; sub-index 6 4 - 256 words; sub-index 7 5 - 512 words; sub-index 8 6 - 1024 words; sub-index 9 7 - 2048 words; sub-index 10
[31:16]	File Index	This determines which index, or offset, of the File Type will be transferred. Valid Values: 0 to "storage size divided by transfer size minus 1" ACE Storage - 6144 words ACE Shared - 2048 words User Storage - 4096 words

2200.03h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2200.04h	Block Transfer - 32 Words			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read/Write	No

Description:

This sub-index is a 34-word register. Up to 32 words of data can be transferred here using the FTS command object and then read.

Word	Bits	Name	Description
0	[3:0]	Transfer Command	An Action enum indicating the indented type of transfer.
	[7:4]	File Type	A File type enum indicating the file that is being transferred.
	[15:8]	Transfer Type	A Transfer type enum that MUST match the sub-index that will be read from or written to.
1	[9:0]	File Index	This is an unsigned integer that represents the array element of the transfer type that is "overlaid" on top of the specified file storage area. If the file index specified references an area that is outside of the file storage area, the command will fail.
	[15:10]	Reserved	Should always be zero
2-33	-	User Data	This block of data is the data that is being written to/read from the drive.

2200.05h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2200.06h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2200.07h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2200.08h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2200.09h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2200.0Ah	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2200.0Bh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2200.0Ch	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

100Ch: Guard Time

100Ch	Guard Time			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)} – 1]$	N/A	Read / Write	Yes
Description: Used with object 100Dh (Life Time Factor) to store the guard time in ms and the Life Time Factor. The Life Time Factor multiplied with the guard time gives the lifetime for the Life Guarding Protocol.				

100Dh: Life Time Factor

100Dh	Life Time Factor			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	$0 – [2^{(8)} – 1]$	N/A	Read / Write	Yes
Description: Used with object 100Ch (Guard Time) to store the guard time in ms and the Life Time Factor. The Life Time Factor multiplied with the guard time gives the lifetime for the Life Guarding Protocol.				

1016h: Consumer Heartbeat Time

1016.01h	Consumer Heartbeat Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - [2^{(32)} - 1]$	milliseconds (ms)	Read / Write	No

Description:
Represents the time in which the consumer should expect to receive a heartbeat message. If a heartbeat is not detected within this time frame, the drive will experience a communication error. The action taken during a communication error is configurable. When set to zero, the consumer heartbeat time function is turned off. For details about the format of this sub-index see "Heartbeat" on page 9.

1017h: Producer Heartbeat Time

1017.00h	Producer Heartbeat Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	No

Description:
Represents the time between successive heartbeat messages. Once assigned to a device, that device will begin sending heartbeat messages. They can be any integer value between 1 and 65535. When set to zero, the producer heartbeat is disabled.

1018h: Identity Object

1018.01h	Vendor ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No

Description:
A unique vendor identifier. Always BDh for *ADVANCED* Motion Controls' drives.

20E6h: CANopen Configuration Parameters

20E6.01h	Baud Rate			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0-3	Kbps	Read / Write	Yes

Description:
Supported CAN Baud Rate values.

Value	Baud rate speed
0	1000 Kbps (Default)
1	500 Kbps
2	250 Kbps
3	125 Kbps

20E6.02h	Node Address			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	1 - 127	N/A	Read / Write	Yes

Description:
Each node in a CANopen network must have a unique Node-ID. Node Address is configurable using rotary hardware switch or using ACE software.

20E6.03h	Startup Mode of Operation			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)} –1]$	N/A	Read / Write	Yes

Description:
Possible values:

Bit	Description
1	Profile Position Mode
3	Profile Velocity Mode
4	Profile Torque Mode (current mode)
6	Homing Mode
7	Interpolated Position Mode (PVT)
8	Cyclic Synchronous Position Mode
9	Cyclic Synchronous Velocity Mode
A	Cyclic Synchronous Torque Mode (current mode)
8C	Jog Mode
9E	Config 0
DE	Config 1
EC	Motion Engine Mode
FF	None (Use active configuration settings) (Default)

20E6.04h	Size Indicated Answer			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	Yes

Description:
Note: Sub index 4 value is interrupted as Boolean.

Value	Description
0	Drive does not respond with size indications in SDO message (Default)
Any non-zero value	Drive responds with size indications

20E6.05h	CAN Option			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Bit define values:

Bit Offset	Name	Description (1= Assigned, 0= Not Assigned)
0	Auto Sequence	State Machine Auto sequence- When assigned the drive will automatically sequence to the enable state when configured to do so. (Default)
1	Disable Msg Filter	Inhibit COB ID filtering - when assigned, COB ID filtering will be turned off. It is recommended to leave this bit unassigned.
2-15	Reserved	Reserved.

20EBh: Time Stamp Settings

20EB.01h	CAN Time Stamp Milliseconds			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - [2^{(32)} - 1]$	milliseconds (ms)	Read/Write	No

Description:
This specifies the initial value of the millisecond timer to be used as an initial time stamp value when the drive is configured to be a time stamp master.

20EB.02h	CAN Time Stamp Days			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read/Write	No

Description:
This specifies the initial value of the days timer to be used as an initial time stamp value when the drive is configured to be a time stamp master.

20EB.03h	CAN Time Stamp State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read/Write	No

Description:

This object specifies whether the drive supplies or receives time stamp messages, or if it is inactive. The default setting is 0. It should be noted that an object cannot be assigned as a CAN Time Stamp Slave (1). Once a node on the bus is set to be a CAN Time Stamp Master (2), then the other objects will be automatically assigned as CAN Time Stamp Slaves (1). The Slaves can then be toggled between Inactive (0) and Slave (1) configurations.

Value	Description
0	Inactive
1	CAN Time Stamp Slave
2	CAN Time Stamp Master

Note: If the drive acts as a time stamp master, it will begin broadcasting once configured. Each time stamp message will be broadcast approximately once every 75 seconds. The drive will stop broadcasting messages when in the stopped state. The worst-case jitter should be less than 100µs with medium bus traffic (<500µs with heavy traffic). The drive cannot be transitioned directly from Slave to Master or from Master to Slave.

2005h: Serial Interface Configuration

2005.01h	RS-232 Drive Address			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 63	N/A	Read/Write	Yes

Description:

Specifies the RS-232 drive address.

2005.02h	RS-232 Baud Rate			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0-7	N/A	Read/Write	Yes

Description:

An integer value that corresponds to the RS-232 baud rate selection. The recommended baud rate is 115200. Use the table below to select the desired baud rate. Baud rates below 38400 are not recommended for drive commissioning.

Value	Baud Rate (bits/s)
0	9600
1	19200
2	38400
3	57600
4	115200
5	230400
6	460800
7	921600

2.2.2 PDO Configuration

1400h: 1st Receive PDO Communication Parameter This PDO is valid in all operating modes. The COB-ID of this PDO can be set to any value. See object 1600h for details about the data transmitted by this PDO.

1400.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes

Description:

Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.

1400.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes

Description:

Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Setting COB-ID's for each PDO" on page 27.

1600h: 1st Receive PDO Mapping Parameter

This PDO is used to set the state of the drive (ex: ready, not ready, enabled, disabled, etc.). The object mapped to this PDO is fixed and not user selectable. See object 1400h for details on the transmission method.

1600.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the ControlWord object (6040h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1401h: 2nd Receive PDO Communication Parameter

This PDO is valid in all operating modes. The COB-ID of this PDO can be set to any value. See object 1601h for details about the data transmitted by this PDO.

1401.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1401.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see Section "Transmission Type" on page 28.				

1601h: 2nd Receive PDO Mapping Parameter

This PDO is used to set both the state of the drive (ex: enabled, disabled, faulted, etc.) and the mode of operation of the drive (ex: torque, velocity, or position modes). The objects mapped to this PDO are fixed and not user selectable. See object 1401h for details on the transmission method.

1601.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the ControlWord object (6040h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1601.02h	PDO Mapping for the 2nd Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Modes of Operation object (6060h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1402h: 3rd Receive PDO Communication Parameter

This PDO is valid in position modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1602h for details about the data transmitted by this PDO.

1402.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1402.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1602h: 3rd Receive PDO Mapping Parameter

This PDO is used to set both the state of the drive (ex: enabled, disabled, faulted, etc.) and the target position of the drive. The PDO is only used in position modes (see object 6060h for operating modes). The objects mapped to this PDO are fixed and not user selectable. See object 1402h for details on the transmission method.

1602.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the ControlWord object (6040h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1602.02h	PDO Mapping for the 2nd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Position object (607Ah). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1403h: 4th Receive PDO Communication Parameter

This PDO is valid in velocity modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1603h for details about the data transmitted by this PDO.

1403.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1403.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1603h: 4th Receive PDO Mapping Parameter

This PDO is used to set both the state of the drive (ex: enabled, disabled, faulted, etc.) and the target velocity of the drive. The PDO is only used in velocity modes (see object 6060h for operating modes). The objects mapped to this PDO are fixed and not user selectable. See object 1403h for details on the transmission method.

1603.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the ControlWord object (6040h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1603.02h	PDO Mapping for the 2nd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Velocity object (60FFh). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1404h: 5th Receive PDO Communication Parameter

This PDO is valid in torque modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1604h for details about the data transmitted by this PDO.

1404.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1404.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1604h: 5th Receive PDO Mapping Parameter

This PDO is used to set both the state of the drive (ex: enabled, disabled, faulted, etc.) and the target torque of the drive. The PDO is only used in torque modes (see object 6060h for operating modes). The objects mapped to this PDO are fixed and not user selectable. See object 1404h for details on the transmission method.

1604.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the ControlWord object (6040h). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1604.02h	PDO Mapping for the 2nd Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Current object (6071h). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1414h: 21st Receive PDO Communication Parameter

This PDO is valid in position modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1614h for details about the data transmitted by this PDO.

1414.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see “Setting COB-ID’s for each PDO” on page 27.				

1414.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see “Transmission Type” on page 28.				

1614h: 21st Receive PDO Mapping Parameter

This PDO is used to set the target position of the drive. The PDO is only used in position modes (see object 6060h for operating modes). The object mapped to this PDO is fixed and not user selectable. See object 1414h for details on the transmission method.

1614.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Position object (607Ah). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1415h: 22nd Receive PDO Communication Parameter

This PDO is valid in velocity modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1615h for details about the data transmitted by this PDO.

1415.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see “Setting COB-ID’s for each PDO” on page 27.				

1415.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see “Transmission Type” on page 28.				

1615h: 22nd Receive PDO Mapping Parameter

This PDO is used to set the target velocity of the drive. The PDO is only used in velocity modes (see object 6060h for operating modes). The object mapped to this PDO is fixed and not user selectable. See object 1415h for details on the transmission method.

1615.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Velocity object (60FFh). For details about the format of this sub-index see S“Mapping Parameter Object” on page 28.				

1416h: 23rd Receive PDO Communication Parameter

This PDO is valid in torque modes only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1616h for details about the data transmitted by this PDO.

1416.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see “Setting COB-ID’s for each PDO” on page 27.				

1416.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see “Transmission Type” on page 28.				

1616h: 23rd Receive PDO Mapping Parameter

This PDO is used to set the target current of the drive. The PDO is only used in torque modes (see object 6060h for operating modes). The object mapped to this PDO is fixed and not user selectable. See object 1416h for details on the transmission method.

1616.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Target Current object (6071h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1417h: 24th Receive PDO Communication Parameter

This PDO is valid in interpolated position mode (PVT mode) only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1617h for details about the data transmitted by this PDO.

1417.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1417.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1617h: 24th Receive PDO Mapping Parameter

This PDO is used to send PVT commands (set-points) to the drive. The PDO is only available in interpolated position mode (see object 6060h for operating modes). The object mapped to this PDO is fixed and not user selectable. See object 1417h for details on the transmission method.

1617.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Interpolation Data Record object (60C1h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1419h: 26th Receive PDO Communication Parameter

This PDO is used to initiate the start of PVT execution. The PDO is only applicable when the mode of operation is interpolated position mode (see object 6060h for operating modes).

1419.01h	COB-ID Used by PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read/Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. It is recommended to use the default value. For details see "Setting COB-ID's for each PDO" on page 27.				

1419.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 - 255	N/A	Read/Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. It is recommended to use the default value. For details see "Transmission Type" on page 28.				

1420h: 27th Receive PDO Communication Parameter

This PDO is valid in profile position mode only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1620h for details about the data transmitted by this PDO.

1420.01h	COB-ID Used by PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read/Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. It is recommended to use the default value. For details see "Setting COB-ID's for each PDO" on page 27.				

1420.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 - 255	N/A	Read/Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. It is recommended to use the default value. For details see "Transmission Type" on page 28.				

1620h: 27th Receive PDO Mapping Parameter

This PDO is used to send the Command Limiter's maximum velocity values to the drive. This PDO is only used in profile position mode (see object 6060h for modes of operation). The object mapped to this PDO is fixed and not user-selectable. See object 1420h for details on the transmission method.

1620.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Controlled Accel/Decel Maximum Speed: Config 0 object (203C.09h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1421h: 28th Receive PDO Communication Parameter

This PDO is valid in profile position mode only and does not exist in other modes. The COB-ID of this PDO can be set to any value. See object 1621h for details about the data transmitted by this PDO.

1421.01h	COB-ID Used by PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read/Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. It is recommended to use the default value. For details see "Setting COB-ID's for each PDO" on page 27.				

1421.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 - 255	N/A	Read/Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. It is recommended to use the default value. For details see "Transmission Type" on page 28.				

1621h: 28th Receive PDO Mapping Parameter

This PDO is used to send the Command Limiter's maximum acceleration and deceleration values to the drive. This PDO is only used in profile position mode (see object 6060h for modes of operation). The object mapped to this PDO is fixed and not user-selectable. See object 1421h for details on the transmission method.

1621.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Controlled Accel/Decel Maximum Acceleration: Config 0 object (203C.0Ah). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1621.02h	PDO Mapping for the 2nd Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Controlled Accel/Decel Maximum Deceleration: Config 0 object (203C.0Bh). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1800h: 1st Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A00h for details about the data transmitted by this PDO.

1800.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1800.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A00h: 1st Transmit PDO Mapping Parameter

This PDO transmits drive status information. The object mapped to this PDO is fixed and not user selectable. See object 1800h for details on the transmission method.

1A00.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 - 2^{32}	N/A	Read Only	Yes
Description: Maps the StatusWord object (6041h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1802h: 3rd Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A02h for details about the data transmitted by this PDO.

1802.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1802.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A02h: 3rd Transmit PDO Mapping Parameter

This PDO transmits drive status information and the actual position value stored in the drive. The objects mapped to this PDO are fixed and not user selectable. See object 1802h for details on the transmission method.

1A02.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the StatusWord object (6041h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1A02.02h	PDO Mapping for the 2nd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0 – 255	N/A	Read Only	No
Description: Maps the Actual Position Value object (6064h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1803h: 4th Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A03h for details about the data transmitted by this PDO.

1803.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1803.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A03h: 4th Transmit PDO Mapping Parameter

This PDO transmits drive status information and the actual velocity value stored in the drive. The objects mapped to this PDO are fixed and not user selectable. See object 1803h for details on the transmission method.

1A03.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the StatusWord object (6041h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1A03.02h	PDO Mapping for the 2nd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0 – 255	N/A	Read Only	No
Description: Maps the Actual Velocity Value object (606Ch). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1804h: 5th Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A04h for details about the data transmitted by this PDO.

1804.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1804.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A04h: 5th Transmit PDO Mapping Parameter

This PDO transmits drive status information and the actual torque value stored in the drive. The objects mapped to this PDO are fixed and not user selectable. See object 1804h for details on the transmission method.

1A04.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the StatusWord object (6041h). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1A04.02h	PDO Mapping for the 2nd Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Actual Current Value object (6077h). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1814h: 21st Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A14h for details about the data transmitted by this PDO.

1814.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see “Setting COB-ID’s for each PDO” on page 27.				

1814.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see “Transmission Type” on page 28.				

1A14h: 21st Transmit PDO Mapping Parameter

This PDO transmits the actual position value stored in the drive. The object mapped to this PDO is fixed and not user selectable. See object 1814h for details on the transmission method.

1A14.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Actual Position Value object (6064h). For details about the format of this sub-index see “Mapping Parameter Object” on page 28.				

1815h: 22nd Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A15h for details about the data transmitted by this PDO.

1815.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1815.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A15h: 22nd Transmit PDO Mapping Parameter

This PDO transmits the actual velocity value stored in the drive. The object mapped to this PDO is fixed and not user selectable. See object 1815h for details on the transmission method.

1A15.01h	PDO Mapping for the 1st Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Actual Velocity Value object (606Ch). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1816h: 23rd Transmit PDO Communication Parameter

This PDO is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h), can be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A16h for details about the data transmitted by this PDO.

1816.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1816.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A16h: 23rd Transmit PDO Mapping Parameter

This PDO transmits the actual torque value stored in the drive. The object mapped to this PDO is fixed and not user selectable. See object 1816h for details on the transmission method.

1A16.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Actual Current Value object (6077h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1817h: 24th Transmit PDO Communication Parameter

This PDO is applicable to interpolated position mode only (see object 6060h for operating modes) and is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h). The PDO can also be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A17h for details about the data transmitted by this PDO.

1817.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1817.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A17h: 24th Transmit PDO Mapping Parameter

This PDO transmits information about the status of the PVT buffer in the drive. The PDO is only useful when the drive is in interpolated position mode (see object 6060h for operating modes). The object mapped to this PDO is fixed and not user selectable. See object 1817h for details on the transmission method.

1A17.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Buffer Position of the Interpolation Data Configuration object (60C4.04h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1818h: 25th Transmit PDO Communication Parameter

This PDO is applicable to all operating modes (see object 6060h for operating modes) and is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h). The PDO can also be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A18h for details about the data transmitted by this PDO.

1818.01h	COB-ID Used By PDO			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see "Setting COB-ID's for each PDO" on page 27.				

1818.02h	Transmission Type			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see "Transmission Type" on page 28.				

1A18h: 25th Transmit PDO Mapping Parameter

This PDO transmits information about the status of the programmable and dedicated digital inputs on the drive. The objects mapped to this PDO are fixed and not user selectable. See object 1818h for details on the transmission method.

1A18.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read Only	No
Description: Maps the Digital Input Values object (2023.01h). For details about the format of this sub-index see "Mapping Parameter Object" on page 28.				

1819h: 26th Transmit PDO Communication Parameter

This PDO is applicable to all operating modes (see object 6060h for operating modes) and is transmitted upon a user configurable event (see objects 2120h – 2125h, 2130h – 2133h, 2140h – 2147h and 2150h – 2153h). The PDO can also be transmitted upon a SYNC message or when an RTR is received if the sub-indices of this object are configured appropriately. See object 1A19h for details about the data transmitted by this PDO.

1819.01h	COB-ID Used By PDO			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Holds the COB-ID of the PDO as well as other parameters. For details see “Setting COB-ID’s for each PDO” on page 27.				

1819.02h	Transmission Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned8	0 – 255	N/A	Read / Write	Yes
Description: Defines the way in which the PDO will be transmitted, namely synchronous or asynchronous. For details see “Transmission Type” on page 28.				

1A19h: 26th Transmit PDO Mapping Parameter

This PDO transmits up to 8 user specified objects defined by the sub-indices below. Any object in this object dictionary may be mapped to one of these sub-indices; there is no restriction other than data size. If a large object, such as a 32-byte string, is mapped to TDDO26, it simply will not transmit when triggered. Generally it is most useful to map numerical data to this TPDO.

Notice

Sub-index 0 (1A19.00h) must reflect the number of configured mapping sub-indices. If sub-index 0 is left at its default value of 0, TPDO26 will not transmit.

The total number of bytes TPDO26 can transmit is 8. If, across all the sub-indices, more than 8 bytes are assigned to transmit, TPDO26 will not transmit.

- Example 1: Map 8 objects to all 8 sub-indices of TPDO26. Each object only has 8 bits of data, therefore the total bytes to transmit = 8. In this case TPDO26 will transmit and the data will appear sub-index 1 = byte 1, sub-index 2 = byte 2 and so on.
- Example 2: Map 2 objects, each a 32-bit object, to sub-indices 1 and 2. In this case TPDO26 will transmit and the data will appear sub-index 1 = bytes 1-4, sub-index 2 = bytes 5-8.
- Example 3: Map 3 objects, two 32-bit objects and one 16-bit on object to sub-indices 1, 2, and 3. In this case TPDO26 will not transmit because the total number of bytes assigned to transmit exceeds 8.

See object 1819h for details on setting the transmission method.

1A19.01h	PDO Mapping for the 1st Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 1.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.02h	PDO Mapping for the 2nd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08 contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 2.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.03h	PDO Mapping for the 3rd Application Object			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 3.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.04h	PDO Mapping for the 4th Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 4.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.05h	PDO Mapping for the 5th Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 5.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.06h	PDO Mapping for the 6th Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes

Description:
Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data.

To enable this mapping, 1A19.00h must be set to ≥ 6.

For details about formatting data for this sub-index see “Mapping Parameter Object” on page 28.

1A19.07h	PDO Mapping for the 7th Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data. To enable this mapping, 1A19.00h must be set to ≥ 7. For details about formatting data for this sub-index see "Mapping Parameter Object" on page 28.				

1A19.08h	PDO Mapping for the 8th Application Object			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes
Description: Identifies an object that TPDO26 will transmit data from when triggered. It is important to note that TPDO26 only has 8 available data bytes to transmit information with. If sub-indices 1A19.01h through 1A19.08h contain objects such that the total number of bytes to transmit is greater than 8, TPDO26 will not transmit any data. To enable this mapping, 1A19.00h must be set to ≥ 8. For details about formatting data for this sub-index see "Mapping Parameter Object" on page 28.				

2122h: TPDO Timer1 Next Processing Time

2122h	TPDO Timer1 Next Processing Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	milliseconds (ms)	Read	No
Description: Contains the time of the next Timer1 event with respect to the total drive run time as seen by the drive.				

2125h: TPDO Timer2 Next Processing Time

2125h	TPDO Timer2 Next Processing Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	milliseconds (ms)	Read	No
Description: Contains the time of the next Timer2 event with respect to the total drive run time as seen by the drive.				

2133h: TPDO Value-Changed Object Last Value

2133h	TPDO Value-Changed Object Last Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read Only	No
Description: Consists of the value of the observed object, defined by 2130h, from the last TPDO transmission triggered by a Value-Changed event.				

2143h: TPDO Bits-Changed_1 Object Last Value

2143h	TPDO Bits-Changed_1 Object Last Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read Only	No
Description: This object consists of the value of the observed object, defined by 2140h, from the last TPDO transmission triggered by a Bits-Changed1 event.				

2147h: TPDO Bits-Changed_2 Object Last Value

2147h	TPDO Bits-Changed_2 Object Last Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read Only	No
Description: This object consists of the value of the observed object, defined by 2144h, from the last TPDO transmission triggered by a Bits-Changed2 event.				

20E8h: TPDO Timer Configuration

20E8.01h	TPDO Timer1 Cycle Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	milliseconds (ms)	Read / Write	Yes
Description: Sets the cycle time of the assigned TPDOs (assigned in object 20E8.02h). If the cycle time is set to 0, the assigned TPDOs will be transmitted continuously.				

20E8.02h	TPDO Timer1 Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – 1FFh	N/A	Read / Write	Yes

Description:
Assigns TPDOs to Timer1. If this object is set to 0, Timer1 will stop.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E8.03h	TPDO TPDO Timer 2 Assigned TPDO's			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	milliseconds (ms)	Read / Write	Yes

Description:
Sets the cycle time of the assigned TPDOs for Timer2. If the cycle time is set to 0, the assigned TPDOs will be transmitted continuously

20E8.04h	TPDO Timer2 Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – 1FFh	N/A	Read / Write	Yes

Description:
Assigns TPDOs to Timer 2. If this object is set to 0, Timer 2 will stop.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E7h: TPDO Value-Changed Configuration

20E7.01h	TPDO Value-Changed Object ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	No

Description:

Contains the Object ID of the object to observe continuously. After a user specified value change of this object (set via object 2131h), the assigned TPDOs will be sent (assigned via object 20E7h). Use the three objects (20E7.01h, 20E7.02h, 20E7.03h) to monitor any object and send assigned TPDOs after a desired value change. Use the format in the table below to specify the observed object.

Byte0	Byte1	Byte2	Byte3
Sub-index	Object Index (LSB)	Object Index (MSB)	Always 0

20E7.02h	TPDO Value-Changed Delta Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	No

Description:

Sets the amount of change of the observed object (defined by 20E7h) that will cause the assigned Transmit PDOs to be sent (assigned via object 20E7.03h). Use the three objects (20E7.01h,20E7.02h, 20E7.03h) to monitor any object and send assigned TPDOs after a desired value change. Setting this value to zero disables the functionality. The meaning of the value in this object depends on the observed object.

20E7.03h	TPDO Value-Changed Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – 1FFh	N/A	Read / Write	Yes

Description:

Assigns TPDOs to Value-Changed event. If this object is set to 0, Timer 1 will stop.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E7.04h	TPDO Bits-Changed_1 Object ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
Identifies a CANopen object which is observed continuously for bit changing. If the observed bits change, the assigned TPDOs will be sent. The observed bits are defined by a bit mask in object 20E7h while the assigned TPDOs are defined by object 20E7.h. Use the format in the table below to specify the observed object.

Byte0	Byte1	Byte2	Byte3
Sub-index	Object Index (LSB)	Object Index (MSB)	Always 0

20E7.05h	TPDO Bits-Changed_1 Object Bit Mask			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
Bit mask to identify which bits are observed in the object identified in 2140h. If the observed bits change the assigned TPDOs are sent. If this variable is set to 0 the identified object will not be observed.

20E7.06h	TPDO Bits-Changed_1 Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
Assigns TPDOs to Bits-Changed1 event. If this object is set to a value of 0, the object identified in 20E7h will not be observed.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E7.07	TPDO Bits-Changed_2 Object ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - 2^{32}$	N/A	Read / Write	Yes

Description:
This object is used to identify a CANopen object which is observed continuously for bit changing. If the observed bits change, the assigned TPDOs will be sent. The observed bits are defined by a bit mask in object 20E7h while the assigned TPDOs are defined by object 20E7h. Use the format in the table below to specify the observed object.

Byte0	Byte1	Byte2	Byte3
Sub-index	Object Index (LSB)	Object Index (MSB)	Always 0

20E7.08h	TPDO Bits-Changed_2 Object Bit Mask			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - 2^{32}$	N/A	Read / Write	Yes

Description:
This object consists of a bit mask to identify which bits are observed in the object identified in 20E7h. If the observed bits change the assigned TPDOs are sent. If this variable is set to 0 the identified object will not be observed.

20E7.09h	TPDO Bits-Changed_2 Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - 2^{32}$	N/A	Read / Write	Yes

Description:
Assigns TPDOs to Bits-Changed2 event. If this object is set to a value of 0, the object identified in 2144h will not be observed.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E7.0Ah	TPDO Value-Reached Object ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
This object is used to identify a CANopen object which is observed continuously for changing. If the value of the observed object reaches a predefined value, the assigned TPDOs will be sent. The predefined value is defined in 2151h while the assigned TPDOs are defined in 2152h. Use the format in the table below to specify the observed object.

Byte0	Byte1	Byte2	Byte3
Sub-index	Object Index (LSB)	Object Index (MSB)	Always 0

20E7.0Bh	TPDO Value-Reached			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
This object consists of a predefined value to compare with the value of an observed object identified in 20E7h. If the value of the observed object reaches this value the assigned TPDOs are sent.

20E7.0Ch	TPDO Value-Reached Assigned TPDOs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – 2^{32}$	N/A	Read / Write	Yes

Description:
Assigns TPDOs to Value-Reached event. If this object is set to a value of 0, the object identified in 2150h will not be observed.

Bit	Assignment (1 = assigned, 0 = not assigned)
0	TPDO 1
1	TPDO 3
2	TPDO 4
3	TPDO 5
4	TPDO 21
5	TPDO 22
6	TPDO 23
7	TPDO 24
8	TPDO 25
9	TPDO 26
10-31	Reserved

20E7.0Dh	TPDO Value-Reached Direction			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – 2^{16}$	N/A	Read / Write	Yes

Description:
If the value of this object is 0, the assigned TPDOs (defined by 2152h) are sent if the observed object (identified in 2150h) reaches the predefined value (set by 2151h) in the downward direction. Otherwise the assigned TPDOs are sent if the value of the observed object reaches the predefined value in the upward direction.

2.3 Drive Configuration

2.3.1 Motion Control Profile

20D0h: Control Loop Configuration Parameters

20D0.01h	Control Loop Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	N/A	N/A	Read / Write	Yes
Description: Control loop configuration. Drive setup and configuration software will determine the values in this parameter. For systems that do not load parameter values from non-volatile memory but rather download parameters to the drive upon each system initialization, this parameter should be read from the drive upon completion of setup and configuration and saved with all other relevant drive parameters.				

2076h: Analog Motor Feedback Parameters

2076.01h	Commutation Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2076.02h	Commutation Counts			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - 2^{30}$	N/A	Read / Write	No
Description: The number of commutation counts per unit length.				

2076.03h	Pole Pairs per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	1 - 64	Pole Pairs	Read / Write	No
Description: The high byte specifies the integral number of pole pairs and the low byte specifies the fractional pole pair count.				

2076.04h	Phase Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - 2^{15}$	Ohms	Read / Write	No
Description: 16bitS12 value used to specify the resistance of each phase of the motor.				

2076.05h	Phase Inductance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 - 2^{15}	Henrys	Read / Write	No
Description: 16bitS14 value used to specify the inductance of each phase of the motor.				

2076.06h	Null Torque Angle at Lower Bound			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 360	DG1	Read / Write	No
Description: Represents the Null torque angle when the value of the analog input is at the lower bound of the voltage range.				

2076.07h	Counts per Full Scale			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	Counts	Read / Write	No
Description: The amount of counts per full scale of the voltage range.				

2076.08h	Analog Input Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ -1]	N/A	Read / Write	No
Description: Allows the user to configure the operational behavior of the analog input. The bits of the structure are defined as follows:				

Bits	Name	Description
[0]	Invert Input	Setting this bit effectively causes the normalized input voltage value to be multiplied by -1
[1]	Rotary Input	Setting this bit causes the analog input to "wrap around" one boundary to the other, used for rotary pots
[15:2]	Reserved	This value MUST be zero

2076.09h	Input Voltage Bounds			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read / Write	No

Description:
Contains the Upper and Lower bounds of the voltage range, whose structure is defined below:

Word #	Name	Description
0	Upper Voltage Boundary	The percentage of the full-scale input voltage that represents the most valid input voltage.
1	Lower Voltage Boundary	The percentage of the full-scale input voltage that represents the most valid input voltage.

2076.0Ah	Reference Frame Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} -1]$	N/A	Read / Write	No

Description:
Specifies how to use the selected number of position bits and whether to reflect the axis. The bits of the structure are defined as follows:

Bits	Name	Description
[0]	Enable Reflection over Encoder Axis	Allows the user to reflect the encoder axis about 0 0: Do NOT reflect axis: encoder position = (ref = 1) 1: Reflect the encoder axis: encoder position = ref (- 1) encoder position = (ref) * raw encoder position + user offset
[1]	Enable Absolute Encoder Modulo	Allows the user to keep the monitored absolute position within the range of the analog input 0: Disable Modulo: The monitored Encoder position can go out of the range of the encoder 1: Enable Modulo: No matter how far the encoder moves in one direction, the value reported by the Absolute encoder position will always lie within the range: encoder position = ((ref) * raw encoder position) % Range + Range Offset, where Range and Range Offset are specified by their respective sub-indexes. It should be noted that the range value should be such that the maximum distance the encoder is expected to move should be less than half of the range.
[4:2]	Position Feedback Configuration	Allows the user to specify how the drive's position frame of reference will be initialized when the feedback object is used for position feedback: 0: Pos = raw encoder position 1: Pos = raw encoder position + offset 2: Pos = -raw encoder position 3: Pos = -raw encoder position + offset 4: Pos = encoder position
{15:5]	Reserved	Value MUST be 0.

2076.0Bh	Monitored Encoder Offset and Range			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer64	-2^{31} - 2^{31}	N/A	Read / Write	No
Description: This is the range and offset values that are applied to the position that is read from the analog input. It allows the user to specify the absolute reference frame.				

2076.0Ch	Voltage Sense LFP Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 - 1	N/A	Read / Write	No
Description: Specifies the cutoff frequency characteristics of the single pole lowpass filter that is dedicated to the analog input based motor feedback. It is applied prior to the conversion to position and velocity.				

2076.0Dh	Motor Rated Current			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[2^{(15)}]$-$[2^{(15)}-1]$	DC1	Read / Write	Yes
Description: Contains a value corresponding to the rated motor current.				

2077h: Analog Motor Feedback Values

2077.01h	Raw Value			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	N/A	N/A	Read Only	No
Description: The raw value of the analog input from the ADC.				

2077.02h	Bounded Value			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	N/A	N/A	Read Only	No
Description: The raw value but bounded by a set boundary.				

2077.03h	Analog Input Value Range			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No
Description: The value of the analog input converted to a range value.				

2077.04h	Analog Input Value Absolute Range			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No
Description: The absolute value of the analog input converted to a range value.				

2077.05h	Analog Position Counts Unsigned			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No
Description: The number of position counts from the analog input.				

2077.06h	Analog Position Counts Signed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No
Description: The number of turns of the rotor, either forwards or backwards.				

2077.07h	Monitored Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	Counts	Read Only	No
Description: The monitored encoder raw position value.				

2077.08h	Captured Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	Counts	Read Only	No
Description: The captured encoder position.				

202Fh: AC Induction Motor Parameters

202F.01h	AC Induction Motor - Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	Current Structure Units	Read / Write	No

Description:
This object is a 2-word structure containing current parameters unique to an induction motor.

	Parameter
Word 0	The rated peak line current used to compute the AC induction slip coefficients.
Word 1	The no-load magnetization current used to compute the internal AC induction parameters.

202F.02h	AC Induction Motor - Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	Speed Structure Units	Read / Write	No

Description:
This object is a 3-word structure containing speed parameters unique to an induction motor.

	Parameter
Word 0	The specified rated line frequency in Hz of the AC induction motor.
Word 1	The rotor no-load base speed (electrical cycles per minute).
Word 2	The field weakening threshold speed (electrical cycles per minute).

2070h: Incremental Encoder #1 Motor Feedback

2070.01h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2070.02h	Incremental Encoder #1 - Commutation Counts per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – [$2^{(30)}$-1]	counts	Read / Write	Yes

Description:
Contains a value corresponding to the number of quadrature counts per unit length.

2070.03h	Incremental Encoder #1 - Pole Pairs per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	1-64	counts	Read / Write	Yes
Description: Contains a value corresponding to the number of pole pairs per unit length.				

2070.04h	Incremental Encoder #1 - Motor Phase Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	ohms	Read / Write	Yes
Description: Contains a value corresponding to the resistance of each phase of the motor.				

2070.05h	Incremental Encoder #1 - Motor Phase Inductance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	Henrys	Read / Write	Yes
Description: Contains a value corresponding to the inductance of each phase of the motor.				

2070.06h	Incremental Encoder #1 - Null Torque Sync Angle #1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the Null Torque Angle of the first of the two synchronization edges.				

2070.07h	Incremental Encoder #1 - Null Torque Sync Angle #2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the Null Torque Angle of the second of the two synchronization edges.				

2070.08h	Incremental Encoder #1 - Commutation Angle Error Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the error angle that will be tolerated before a commutation sync error is reported.				

2070.09h	Incremental Encoder #1 - Maximum Commutation Angle Error Adjustment			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the maximum amount of phase angle correction that may be applied per each synchronization event.

2070.0Ah	Incremental Encoder #1 - Hall State Table			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	$0 – [2^{(16)}-1]$	N/A	Read / Write	Yes

Description:
Contains an array listing the optimum torque angle for each valid Hall state.

	Torque Angle Default Values	
Hall State Value	Hex	Degrees
0	0x0000	0
1	0x4000	90
2	0XEAAB	330
3	0x1555	30
4	0x9555	210
5	0x6AAB	150
6	0xC000	290
7	0x000	0

2070.0Bh	Incremental Encoder #1 - Low Speed Estimator Gain			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(32)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the K_t/J value used by the Low Speed Estimator when the encoder is used as a velocity feedback source. This value can be calculated from the ACE value as follows:

(Low Speed Smoothing) x (50/3) x (Encoder_Cts/Rev) x (C_{pk}) x ($65536/(V_{vel}^2)$), where:

V_{vel} = (Switching Frequency/2)

C_{pk} = Hardware Peak Current

2070.0Ch	Incremental Encoder #1 - NTAD Selection Enum			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	0-2	N/A	Read / Write	Yes

Description:
Selects from one of the three Null Torque Angle Determination methods.

Null Torque Angle Determination Method	
Description	Value
Wake and Shake	0
Slam and Go	1
Sweep the Leg	2

2070.0Dh	Incremental Encoder #1 - Maximum Amount of NTAD Movement Allowed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the amount of movement allowed (per unit length) during the execution of certain Null Torque Angle Determination methods.

2070.0Eh	Incremental Encoder #1 - Maximum Torque Current Allowed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	DC1	Read / Write	Yes

Description:
Contains a value corresponding to the maximum amount of torque producing current to be used during any of the Null Torque Angle Determination methods. See “Appendix” on page 337 for unit conversion.

2070.0Fh	Incremental Encoder #1 - Lock Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	ms	Read / Write	Yes

Description:
Contains a value corresponding to the number of milliseconds to lock the rotor in a null torque position at the end of a successful Null Torque Angle Determination.

2070.10h	Incremental Encoder #1 - Internal Retry Brake Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	ms	Read / Write	Yes

Description:
Contains a value corresponding to the number of milliseconds to apply the dynamic brake to stop any motion between consecutive Null Torque Angle Determination retry attempts.

2070.11h	Incremental Encoder #1 - Motor Rated Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}]-[2^{(15)}-1]$	DC1	Read / Write	Yes

Description:
Contains a value corresponding to the rated motor current.

2070.12h	Incremental Encoder #1 - NTAD Start Angle			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0-360	DG1	Read / Write	Yes

Description:
Contains a value corresponding to the initial electrical angle used at the start of Phase Detect. This value can only be written when Phase Detect is not active.

2070.13h	Incremental Encoder #1 - Velocity Sense Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read / Write	Yes

Description:
Contains a structure used to configure the velocity sense for Incremental Encoder #1

Bits	Name	Description
0	Low Speed Estimator	0: The Low Speed Estimate is Active (default) 1:The Low Speed Estimator is inactive
1...15	Reserved	Must be 0

2071h: Incremental Encoder #1 Feedback Values

2071.01h	Incremental Encoder #1 - Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the position reported by the incremental encoder connected to FB2.				

2071.02h	Incremental Encoder #1 - Position Index Capture Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the position of the last encoder index captured by the drive for the incremental encoder connected to FB2. Requires encoder with index.				

2072h: Incremental Encoder #2 Motor Feedback

2072.01h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2072.02h	Incremental Encoder #2 - Commutation Counts per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(32)}-1]$	counts	Read / Write	Yes
Description: Contains a value corresponding to the number of quadrature counts per unit length.				

2072.03h	Incremental Encoder #2 - Pole Pairs per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	1-64	counts	Read / Write	Yes
Description: Contains a value corresponding to the number of pole pairs per unit length.				

2072.04h	Incremental Encoder #2 - Motor Phase Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	ohms	Read / Write	Yes
Description: Contains a value corresponding to the resistance of each phase of the motor.				

2072.05h	Incremental Encoder #2 - Motor Phase Inductance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	Henrys	Read / Write	Yes
Description: Contains a value corresponding to the inductance of each phase of the motor.				

2072.06h	Incremental Encoder #2 - Null Torque Sync Angle #1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	N/A	Read / Write	Yes
Description: Contains a value corresponding to the Null Torque Angle of the first of the two synchronization edges.				

2072.07h	Incremental Encoder #2 - Null Torque Sync Angle #2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	N/A	Read / Write	Yes
Description: Contains a value corresponding to the Null Torque Angle of the second of the two synchronization edges.				

2072.08h	Incremental Encoder #2 - Commutation Angle Error Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	N/A	Read / Write	Yes
Description: Contains a value corresponding to the error angle that will be tolerated before a commutation sync error is reported.				

2072.09h	Incremental Encoder #2 - Maximum Commutation Angle Error Adjustment			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	N/A	Read / Write	Yes
Description: Contains a value corresponding to the maximum amount of phase angle correction that may be applied per each synchronization event.				

2072.0Ah	Incremental Encoder #2 - Hall State Table			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	$0 – [2^{(16)}-1]$	N/A	Read / Write	Yes

Description:

Contains an array listing the optimum torque angle for each valid Hall state.

	Torque Angle Default Values	
Hall State Value	Hex	Degrees
0	0x0000	0
1	0x4000	90
2	0XEAAB	330
3	0x1555	30
4	0x9555	210
5	0x6AAB	150
6	0xC000	290
7	0x000	0

2072.0Bh	Incremental Encoder #2 - Low Speed Estimator Gain			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(32)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the K_t/J value used by the Low Speed Estimator when the encoder is used as a velocity feedback source. This value can be calculated from the ACE value as follows:

(Low Speed Smoothing) x (50/3) x (Encoder_Cts/Rev) x (C_{pk}) x ($65536/(V_{vel}^2)$), where:

V_{vel} = (Switching Frequency/2)

C_{pk} = Hardware Peak Current

2072.0Ch	Incremental Encoder #2 - NTAD Selection Enum			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	0-2	N/A	Read / Write	Yes

Description:

Selects from one of the three Null Torque Angle Determination methods.

Null Torque Angle Determination Method	
Description	Value
Wake and Shake	0
Slam and Go	1
Sweep the Leg	2

2072.0Dh	Incremental Encoder #2 - Maximum Amount of NTAD Movement Allowed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the amount of movement allowed (per unit length) during the execution of certain Null Torque Angle Determination methods.				

2072.0Eh	Incremental Encoder #2 - Maximum Torque Current Allowed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	DC1	Read / Write	Yes
Description: Contains a value corresponding to the maximum amount of torque producing current to be used during any of the Null Torque Angle Determination methods. See “Appendix” on page 337 for unit conversion.				

2072.0Fh	Incremental Encoder #2 - Lock Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	ms	Read / Write	Yes
Description: Contains a value corresponding to the number of milliseconds to lock the rotor in a null torque position at the end of a successful Null Torque Angle Determination.				

2072.10h	Incremental Encoder #2 - Internal Retry Brake Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	ms	Read / Write	Yes
Description: Contains a value corresponding to the number of milliseconds to apply the dynamic brake to stop any motion between consecutive Null Torque Angle Determinaton retry attempts.				

2072.11h	Incremental Encoder #2 - Motor Rated Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$[2^{(15)}]-[2^{(15)}-1]$	DC1	Read / Write	Yes
Description: Contains a value corresponding to the rated motor current.				

2072.12h	Incremental Encoder #2 -NTAD Start Angle			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 360	DG1	Read / Write	Yes

Description:
Contains a value corresponding to the initial electrical angle used at the start of Phase Detect. This value can only be written when Phase Detect is not active.

2072.13h	Incremental Encoder #2 - Velocity Sense Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read / Write	Yes

Description:
Contains a structure used to configure the velocity sense for Incremental Encoder #2

Bits	Name	Description
0	Low Speed Estimator	0: The Low Speed Estimate is active (default) 1: The Low Speed Estimator is inactive
1...152	Reserved	Must be 0

2073h: Incremental Encoder #2 Feedback Values

2073.01h	Incremental Encoder #2 - Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the position reported by the incremental encoder connected to FB2.

2073.02h	Incremental Encoder #2 - Position Index Capture Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the position of the last encoder index captured by the drive for the incremental encoder connected to FB2. Requires encoder with index.

2074h: Absolute Serial Encoder Motor Feedback

2074.01h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2074.02h	Absolute Serial Encoder - Commutation Counts per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 – [$2^{(32)}$-1]	counts	Read / Write	Yes
Description: Contains a value corresponding to the number of quadrature counts per unit length.				

2074.03h	Absolute Serial Encoder - Pole Pairs per Unit Length			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	1-64	counts	Read / Write	Yes
Description: Contains a value corresponding to the number of pole pairs per unit length.				

2074.04h	Absolute Serial Encoder - Motor Phase Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 – [$2^{(16)}$-1]	ohms	Read / Write	Yes
Description: Contains a value corresponding to the resistance of each phase of the motor.				

2074.05h	Absolute Serial Encoder - Motor Phase Inductance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 – [$2^{(16)}$-1]	Henrys	Read / Write	Yes
Description: Contains a value corresponding to the inductance of each phase of the motor.				

2074.06h	Absolute Serial Encoder - Null Torque Angle at Encoder Zero Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [$2^{(16)}$-1]	N/A	Read / Write	Yes
Description: Contains a value corresponding to the null torque angle of the motor when the position of the absolute encoder is 0 counts.				

2074.07h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2074.08h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2074.09h	Absolute Serial Encoder - Monitored Encoder Parameters			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer64	$0 – [2^{(32)}-1]$	N/A	Read / Write	Yes

Description:
This is a structure containing both the offset and range of the monitored encoder. The offset is added to the absolute position value that is read from the encoder. The range restricts the values the encoder may take. Together it allows the user to specify the absolute reference frame.

2074.0Ah	Absolute Serial Encoder - Motor Rated Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[2^{(15)}]-[2^{(15)}-1]$	counts	Read / Write	Yes

Description:
Contains a value corresponding to the rated motor current.

2075h: Absolute Encoder #1 Feedback Values

2075.01h	Incremental Encoder #2 - Raw Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned	$0 – [2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the raw position reported by the absolute encoder connected to FB1.

2075.02h	Absolute Encoder #1 - Monitored Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[2^{(31)}]-[2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the measured position from the drive’s reference frame.

2075.03h	Absolute Encoder #1 - Position Index Capture Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0- [2^{(31)}]-[2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the raw position reported by the absolute encoder connected to FB1 when the last index was seen.

2075.04h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2046h: Auxiliary Input Parameters

2046.01h	Auxiliary Input - Input Counts: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	1 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the number of input counts in the input/output ratio used for Encoder following and Step and Direction modes in Configuration 0.				

2046.02h	Auxiliary Input - Output Counts: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$-[2^{(16)} - 1]$ - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the output in the input/output ratio used for Encoder following and Step and Direction modes in Configuration 0. Encoder following mode can be used only when the position loop is closed. However, Step and Direction can be used to control position, velocity or current. Therefore, the scaling value used is mode dependent.				

2046.03h	Auxiliary Input - Input Counts: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	1 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the number of input counts in the input/output ratio used for Encoder following and Step and Direction modes in Configuration 1.				

2046.04h	Auxiliary Input - Output Counts: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$-[2^{(16)} - 1]$ - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the output in the input/output ratio used for Encoder following and Step and Direction modes in Configuration 1. Encoder following mode can be used only when the position loop is closed. However, Step and Direction can be used to control position, velocity or current. Therefore, the scaling value used is mode dependent.				

2035h: Current Loop Control Parameters

2035.01h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	Yes

2035.02h	Drive Current Limits			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	DC1	Read / Write	Yes

Description:
Contains a structure that contains the peak and continuous current limits set in the drive.

Word	Name
0	Peak Current Limit
1	Continuous Current Limit

2035.03h	Peak Current Hold Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} – 1]$	milliseconds (ms)	Read / Write	Yes

Description:
Contains a value corresponding to the peak current time set in the drive.

2035.04h	Peak to Continuous Current Transition Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} – 1]$	milliseconds (ms)	Read / Write	Yes

Description:
Contains a value corresponding to the peak to continuous current transition time set in the drive.

2035.05h	Torque At Command Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} – 1]$	DC1	Read / Write	Yes

Description:
Contains a value for an At Command window around the current error. While in current mode, when the current error is within this window, the At Command event will be active.

2035.06h	Torque At Command Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	Milliseconds (ms)	Read / Write	Yes
Description: Contains a value corresponding to the time the current error must be within the configured Torque At Command Window before the At Command event becomes active.				

2035.07h	Torque Current Target Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[2^{(15)}] – [2^{(15)} –1]$	DC1	Read / Write	Yes
Description: Contains a value corresponding to the torque current target offset.				

2035.08h	Phase Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(14)}] – [2^{(14)}]$	DG1	Read / Write	Yes
Description: Contains a value corresponding to the Phase Advance feature.				

2035.09h	Application Current Limit - Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0– [2^{(16)}]$	DC1	Read / Write	No
Description: Contains a value corresponding to the maximum allowable torque producing current target for Config 0				

2035.0Ah	Application Current Limit - Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0– [2^{(16)}]$	DC1	Read / Write	No
Description: Contains a value corresponding to the maximum allowable torque producing current target for Config 1				

2035.0Bh	User Current Slew Rate			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No

Description:

Contains a value corresponding to the maximum rate the current output is allied to change per servo period. A value of 0 indicates that the slew rate limiting is disabled. This can be calculated in units of A/us from the following formula:

(User Current Slew Rate) x (Cpk/$2^{(14)}$)/Tsp, where:

Cpk = Hardware Peak Current

Tsp = Servo Period

2231h: Current Loop Gain Parameters

2231.02h	Current Loop Gain (Set 0)			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	0 – [$2^{(15)}$-1]	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to the proportional gain of the current loop for Gain Set 0. This value is calculated from the ACE gain value [%Vbus/A] as follows:

(Current Loop Gain) x 2^9 x C_{pk}, where:

C_{pk} = Hardware Peak Current

2231.03h	Current Loop Ki Cutoff (Set 0)			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – [$2^{(15)}$-1]	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to the Ki cutoff of the current loop for Gain Set 0. This value is calculated from the ACE gain value [Hz] as follows:

(Current Loop Cutoff) x (2^{16} x 2 x pi)/(V_{cur}), where:

V_{cur} = Switching Frequency

2231.04h	Current Loop Gain (Set 1)			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	0 – [$2^{(15)}$-1]	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to the proportional gain of the current loop for Gain Set 1. This value is calculated from the ACE gain value [%Vbus/A] as follows:

(Current Loop Gain) x 2^9 x C_{pk}, where:

C_{pk} = Hardware Peak Current

2231.05h	Current Loop Ki Cutoff (Set 1)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the Ki cutoff of the current loop for Gain Set 1. This value is calculated from the ACE gain value [Hz] as follows:

(Current Loop Cutoff) x $(2^{16}$ x 2 x pi)/(V_{cur}), where:

V_{cur} = Switching Frequency

2231.06h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2231.07h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2231.08h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2231.09h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2231.0Ah	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2231.0Bh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2235h: Velocity Loop Gain Parameters

2235.01h	Velocity Loop Proportional Gain: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the proportional loop gain of the velocity loop for Gain Set 0. This value can be calculated from the ACE gain value [A/(ct/s)] as follows:

(Velocity Loop Gain) x $((2^{16} * V_{vel}) / (C_{pk}))$, where:
V_{vel} = (Switching Frequency / 2)
C_{pk} = Hardware Peak Current

2235.02h	Velocity Loop Ki Cutoff: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the Ki cutoff of the velocity loop for Gain Set 0. This value can be calculated from the ACE gain value [Hz] as follows:

(Velocity Loop Cutoff) x $(2^{32} * 2 * pi) / (V_{vel})$, where
V_{vel} = (Switching Frequency / 2)

2235.03h	Velocity Loop Kd Cutoff: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the Kd dampening of the velocity loop for Gain Set 0. This value can be calculated from the ACE gain value as follows:

(Velocity Loop Dampening) x $(2^{16} * 2 * pi) / (V_{vel})$, where
V_{vel} = (Switching Frequency / 2)

2235.04h	Velocity Loop Acceleration Feed Forward Gain: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the velocity loop acceleration feed forward gain for Gain Set 0. This value can be calculated from the ACE gain value [A/(ct/s^2)] as follows:

(Velocity Loop Acceleration Feed Forward Gain) x $((2^{16} * (V_{vel})^2) / (C_{pk}))$, where
V_{vel} = (Switching Frequency / 2)
C_{pk} = Hardware Peak Current

2235.05h	Velocity Loop Proportional Gain: Gain Set 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the proportional loop gain of the velocity loop for Gain Set 1. This value can be calculated from the ACE gain value [A/(ct/s)] as follows:

(Velocity Loop Gain) x $((2^{16} * V_{vel}) / (C_{pk}))$, where:
V_{vel} = (Switching Frequency / 2)
C_{pk} = Hardware Peak Current

2235.06h	Velocity Loop Ki Cutoff: Gain Set 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the Ki cutoff of the velocity loop for Gain Set 1. This value can be calculated from the ACE gain value [Hz] as follows:

(Velocity Loop Cutoff) x $(2^{32} * 2 * pi) / (V_{vel})$, where
V_{vel} = (Switching Frequency / 2)

2235.07h	Velocity Loop Kd Cutoff: Gain Set 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to the Kd dampening of the velocity loop for Gain Set 1. This value can be calculated from the ACE gain value as follows:

(Velocity Loop Dampening) x $(2^{16} * 2 * pi) / (V_{vel})$, where

V_{vel} = (Switching Frequency / 2)

2235.08h	Velocity Loop Acceleration Feed Forward Gain: Gain Set 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to the velocity loop acceleration feed forward gain for Gain Set 1. This value can be calculated from the ACE gain value [A/(ct/s^2)] as follows:

(Velocity Loop Acceleration Feed Forward Gain) x $((2^{16} * (V_{vel})^2) / (C_{pk}))$, where

V_{vel} = (Switching Frequency / 2)

C_{pk} = Hardware Peak Current

2236h: Velocity Indications and Limits

2236.01h	Velocity Loop Configuration Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	N/A	N/A	Read / Write	Yes

Description:

Specifies feedback direction configuration for the velocity loop.

Bits	Name	Description
0	Config 0 Feedback Direction	Valid Values: 0: Inverted 1: Standard
1	Config 1 Feedback Direction	Valid Values 0: Inverted 1: Standard
[15:2]	Reserved	Reserved

2236.02h	Feedback Filter Coefficient			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to the velocity feedback filter coefficient. To convert between the value entered into ACE and the value sent to the drive, use the following functions:

ACE to drive:

$$2^{30}(-e^{a}+1) = P$$

where a = [value entered into ACE] x (-6.283185307x10^{-4}) and P = [value sent to drive]

Drive to ACE:

$$\frac{\ln\left(1-\frac{P}{2^{30}}\right)}{-6.283185307\times 10^{-4}} = [\text{value seen in ACE (Hz)}]$$

where P = [value in drive]

2236.03h	Velocity Loop Integrator Decay Rate			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains a value that corresponds to a percentage of the velocity loop integrator decay rate. The value can be calculated from the velocity loop integrator decay rate as follows:

(% of Integrator Gain) * (2^{16} / 100)

2236.04h	Motor Over Speed Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(28)}]$	Ct/s	Read / Write	Yes

Description:
Contains a value corresponding to the motor over speed limit set in the drive. When the velocity of the motor meets or exceeds this value, the drive will indicate a motor over speed condition is present.

2236.05h	Velocity Loop Following Error Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(28)}]$	Ct/s	Read / Write	Yes

Description:
Contains a value corresponding to the velocity at speed limit set in the drive. If the measured velocity meets or exceeds this value, the drive will perceive this as a velocity following error.

2236.06h	Positive Target Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(28)}]$	Ct/s	Read / Write	Yes
Description: Contains a value corresponding to the positive velocity limit set in the drive. When the speed set by this value is met or exceeded, the drive will indicate that the positive limit was reached.				

2236.07h	Negative Target Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(28)}]$	Ct/s	Read / Write	Yes
Description: Contains a value corresponding to the negative velocity limit set in the drive. When the speed set by this value is met or exceeded, the drive will indicate that the positive limit was reached.				

2236.08h	Velocity Loop Integrator Decay Active Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 – [2^{(28)}]$	Ct/s	Read / Write	Yes
Description: Contains a value corresponding to the velocity at speed limit set in the drive. If the measured velocity meets or exceeds this value, the drive will perceive this as a velocity following error.				

2238h: Position Loop Control Parameters

2238.01h	Position Loop Proportional Gain: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes
Description: Contains a value corresponding to the position loop proportional gain for Gain Set 0. This value can be calculated from the ACE gain value [(ct/s)/ct] using the following formula: (Position Loop Proportional Gain) x (2^{32} / V_{pos}) where V_{pos} = (Switching Frequency / 2)				

2238.02h	Position Loop Ki Cutoff: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the Ki cutoff of the position loop for Gain Set 0. This value can be calculated from the ACE gain value [Hz] using the following formula:

(Position Loop Cutoff) x $[(2^{32} \times 2 \times pi) / (V_{pos}^2)]$, where

V_{pos} = (Switching Frequency / 2)

2238.03h	Position Loop Kd Cutoff: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the Kd dampening of the position loop for Gain Set 0. This value can be calculated from the ACE gain value [Hz] using the following formula:

(Position Loop Dampening) x $[(2^{32} \times 2 \times pi) / (V_{pos}^2)]$, where

V_{pos} = (Switching Frequency / 2)

2238.04h	Position Loop Velocity Feed Forward Gain: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the position loop velocity feed forward gain for Gain Set 0. This value can be calculated from the ACE gain value [(ct/s)/(ct/s)] using the following formula:

(Position Loop Velocity Feed Forward Gain) x 2^{28}

2238.05h	Position Loop Acceleration Feed Forward Gain: Gain Set 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the position loop acceleration feed forward gain for Gain Set 0. This value can be calculated from the ACE gain value [A/(ct/s^2)] using the following formula:

(Position Loop Acceleration Feed Forward Gain) x $((2^{28} * V_{pos}^2) / Cpk)$, where

V_{pos} = (Switching Frequency / 2)

Cpk = Hardware Peak Current

2238.06h	Position Loop Configuration Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	N/A	N/A	Read / Write	Yes

Description:

Specifies feedback direction configuration for the position loop..

Bit	Name	Description
0	Config 0 Feedback Direction	Valid Values 0: Inverted 1: Standard
1	Config 1 Feedback Direction	Valid Values 0: Inverted 1: Standard
[15:2]	Reserved	Reserved

2238.07h	Position Loop Integrator Decay Rate			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value that corresponds to a percentage of the position loop integrator decay rate. The value can be calculated from the position loop integrator decay rate as follows:

(% of Integrator Gain) x (2^{16} / 100)

2238.08h	Position Loop Proportional Gain: Gain Set 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the position loop proportional gain for Gain Set 1. This value can be calculated from the ACE gain value [(ct/s)/ct] using the following formula:

(Position Loop Proportional Gain) x (2^{32} / V_{pos}) where

V_{pos} = (Switching Frequency / 2)

2238.09h	Position Loop Ki Cutoff: Gain Set 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 – $[2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the Ki cutoff of the position loop for Gain Set 1. This value can be calculated from the ACE gain value [Hz] using the following formula:

(Position Loop Cutoff) x $[(2^{32}$ x 2 x pi) / $(V_{pos}^{2})]$, where
V_{pos} = (Switching Frequency / 2)

2238.0Ah	Position Loop Kd Cutoff: Gain Set 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 – $[2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the Kd dampening of the position loop for Gain Set 1. This value can be calculated from the ACE gain value [Hz] using the following formula:

(Position Loop Dampening) x $[(2^{32}$ x 2 x pi) / $(V_{pos}^{2})]$, where
V_{pos} = (Switching Frequency / 2)

2238.0Bh	Position Loop Velocity Feed Forward Gain: Gain Set 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 – $[2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the position loop velocity feed forward gain for Gain Set 1. This value can be calculated from the ACE gain value [(ct/s)/(ct/s)] using the following formula:

(Position Loop Velocity Feed Forward Gain) x 2^{28}

2238.0Ch	Position Loop Acceleration Feed Forward Gain: Gain Set 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 – $[2^{(31)}-1]$	N/A	Read / Write	Yes

Description:
Contains a value corresponding to the position loop acceleration feed forward gain for Gain Set 1. This value can be calculated from the ACE gain value [A/(ct/s^2)] using the following formula:

(Position Loop Acceleration Feed Forward Gain) x $((2^{28} * V_{pos}^{2})$ / Cpk), where
V_{pos} = (Switching Frequency / 2)
Cpk = Hardware Peak Current

2039h: Position Limits

2039.01h	Preset Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	Yes

Description:
Replacement value for the measured position when the Set Position event is triggered. This allows you to redefine the current measured position (e.g. reset to zero).

2039.02h	Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	Yes

Description:
Four-word structure containing the minimum and maximum measured position limits.

Word	Description
0-1	Max Measured Position Limit
2-3	Min Measured Position Limit

2039.03h	At Home Position Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	Yes

Description:
Defines a window around the Home Position Value, such that when the measured position is within this window, the At-Home event will be active.

2039.04h	In Position Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - [2^{(32)} - 1]$	counts	Read / Write	Yes

Description:
Defines a window around the target position, such that when the position error is within this window, the At Command event will be active.

2039.05h	Position Following Error Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - [2^{(32)} - 1]$	counts	Read / Write	Yes

Description:
The maximum allowed position error (difference between target position and measured position), prior to setting the “Position Following Error” event (active in position mode only). This parameter is equivalent to the “Position Following Error Limit” of DSP402 (object 6065h).

2039.06h	Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	Yes

Description:
Four-word structure containing the minimum and maximum target position limits.

Word	Description
0-1	Max Target Position Limit
2-3	Min Target Position Limit

2039.07h	Position Limits Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	Yes

Description:
Contains a value configuring the operation of the position limits.

Bit	Name	Description
0	Measured Position Limits	0=Disabled; 1=Enabled
1	Target Position Limits	0=Disabled; 1=Enabled
2-15	Reserved	Reserved

2039.08h	Position Integrator Decay Active Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	Yes

Description:
Contains a value that corresponds to the position loop integrator decay active window. The decay will be active when the position error value falls within this window.

6065h: Position Following Error Window

6065h	Position Following Error Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - [2^{(32)} - 1]$	counts	Read / Write	Yes

Description:
The maximum allowed position error (difference between target and measured position), prior to setting the “Position Following Error” event (active in position mode only).

60F4h: Position Following Error Actual Value

60F4h	Position Following Error Actual Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{32}] - [2^{(32)} - 1]$	counts	Read Only	Yes
Description: Provides the actual value of the position following error, defined as the difference between target and measured position.				

6098h: Homing Method

6098h	Homing Method			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer8	[-2] – 35	N/A	Read / Write	Yes
Description: There are almost 35 homing methods supported by AMC servo drives. See “Homing” on page 40 for details on each homing method.				

6099h: Homing Speeds

6099.01h	Speed During Search For Switch			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - (2^{32}-1)$	DS4	Read / Write	Yes
Description: Sets the speed during the first stage of Homing algorithms. See “Appendix” on page 337 for unit conversion.				

6099.02h	Speed During Search For Zero			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - (2^{32}-1)$	DS4	Read / Write	Yes
Description: Sets the speed during the search for zero. This is usually after the search for switch has completed and is set much slower for accuracy. See “Appendix” on page 337 for unit conversion.				

609Ah: Homing Acceleration

609Ah	Homing Acceleration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - (2^{32}-1)$	DA1	Read / Write	Yes
Description: Sets the accelerations and decelerations used by the drive’s homing routine. See “Appendix” on page 337 for unit conversion details.				

607Ch: Home Offset

607Ch	Home Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} - (2^{31}-1)$	counts	Read / Write	Yes

Description:
When the homing routine is complete, the zero position found by the drive is given an offset equal to the value stored in this object. All moves are interpreted relative to this new zero position. When homing completes, the equation for the drive's current position is "Current position = 0 – Home Offset value".

2048h: PVT Parameters

2048.01h	Buffer Threshold Warning Level			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
A buffer threshold warning will occur when this number of PVT points is left in the buffer.

2048.02h	PVT Input Method			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Defines if incremental or absolute position is to be used with PVT commands. Incremental position sets the PVT target position point equal to the previous PVT position point plus the specified value. Absolute position sets the PVT target position point equal to the specified value.

Value	Input Method
0	Absolute position with sequence counter
1	Incremental position with sequence counter

6086h: Motion Profile Type

6086.00h	Motion Profile Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 - 2	N/A	Read Only	No

Description:
Specifies the type of profile to be used for profiled position mode (see object 6060 for setting modes). The default profile type is linear (trapezoidal), but accel/decel may be selected. This value is not stored to NVM. Specific values for either profile can be configured using object 203C.

Value	Input Method
0 (default)	Linear Ramp (trapezoidal profile)
2	Accel/Decel (jerk-free ramp)

6088h: Torque Profile Type

6088.00h	Torque Profile Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0	N/A	Read Only	No
Description: Specifies the type of profile to be used for profiled torque mode (see object 6060 for setting modes). The value is fixed equal to 0 which specifies a linear (trapezoidal) profile.				

203Ch: Command Limiter Parameters

The Command Limiter limits the slope of the target command in any mode. It is broken into four components, where each component is assigned to one sub-index. To remove any effects of the command limiter, maximize all limiter parameters. Some limiter parameters have units that change with the operating mode of the drive. For these parameters, refer to Table 2.1 to make the correct unit selection.

TABLE 2.1 Command Limiter Units

Drive Operation Mode	Units
Current (Torque)	DJ1
Velocity	DA2
Position (Around Velocity Or Current)	DS2

203C.01h	Linear Ramp Positive Target Positive Change: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum positive change in positive command used with the command limiter in Configuration 0. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.02h	Linear Ramp Positive Target Negative Change: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum negative change in positive command used with the command limiter in Configuration 0. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.03h	Linear Ramp Negative Target Negative Change: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum negative change in negative command used with the command limiter in Configuration 0. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.04h	Linear Ramp Negative Target Positive Change: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum positive change in negative command used with the command limiter in Configuration 0. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.05h	Linear Ramp Positive Target Positive Change: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum positive change in positive command used with the command limiter in Configuration 1. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.06h	Linear Ramp Positive Target Negative Change: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum negative change in positive command used with the command limiter in Configuration 1. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.07h	Linear Ramp Negative Target Negative Change: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - [$2^{(48)}$ –1]	See Table 2.1	Read / Write	Yes
Description: Defines the maximum negative change in negative command used with the command limiter in Configuration 1. Units are mode dependant. See “Appendix” on page 337 for unit conversions.				

203C.08h	Linear Ramp Negative Target Positive Change: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	0 - $[2^{(48)} - 1]$	See Table 2.1	Read / Write	Yes

Description:
Defines the maximum positive change in negative command used with the command limiter in Configuration 1. Units are mode dependant. See "Appendix" on page 337 for unit conversions.

203C.09h	Controlled Accel/Decel Maximum Speed: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer64	0 - $[2^{(64)} - 1]$	DS3	Read / Write	Yes

Description:
Sets the maximum speed for a profile in Configuration 0. See "Appendix" on page 337 for unit conversions.

203C.0Ah	Controlled Accel/Decel Maximum Acceleration: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	0 - $[2^{(32)} - 1]$	DA3	Read / Write	Yes

Description:
Defines the maximum acceleration used with the command limiter in Configuration 0. See "Appendix" on page 337 for unit conversions.

203C.0Bh	Controlled Accel/Decel Maximum Deceleration: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	0 - $[2^{(32)} - 1]$	DA3	Read / Write	Yes

Description:
Defines the maximum deceleration used with the command limiter in Configuration 0. See "Appendix" on page 337 for unit conversions.

203C.0Ch	Controlled Accel/Decel Maximum Speed: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer64	0 - $[2^{(64)} - 1]$	DS3	Read / Write	Yes

Description:
Sets the maximum speed for a profile in Configuration 1. See "Appendix" on page 337 for unit conversions.

203C.0Dh	Controlled Accel/Decel Maximum Acceleration: Config 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	0 - $[2^{(32)} - 1]$	DA3	Read / Write	Yes

Description:
Defines the maximum acceleration used with the command limiter in Configuration 1. See "Appendix" on page 337 for unit conversions.

203C.0Eh	Controlled Accel/Decel Maximum Deceleration: Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	0 - [$2^{(32)}$ –1]	DA3	Read / Write	Yes
Description: Defines the maximum deceleration used with the command limiter in Configuration 1. See “Appendix” on page 337 for unit conversions.				

203C.0Fh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

203C.10h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2243h: Velocity Mode Jerk Limiting Configuration

2243.01h	Jerk Limiting - Config 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0- [$2^{(16)}$-1]	milliseconds	Read/Write	Yes
Description: Defines the maximum jerk in Velocity Mode with Jerk Limiting active in Configuration 0				

2243.02h	Maximum Acceleration Limit - Config 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0- [$2^{(32)}$-1]	ct/s$^{(2)}$	Read/Write	Yes
Description: Defines the maximum acceleration in Velocity Mode with Jerk Limiting active in Configuration 0				

2243.03h	Maximum Deceleration Limit - Config 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0-[$2^{(32)}$-1]	ct/s$^{(2)}$	Read/Write	Yes
Description: Defines the maximum deceleration in Velocity Mode with Jerk Limiting active in Configuration 0				

2243.04h	Maximum Velocity Limit- Config 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0-[$2^{(32)}$-1]	ct/s	Read/Write	Yes
Description: Defines the maximum speed for a profile in Velocity Mode with Jerk Limiting active in Configuration 0				

2243.05h	Jerk Limiting - Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0-[$2^{(16)}$-1]	millisecond	Read/Write	Yes
Description: Defines the maximum jerk in Velocity Mode with Jerk Limiting active in Configuration 1				

2243.06h	Maximum Acceleration Limit - Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0-[$2^{(32)}$-1]	ct/s$^{(2)}$	Read/Write	Yes
Description: Defines the maximum acceleration in Velocity Mode with Jerk Limiting active in Configuration 1				

2243.07h	Maximum Deceleration Limit - Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0-[$2^{(32)}$-1]	ct/s$^{(2)}$	Read/Write	Yes
Description: Defines the maximum deceration in Velocity Mode with Jerk Limiting active in Configuration 1				

2243.08h	Maximum Velocity Limit - Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	0-[$2^{(32)}$-1]	ct/s	Read/Write	Yes
Description: Defines the maximum speed for a profile in Velocity Mode with Jerk Limiting active in Configuration 1				

60C2h: Interpolation Time Period

This object is used only for synchronous cyclic modes of operation (see “6060h: Modes Of Operation” on page 282). The interpolation time period defines the rate in which target commands are sent by the host to the drive. When a periodic target command is sent to the drive at a rate slower than the loop update rate, there is potential for the loop gains to spike with each new target command. Defining the interpolation time period allows the target to follow a linear ramp between target commands. The interpolation time period is made up of two values as follows:

Interpolation Time Period = [interpolation time period value] x $10^{(\text{interpolation time index})}$ seconds

The drive will support an interpolation time period between 0 and 1 second. If the value is not a multiple of the loop update rate, it will be truncated to the next lowest multiple.

60C2.01h	Interpolation Time Period Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned 8	0 - 255	N/A	Read / Write	Yes
Description: Defines the mantissa of the interpolation time period.				

60C2.02h	Interpolation Time Index			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer 8	-6 to 0	N/A	Read / Write	Yes
Description: Defines the exponent of the interpolation time period.				

2.3.2 Hardware Profile

2008h: Drive Initialization Parameters

2008.01h	Start-Up Sequence Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	N/A	Read / Write	Yes
Description: Defines how the drive will behave when power is first applied.				

Bit	Drive Initialization Parameters
0	Disable Bridge
1	Load Config 1
2	Phase Detect
3	Set Position
4	Enable Motion Engine After Startup Sequence
5...15	Reserved

2008.02h	Start-Up Phase Detect Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	N/A	Read / Write	Yes

Description:

Defines how the Phase Detect feature will behave when power is first applied.

Value	Description
0	Phase Detect Immediately upon power-up
1	Phase Detect after the first bridge enable upon power-up

2008.03h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2008.04h	Hard Stop Detection			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	**N/A**	Read / Write	Yes

Description:

Allows the user to configure the various logic terms that will be inclusively OR'ed together in order to qualify a valid Hard Stop Event. Only applicable to Homing Methods -1 and -2

Bit	Name	Description
[0]	Zero Velocity Event is Active	If any of the selected Items become Active during Homing then a Hard Stop will be detected.
[1]	Sustained Current Indicator is Active	
[2]	Position Following Error Event is Active	
[3]	Zero Velocity Event AND Sustained Current Indicator Event are both Active	
[4]	Zero Velocity Event AND Position Following Error Event Are both Active	
[5]	Sustained Current Indicator AND Position Following Error Event Are both Active	
[6]	Zero Velocity Event AND Sustained Current Indicator is Active AND Position Following Error Event Are ALL Active	
[15:7]	Reserved	Value Must be zero

20C8h: Motion Engine Configuration

20C8.01h	Start-Up Motion Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 1FFFh	N/A	Read / Write	Yes

Description:

Defines the startup behavior when running a motion engine index upon power-up. The bit values are broken up as defined below.

Bits 0:2

0: Indexer Mode

1-7: Reserved

Bits 3:4

0: Motion initiated via digital inputs

1: Motion initiated via Network commands

Bits 5:8

Defines the index number to load on power-up

Bits 9:15

0: Motion will not immediately start.

1: Motion will automatically start if the Motion Engine is configured to be enabled on power-up.

2-7: Reserved

2033h: User Voltage Protection Parameters

2033.01h	Voltage Limits			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DV1	Read / Write	Yes

Description:

Contains the over voltage and under voltage limit specified for the drive. The over voltage limit must be set lower than the drive over-voltage hardware shutdown point and greater than the Nominal DC Bus Voltage. The under voltage limit must be set above the drive under-voltage hardware shutdown point and less than the Nominal DC Bus Voltage. See “Appendix” on page 337 for unit conversion.

2033.02h	Shunt Regulator Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read / Write	Yes

Description:

Contains a value corresponding to the current state of the shunt regulator.

Value	Description
0	No Shunt
1	Internal Shunt
2	External Shunt
3	Dual Shunt (Internal and External)

2033.03h	Shunt Regulator Enable Threshold			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$0 – [2^{(15)}-1]$	DV1	Read / Write	Yes
Description: Contains a value corresponding to the shunt regulator enable threshold voltage. When the bus reaches this voltage, built in shut regulator will turn on allow excess energy to be dissipated across an external shunt resistor. Not all drives have built in shunt regulators. See “Appendix” on page 337 for unit conversion.				

2033.04h	External Shunt Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	ohms (Ω)	Read / Write	Yes
Description: Contains a value corresponding to the resistance of the external shunt resistor.				

2033.05h	External Shunt Inductance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	microhenrys (µH)	Read / Write	Yes
Description: Contains a value corresponding to the inductance of the external shunt resistor.				

2033.06h	External Shunt Power			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	watts (W)	Read / Write	Yes
Description: Contains a value corresponding to the amount of power the external shunt resistor is allowed to dissipate.				

2051h: Drive PWM and Servo Period

2051.01h	Active PWM Period			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	10ns	Read Only	Yes
Description: Contains a value corresponding to the active PWM period in the drive.				

2051.02h	Active Servo Period			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	ns	Read Only	Yes
Description: Contains a value corresponding to the active servo period in the drive.				

2051.03h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2051.04h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2051.05h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2052h: High Speed Capture Configuration Parameters

2052.01h	Capture 1 Configuration Parameters			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	No

Description:
Contains a value configuring the trigger source and capture signal for Capture 1. Only one capture signal can be selected at a time.

Bits	Description
0-5	Trigger Source
6-7	Reserved
8-15	Signal Selection

Value	Trigger Source	Value	Trigger Source
1	Incremental Encoder 1 Index	21	Digital Output 1
2	Incremental Encoder 2 Index	22	Digital Output 2
3	Touch Probe 1	23	Digital Output 3
4	Touch Probe 2	24	Digital Output 4
5	Digital Input 1	25	Digital Output 5
6	Digital Input 2	26	Digital Output 6
7	Digital Input 3	27	Digital Output 7
8	Digital Input 4	28	Digital Output 8
9	Digital Input 5	29	Digital Output 9
10	Digital Input 6	30	Digital Output 10
11	Digital Input 7	31	Digital Output 11
12	Digital Input 8	32	Digital Output 12
13	Digital Input 9	33	Digital Output 13
14	Digital Input 10	34	Digital Output 14
15	Digital Input 11	35	Digital Output 15
16	Digital Input 12	36	Digital Output 16
17	Digital Input 13	37	Hall Edge A
18	Digital Input 14	38	Hall Edge B
19	Digital Input 15	39	Hall Edge C
20	Digital Input 16	40	Any Hall Edge

Details on the Signal Selection Enum can be found in Table A.3 in Appendix B.

2052.02h	Capture 2 Configuration Parameters			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	No

Description:

Contains a value configuring the trigger source and capture signal for Capture 2. Only one capture signal can be selected at a time.

Bits	Description
0-5	Trigger Source
6-7	Reserved
8-15	Signal Selection

Value	Trigger Source	Value	Trigger Source
1	Incremental Encoder 1 Index	21	Digital Output 1
2	Incremental Encoder 2 Index	22	Digital Output 2
3	Touch Probe 1	23	Digital Output 3
4	Touch Probe 2	24	Digital Output 4
5	Digital Input 1	25	Digital Output 5
6	Digital Input 2	26	Digital Output 6
7	Digital Input 3	27	Digital Output 7
8	Digital Input 4	28	Digital Output 8
9	Digital Input 5	29	Digital Output 9
10	Digital Input 6	30	Digital Output 10
11	Digital Input 7	31	Digital Output 11
12	Digital Input 8	32	Digital Output 12
13	Digital Input 9	33	Digital Output 13
14	Digital Input 10	34	Digital Output 14
15	Digital Input 11	35	Digital Output 15
16	Digital Input 12	36	Digital Output 16
17	Digital Input 13	37	Hall Edge A
18	Digital Input 14	38	Hall Edge B
19	Digital Input 15	39	Hall Edge C
20	Digital Input 16	40	Any Hall Edge

Details on the Signal Selection Enum can be found in Table A.3 in Appendix B.

2053h: Capture Values

2053.01h	Capture Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:
Returns a bitfield of status events of the capture module.

Word	Description
0	Capture 1 Enabled
1	Capture 1 Armed
2	Capture 1 Positive Edge Captured
3	Capture 1 Negative Edge Captured
4-6	Reserved
7	Capture 2 Enabled
8	Capture 2 Armed
9	Capture 2 Positive Edge Captured
10	Capture 2 Negative Edge Captured
11-14	Reserved
15	Touch Probe Active

2053.02h	Capture 1 Last Rising Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the captured rising edge.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.03h	Capture 1 Last Falling Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the captured rising edge.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.04h	Capture 1 Last Capture			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the last capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.05h	Capture 1 History Capture 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the second most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.06h	Capture 1 History Capture 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the third most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.07h	Capture 1 History Capture 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the fourth most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.08h	Capture 1 History Capture 4			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the fifth most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.09h	Capture 2 Last Rising Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the captured rising edge.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Ah	Capture 2 Last Falling Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the captured rising edge.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Bh	Capture 2 Last Capture			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the last capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Ch	Capture 2 History Capture 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the second most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Dh	Capture 2 History Capture 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the third most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Eh	Capture 2 History Capture 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the fourth most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

2053.0Fh	Capture 2 History Capture 4			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read Only	No

Description:
Contains a structure detailing various parameters at the fifth most recent capture.

Word	Description
0	Edge Type Enum
1	Counter
2-3	Capture Time Stamp (units of 5ns)
4-5	Capture Value

20F1h: High Speed Capture Control

20F1.00h	High Speed Capture Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:
Contains a bitfield representing the High Speed Capture configuration parameters.

Bits	Description
0	Capture 1 Enabled
1	Capture 1 Continuous Trigger Enabled
2	Capture 1 Positive Edge Captured
3	Capture 1 Negative Edge Captured
4-7	Reserved
8	Capture 2 Enabled
9	Capture 2 Continuous Trigger Enabled
10	Capture 2 Positive Edge Captured
11	Capture 2 Negative Edge Captured
12-15	Reserved

60B8h: Touch Probe Function

60B8.00h	Touch Probe Function			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read / Write	No

Description:

Used to configure Touch Probe 1 and Touch Probe 2. It is used to assign the signal source, trigger source, and edge type. An edge must be selected for each probe, even if they are disabled. In continuous trigger/roll mode, a value is captured each time the probe is triggered, without having to reset. The Use Capture Configuration bits have priority over the Trigger Source bits.

Bit(s)	Description
0	Enable Touch Probe 1
1	Probe 1 Continuous Trigger
2-3	Probe 1 Trigger Source
4	Probe 1 Triggering Edge - Rising
5	Probe 1 Triggering Edge - Falling
6	Use Capture Configuration 1 Settings
7	Reserved
8	Enable Touch Probe 2
9	Probe 2 Continuous Trigger
10-11	Probe 2 Trigger Source
12	Probe 2 Triggering Edge - Rising
13	Probe 2 Triggering Edge - Falling
14	Use Capture Configuration 2 Settings
15	Reserved

Trigger Source	
Value	Description
0	Touch Probe Input
1	Encoder Index

60B9h: Touch Probe Status

60B9.00h	Touch Probe Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:
Returns a bitfield of status events for the touch probe module. If either Store Edge bit is high and the Touch Probe is not configured for continuous trigger, the Touch Probe will not store any additional captures. To enable captures again, the probe must be disabled then re-enabled.

Bit(s)	Description
0	Probe 1 Enable
1	Probe 1 Store Edge - Rising
2	Probe 1 Store Edge - Falling
3-7	Reserved
8	Probe 2 Enable
9	Probe 2 Store Edge - Rising
10	Probe 2 Store Edge - Falling
11-15	Reserved

60BAh: Touch Probe 1 Positive Edge

60BA.00h	Touch Probe 1 Positive Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

Description:
Returns the value of the signal source assigned to Touch Probe 1 that was captured at the last positive/rising edge.

60BBh: Touch Probe 1 Negative Edge

60BB.00h	Touch Probe 1 Negative Edge			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

Description:
Returns the value of the signal source assigned to Touch Probe 1 that was captured at the last negative/falling edge.

60BCh: Touch Probe 2 Positive Edge

60BC.00h	Touch Probe 2 Positive Edge			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	N/A	N/A	Read Only	No
Description: Returns the value of the signal source assigned to Touch Probe 2 that was captured at the last positive/rising edge.				

60BDh: Touch Probe 2 Negative Edge

60BD.00h	Touch Probe 1 Negative Edge			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	N/A	N/A	Read Only	No
Description: Returns the value of the signal source assigned to Touch Probe 2 that was captured at the last negative/falling edge.				

60D1h: Touch Probe 1 Positive Value Time Stamp

60D1.00h	Touch Probe 1 Positive Value Time Stamp			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	5ns	Read Only	No
Description: Returns the time that the last rising edge capture occurred.				

60D2h: Touch Probe 1 Negative Value Time Stamp

60D2.00h	Touch Probe 1 Negative Value Time Stamp			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	5ns	Read Only	No
Description: Returns the time that the last falling edge capture occurred.				

60D3h: Touch Probe 2 Positive Value Time Stamp

60D3.00h	Touch Probe 2 Positive Value Time Stamp			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned32	N/A	5ns	Read Only	No
Description: Returns the time that the last rising edge capture occurred.				

60D4h: Touch Probe 2 Negative Value Time Stamp

60D4.00h	Touch Probe 2 Negative Value Time Stamp			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	5ns	Read Only	No
Description: Returns the time that the last falling edge capture occurred.				

60D5h: Touch Probe 1 Positive Edge Counter

60D5.00h	Touch Probe 1 Positive Edge Counter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No
Description: Returns the rising edge counter value. The rising edge counter value is the number of rising edge captures that have occurred since power-up.				

60D6h: Touch Probe 1 Negative Edge Counter

60D6.00h	Touch Probe 1 Negative Edge Counter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No
Description: Returns the falling edge counter value. The falling edge counter value is the number of falling edge captures that have occurred since power-up.				

60D7h: Touch Probe 2 Positive Edge Counter

60D7.00h	Touch Probe 2 Positive Edge Counter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	5ns	Read Only	No
Description: Returns the rising edge counter value. The rising edge counter value is the number of rising edge captures that have occurred since power-up.				

60D8h: Touch Probe 2 Negative Edge Counter

60D8.00h	Touch Probe 2 Negative Edge Counter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No
Description: Returns the falling edge counter value. The falling edge counter value is the number of falling edge captures that have occurred since power-up.				

2021h: Drive Temperature Values

2021.01h	External Thermal Sense Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	N/A	Read Only	No
Description: Contains a value corresponding to the external thermal sense value. This value represents the motor temperature value detected by the drive. To determine the physical temperature, use the following formula: (Thermal Sense Value) / 65536 = Temperature measured by drive (in °C) Example: The reported External Thermal Sense Value is 1234567 (decimal). The temperature measured by the drive is therefore (1234567/65536) = 18.8 °C				

2021.02h	Thermistor Resistance			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	Ohms	Read Only	No
Description: If supported by the hardware, this value represents the measured thermistor resistance value in ohms.				

2021.03h	Drive Operating Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} –1]$	0.25°C	Read Only	No
Description: Contains a value corresponding to the value reported by the drive's temperature sensor. Note that this value will be 0 on FlexPro drives that do not support the appropriate temperature sensor.				

2021.04h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

2115h: Thermal Monitor Configuration

2115.01h	Thermal Monitor Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	Yes

Description:
Contains the bitfield detailing the configuration of temperature monitoring.

Bits	Name	Description
7-0	Thermistor Configuration	Configures the operation of the thermistor/switch 0: Disabled (default) 1: Thermistor Active 2: Switch Active Closed 3: Switch Active Open
15-8	Thermal Monitor Configuration	Configures the operation of the drive's thermal monitor 0: Disabled (default) 1: Enable External Thermal Monitor, using user parameters 2: Enable the Drive Thermal Monitor, using drive parameters 3: Enable the Drive Thermal Monitor, using the lesser of the parameter sets 4: Enable both the External and Drive Thermal Monitor

*Note that Drive Thermal Monitor is not supported on all FlexPro models.

2115.02h	Thermistor Disable Resistance			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - 5000	ohms	Read / Write	Yes

Description:
Contains a value corresponding to the measured thermistor resistance when the Motor Over Temperature Event will be triggered.

2115.03h	Thermistor Enable Resistance			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - 5000	ohms	Read / Write	Yes

Description:
Contains a value corresponding to the measured thermistor resistance when the Motor Over Temperature Event will be cleared.

2115.04h	Thermistor Offset Resistance			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	-2500 - 2500	ohms	Read / Write	Yes

Description:
Contains a value corresponding to an offset that is added to the measured thermistor resistance.

2115.05h	External Temperature Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	DT1	Read / Write	Yes

Description:
Contains a structure containing the temperature configuration for the External Thermal Monitor.

Offset	Name	Description
0	External Disable Temperature Level	The temperature at which the drive will disable due to a Motor Over Temperature fault.
2	External Rated Temperature Level	The temperature at which the drive will start limiting current.

2115.06h	Thermal Monitor Hysteresis			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	6554 - $[2^{(16)} - 1]$	%	Read / Write	Yes

Description:
Contains a value corresponding to the percentage of the shutdown temperature at which the drive will re-enable. A value of 6554 represents 10%. For example, a drive with a shutdown temperature of 100 degrees Celsius with a hysteresis of 10% will re-enable once the external temperature drops to 90 degrees Celsius.

2115.07h	Thermal Monitor Time Constant			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 35999	0.1 seconds	Read / Write	Yes

Description:
Contains a value corresponding to the motor/system thermal time constant.

2058h: Digital Input Parameters

TABLE 2.2 Object 2058 Mapping

Bit	Digital Input Mask*
0	Digital Input 1
1	Digital Input 2
2	Digital Input 3
3	Digital Input 4
4	Digital Input 5
5	Digital Input 6
6	Digital Input 7
7	Digital Input 8
8…15	Reserved

* Number of actual inputs depends on drive model

2058.01h	Digital Input Mask: Active Level			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Determines which digital inputs are active high and which are active low. See Table 2.2 above for mapping structure.				

2058.02h	Digital Input Mask: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to User Disable. See Table 2.2 above for mapping structure.				

2058.03h	Digital Input Mask: Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the positive limit. See Table 2.2 above for mapping structure.				

2058.04h	Digital Input Mask: Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to negative limit. See Table 2.2 above for mapping structure.				

2058.05h	Digital Input Mask: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to activate Motor Over Temperature. See Table 2.2 above for mapping structure.				

2058.06h	Digital Input Mask: Phase Detection			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to activate Phase Detection. See Table 2.2 above for mapping structure.				

2058.07h	Digital Input Mask: Auxiliary Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to activate the Auxiliary Disable. See Table 2.2 above for mapping structure.				

2058.08h	Digital Input Mask: Set Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to activate the Set Position event. See Table 2.2 above for mapping structure.				

2058.09h	Digital Input Mask: Start Homing			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to activate the Start Homing event. See Table 2.2 above for mapping structure.				

2058.0Ah	Digital Input Mask: Home Switch			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Home Switch. See Table 2.2 above for mapping structure.				

2058.0Bh	Digital Input Mask: User Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Stop event. See Table 2.2 above for mapping structure.				

2058.0Ch	Digital Input Mask: Set / Reset Capture A			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Set / Reset Capture A event. See Table 2.2 above for mapping structure.				

2058.0Dh	Digital Input Mask: Set / Reset Capture B			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Set / Reset Capture B event. See Table 2.2 above for mapping structure.				

2058.0Eh	Digital Input Mask: Set / Reset Capture C			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Set / Reset Capture C event. See Table 2.2 above for mapping structure.				

2058.0Fh	Digital Input Mask: Reset Event History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Reset Event History event. See Table 2.2 above for mapping structure.				

2058.10h	Digital Input Mask: Configuration Select 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Configuration Select 0 event. See Table 2.2 above for mapping structure.				

2058.11h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	Yes

2058.12h	Digital Input Mask: Gain Select 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Gain Select 0 event. See Table 2.2 above for mapping structure.				

2058.13h	Digital Input Mask: Zero Position Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Zero Position Error event. See Table 2.2 above for mapping structure.				

2058.14h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	Yes

2058.15h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	Yes

2058.16h	Digital Input Mask: Motion Engine Mode			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Engine Mode event. See Table 2.2 above for mapping structure.				

2058.17h	Digital Input Mask: Motion Engine Enable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Enable Enable event. See Table 2.2 above for mapping structure.				

2058.18h	Digital Input Mask: Motion Execute			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Execute event. See Table 2.2 above for mapping structure.				

2058.19h	Digital Input Mask: Motion Select 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Select 0 event. See Table 2.2 above for mapping structure.				

2058.1Ah	Digital Input Mask: Motion Select 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Select 1 event. See Table 2.2 above for mapping structure.				

2058.1Bh	Digital Input Mask: Motion Select 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Select 2 event. See Table 2.2 above for mapping structure.				

2058.1Ch	Digital Input Mask: Motion Select 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Select 3 event. See Table 2.2 above for mapping structure.				

2058.1Dh	Digital Input Mask: Motion Engine Abort			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Motion Engine Abort event. See Table 2.2 above for mapping structure.				

2058.1Eh	Digital Input Mask: Jog Plus			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Jog Plus event. See Table 2.2 above for mapping structure.				

2058.1Fh	Digital Input Mask: Jog Minus			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Jog Minus event. See Table 2.2 above for mapping structure.				

2058.20h	Digital Input Mask: Jog 0 Select			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Jog 0 Select event. See Table 2.2 above for mapping structure.				

2058.21h	Digital Input Mask: Jog 1 Select			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital inputs, if any, are assigned to the Jog 1 Select event. See Table 2.2 above for mapping structure.				

2058.22h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
-	-	-	-	-

205Ah: Digital Output Parameters

TABLE 2.3 Object 205A Mapping

Bit	Digital Output Mask
0	Digital Output 1
1	Digital Output 2
2	Digital Output 3

3	Digital Output 4
4…15	Reserved

205A.01h	Digital Output Mask: Active Level			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs are active high and which are active low. See Table 2.3 above for mapping structure.				

205A.02h	Digital Output Mask: Drive Reset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Drive Reset event. See Table 2.3 above for mapping structure.				

205A.03h	Digital Output Mask: Drive Internal Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Drive Internal Error event. See Table 2.3 above for mapping structure.				

205A.04h	Digital Output Mask: Short Circuit Fault			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Short Circuit Fault event. See Table 2.3 above for mapping structure.				

205A.05h	Digital Output Mask: Over-Current Fault			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Over-Current event. See Table 2.3 above for mapping structure.				

205A.06h	Digital Output Mask: Hardware Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Hardware Under Voltage event. See Table 2.3 above for mapping structure.				

205A.07h	Digital Output Mask: Hardware Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Hardware Over Voltage event. See Table 2.3 above for mapping structure.				

205A.08h	Digital Output Mask: Drive Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Drive Over Temperature event. See Table 2.3 above for mapping structure.				

205A.09h	Digital Output Mask: Parameter Restore Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Parameter Restore Error event. See Table 2.3 above for mapping structure.				

205A.0Ah	Digital Output Mask: Parameter Store Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Parameter Store Error event. See Table 2.3 above for mapping structure.				

205A.0Bh	Digital Output Mask: Invalid Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Invalid Hall State event. See Table 2.3 above for mapping structure.				

205A.0Ch	Digital Output Mask: Phase Synchronization Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Phase Synchronization Error event. See Table 2.3 above for mapping structure.				

205A.0Dh	Digital Output Mask: Motor Over Temperature			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Motor Over Temperature event. See Table 2.3 above for mapping structure.				

205A.0Eh	Digital Output Mask: Phase Detection Fault			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Phase Detection Fault event. See Table 2.3 above for mapping structure.				

205A.0Fh	Digital Output Mask: Feedback Sensor Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Feedback Sensor Error event. See Table 2.3 above for mapping structure.				

205A.10h	Digital Output Mask: Log Entry Missed			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Log Entry Missed event. See Table 2.3 above for mapping structure.				

205A.11h	Digital Output Mask: Software Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Software Disable event. See Table 2.3 above for mapping structure.				

205A.12h	Digital Output Mask: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the User Disable event. See Table 2.3 above for mapping structure.				

205A.13h	Digital Output Mask: User Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Positive Limit event. See Table 2.3 above for mapping structure.				

205A.14h	Digital Output Mask: User Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Negative Limit event. See Table 2.3 above for mapping structure.				

205A.15h	Digital Output Mask: Current Limiting (Foldback)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Current Limiting event. See Table 2.3 above for mapping structure.				

205A.16h	Digital Output Mask: Continuous Current Limit Reached			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Continuous Current Limit Reached event. See Table 2.3 above for mapping structure.				

205A.17h	Digital Output Mask: Current Loop Saturated			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Current Loop Saturated event. See Table 2.3 above for mapping structure.				

205A.18h	Digital Output Mask: User Under Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the User Under Voltage event. See Table 2.3 above for mapping structure.				

205A.19h	Digital Output Mask: User Over Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the User Over Voltage event. See Table 2.3 above for mapping structure.				

205A.1Ah	Digital Output Mask: Non-Sinusoidal Commutation			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Non-Sinusoidal Commutation. See Table 2.3 above for mapping structure.				

205A.1Bh	Digital Output Mask: Phase Detection			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Phase Detection event. See Table 2.3 above for mapping structure.				

205A.1Ch	Digital Output Mask: User Auxiliary Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the User Auxiliary Disable event. See Table 2.3 above for mapping structure.				

205A.1Dh	Digital Output Mask: Shunt Regulator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Shunt Regulator event. See Table 2.3 above for mapping structure.				

205A.1Eh	Digital Output Mask: Phase Detection Complete			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Phase Detection Complete event. See Table 2.3 above for mapping structure.				

205A.1Fh	Digital Output Mask: Command Limiter Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Command Limiter Active event. See Table 2.3 above for mapping structure.				

205A.20h	Digital Output Mask: Motor Over Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Motor Over Speed event. See Table 2.3 above for mapping structure.				

205A.21h	Digital Output Mask: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the At Command event. See Table 2.3 above for mapping structure.				

205A.22h	Digital Output Mask: Zero Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Zero Velocity event. See Table 2.3 above for mapping structure.				

205A.23h	Digital Output Mask: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Velocity Following Error event. See Table 2.3 above for mapping structure.				

205A.24h	Digital Output Mask: Positive Velocity Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Positive Velocity Limit event. See Table 2.3 above for mapping structure.				

205A.25h	Digital Output Mask: Negative Velocity Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Negative Velocity Limit event. See Table 2.3 above for mapping structure.				

205A.26h	Digital Output Mask: Max Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Max Measured Position event. See Table 2.3 above for mapping structure.				

205A.27h	Digital Output Mask: Min Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Min Measured Position event. See Table 2.3 above for mapping structure.				

205A.28h	Digital Output Mask: At Home Position			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the At Home Position event. See Table 2.3 above for mapping structure.				

205A.29h	Digital Output Mask: Position Following Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Position Following Error event. See Table 2.3 above for mapping structure.				

205A.2Ah	Digital Output Mask: Max Target position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Max Target Position Limit event. See Table 2.3 above for mapping structure.				

205A.2Bh	Digital Output Mask: Min Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Min Target Position Limit event. See Table 2.3 above for mapping structure.				

205A.2Ch	Digital Output Mask: Set Measured Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Set Measured Position event. See Table 2.3 above for mapping structure.				

205A.2Dh	Digital Output Mask: Homing Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Homing Active event. See Table 2.3 above for mapping structure.				

205A.2Eh	Digital Output Mask: Apply Brake			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Apply Brake event. See Table 2.3 above for mapping structure.				

205A.2Fh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205A.30h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

205A.31h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

205A.32h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

205A.33h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

205A.34h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

205A.35h	Digital Output Mask: Communication Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Communication Error event. See Table 2.3 above for mapping structure.				

205A.36h	Digital Output Mask: Homing Complete			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Homing Complete event. See Table 2.3 above for mapping structure.				

205A.37h	Digital Output Mask: Commanded Stop			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Commanded Stop event. See Table 2.3 above for mapping structure.				

205A.38h	Digital Output Mask: User Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the User Stop event. See Table 2.3 above for mapping structure.				

205A.39h	Digital Output Mask: Bridge Enabled			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Bridge Enabled status. See Table 2.3 above for mapping structure.				

205A.3Ah	Digital Output Mask: Dynamic Brake Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Dynamic Brake Active event. See Table 2.3 above for mapping structure.				

205A.3Bh	Digital Output Mask: Stop Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Stop Active event. See Table 2.3 above for mapping structure.				

205A.3Ch	Digital Output Mask: Positive Stop Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Positive Stop Active event. See Table 2.3 above for mapping structure.				

205A.3Dh	Digital Output Mask: Negative Stop Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Negative Stop Active event. See Table 2.3 above for mapping structure.				

205A.3Eh	Digital Output Mask: Positive Inhibit Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Positive Inhibit Active event. See Table 2.3 above for mapping structure.				

205A.3Fh	Digital Output Mask: Negative Inhibit Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Negative Inhibit Active event. See Table 2.3 above for mapping structure.				

205A.40h	Digital Output Mask: User Bit 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 0. See Table 2.3 above for mapping structure.				

205A.41h	Digital Output Mask: User Bit 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 1. See Table 2.3 above for mapping structure.				

205A.42h	Digital Output Mask: User Bit 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 2. See Table 2.3 above for mapping structure.				

205A.43h	Digital Output Mask: User Bit 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 3. See Table 2.3 above for mapping structure.				

205A.44h	Digital Output Mask: User Bit 4			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 4. See Table 2.3 above for mapping structure.				

205A.45h	Digital Output Mask: User Bit 5			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 5. See Table 2.3 above for mapping structure.				

205A.46h	Digital Output Mask: User Bit 6			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 6. See Table 2.3 above for mapping structure.				

205A.47h	Digital Output Mask: User Bit 7			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 7. See Table 2.3 above for mapping structure.				

205A.48h	Digital Output Mask: User Bit 8			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 8 See Table 2.3 above for mapping structure.				

205A.49h	Digital Output Mask: User Bit 9			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 9. See Table 2.3 above for mapping structure.				

205A.4Ah	Digital Output Mask: User Bit 10			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 10. See Table 2.3 above for mapping structure.				

205A.4Bh	Digital Output Mask: User Bit 11			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 11. See Table 2.3 above for mapping structure.				

205A.4Ch	Digital Output Mask: User Bit 12			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 12. See Table 2.3 above for mapping structure.				

205A.4Dh	Digital Output Mask: User Bit 13			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 13. See Table 2.3 above for mapping structure.				

205A.4Eh	Digital Output Mask: User Bit 14			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 14. See Table 2.3 above for mapping structure.				

205A.4Fh	Digital Output Mask: User Bit 15			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to User Bit 15. See Table 2.3 above for mapping structure.				

205A.50h	Digital Output Mask: Capture A			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Capture A. See Table 2.3 above for mapping structure.				

205A.51h	Digital Output Mask: Capture B			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Capture B. See Table 2.3 above for mapping structure.				

205A.52h	Digital Output Mask: Thermal Monitor Fault			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Thermal Monitor Fault event. See Table 2.3 above for mapping structure.				

205A.53h	Digital Output Mask: Commanded Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Commanded Positive Limit. See Table 2.3 above for mapping structure.				

205A.54h	Digital Output Mask: Commanded Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Commanded Negative Limit. See Table 2.3 above for mapping structure.				

205A.55h	Digital Output Mask: Safe Torque Off Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Safe Torque Off Active. See Table 2.3 above for mapping structure.				

205A.56h	Digital Output Mask: Zero Position Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Zero Position Error. See Table 2.3 above for mapping structure.				

205A.57h	Digital Output Mask: Motion Engine Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Motion Engine Error. See Table 2.3 above for mapping structure.				

205A.58h	Digital Output Mask: Motion Engine Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Motion Engine Active. See Table 2.3 above for mapping structure.				

205A.59h	Digital Output Mask: Active Motion Busy			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Busy. See Table 2.3 above for mapping structure.				

205A.5Ah	Digital Output Mask: Active Motion Done			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Done. See Table 2.3 above for mapping structure.				

205A.5Bh	Digital Output Mask: Active Motion Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Error. See Table 2.3 above for mapping structure.				

205A.5Ch	Digital Output Mask: Active Motion Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Active. See Table 2.3 above for mapping structure.				

205A.5Dh	Digital Output Mask: Active Motion Aborted			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Aborted. See Table 2.3 above for mapping structure.				

205A.5Eh	Digital Output Mask: Active Motion Execute			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion Execute. See Table 2.3 above for mapping structure.				

205A.5Fh	Digital Output Mask: Active Motion MotionDone			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion MotionDone. See Table 2.3 above for mapping structure.				

205A.60h	Digital Output Mask: Active Motion SequenceDone			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Active Motion SequenceDone. See Table 2.3 above for mapping structure.				

205A.61h	Digital Output Mask: Absolute Position Valid			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Absolute Position Valid See Table 2.3 above for mapping structure.				

205A.62h	Digital Output Mask: Jog Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Jog Active. See Table 2.3 above for mapping structure.				

205A.63h	Digital Output Mask: PWM and Direction Broken Wire			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to PWM and Direction Broken Wire. See Table 2.3 above for mapping structure.				

205A.64h	Digital Output Mask: PLS Pulse 1 Post Active Level Output			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to PLS Pulse 1 Post Active Level. See Table 2.3 above for mapping structure.				

205A.65h	Digital Output Mask: PLS Pulse 2 Post Active Level Output			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to PLS Pulse 2 Post Active Level. See Table 2.3 above for mapping structure.				

205A.66h	Digital Output Mask: Motion Engine Abort			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to Motion Engine Abort. See Table 2.3 above for mapping structure.				

205A.67h	Digital Output Mask: Sustained Current Indicator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the Sustained Current Indicator event. See Table 2.3 above for mapping structure.				

205A.68h	Digital Output Mask: High Current Indicator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Defines which digital outputs, if any, are assigned to the High Current Indicator event. See Table 2.3 above for mapping structure.				

2044h: Analog Input Configuration Some deadband parameters have units that vary with the operating mode of the drive. For these parameters, refer to Table 2.4 for the correct unit selection.

TABLE 2.4 Deadband Units

Drive Operation Mode	Units
Current (Torque)	DC2
Velocity	DS1
Position (Around Velocity Or Current)	counts

2044.01h	Analog Input 1 Config 0: Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 1 Configuration 0.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.02h	Analog Input 1 Config 0: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 1 Configuration 0 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.03h	Analog Input 1 Config 0: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 1 Configuration 0 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.04h	Analog Input 1 Config 0: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 1 Configuration 0 in int32S30 notation.

2044.05h	Analog Input 1 Config 0: Deadband Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 1 Configuration 0 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.06h	Analog Input 1 Config 0: Deadband Width			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 1 Configuration 0 in int16S14 notation.

2044.07h	Analog Input 1 Config 0: Deadband Setpoint			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 1 Configuration 0 in int16S14 notation.

2044.08h	Analog Input 1 Config 1: Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 1 Configuration 1.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.09h	Analog Input 1 Config 1: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	[$-2^{(15)}$] - [$2^{(15)}$ –1]	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 1 Configuration 1 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.0Ah	Analog Input 1 Config 1: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[$-2^{(31)}$] - [$2^{(31)}$ –1]	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 1 Configuration 1 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.0Bh	Analog Input 1 Config 1: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[$-2^{(31)}$] - [$2^{(31)}$ –1]	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 1 Configuration 1 in int32S30 notation.

2044.0Ch	Analog Input 1 Config 1: Deadband Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 1 Configuration 1 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.0Dh	Analog Input 1 Config 1: Deadband Width			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 1 Configuration 1 in int16S14 notation.

2044.0Eh	Analog Input 1 Config 1: Deadband Setpoint			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 1 Configuration 1 in int16S14 notation.

2044.0Fh	Analog Input 2 Config 0: Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 2 Configuration 0.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.10h	Analog Input 2 Config 0: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 2 Configuration 0 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.11h	Analog Input 2 Config 0: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 2 Configuration 0 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.12h	Analog Input 2 Config 0: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 2 Configuration 0 in int32S30 notation.

2044.13h	Analog Input 2 Config 0: Deadband Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 2 Configuration 0 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.14h	Analog Input 2 Config 0: Deadband Width			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 2 Configuration 0 in int16S14 notation.

2044.15h	Analog Input 2 Config 0: Deadband Setpoint			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 2 Configuration 0 in int16S14 notation.

2044.16h	Analog Input 2 Config 1: Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 2 Configuration 1.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.17h	Analog Input 2 Config 1: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 2 Configuration 1 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.18h	Analog Input 2 Config 1: Output Boundaries			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 2 Configuration 1 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.19h	Analog Input 2 Config 1: Low Pass Filter Coefficient			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 2 Configuration 1 in int32S30 notation.

2044.1Ah	Analog Input 2 Config 1: Deadband Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 2 Configuration 1 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.1Bh	Analog Input 2 Config 1: Deadband Width			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 2 Configuration 1 in int16S14 notation.

2044.1Ch	Analog Input 2 Config 1: Deadband Setpoint			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 2 Configuration 1 in int16S14 notation.

2044.1Dh	Analog Input 3 Config 0: Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:

Contains the configuration parameters of Analog Input 3 Configuration 0.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.1Eh	Analog Input 3 Config 0: Input Boundaries			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}]$ - $[2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:

Contains the four Input Limits and Warning Boundaries of Analog Input 3 Configuration 0 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.1Fh	Analog Input 3 Config 0: Output Boundaries			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:

Contains the two Output Boundaries of Analog Input 3 Configuration 0 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.20h	Analog Input 3 Config 0: Low Pass Filter Coefficient			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:

Contains the Low Pass Filter Coefficient of Analog Input 3 Configuration 0 in int32S30 notation.

2044.21h	Analog Input 3 Config 0: Deadband Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:

Contains the configuration parameters of Analog Input 3 Configuration 0 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.22h	Analog Input 3 Config 0: Deadband Width			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:

Contains the Deadband Width of Analog Input 3 Configuration 0 in int16S14 notation.

2044.23h	Analog Input 3 Config 0: Deadband Setpoint			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:

Contains the Deadband Setpoint of Analog Input 3 Configuration 0 in int16S14 notation.

2044.24h	Analog Input 3 Config 1: Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:

Contains the configuration parameters of Analog Input 3 Configuration 1.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.25h	Analog Input 3 Config 1: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 3 Configuration 1 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.26h	Analog Input 3 Config 1: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 3 Configuration 1 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.27h	Analog Input 3 Config 1: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 3 Configuration 1 in int32S30 notation.

2044.28h	Analog Input 3 Config 1: Deadband Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 3 Configuration 1 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.29h	Analog Input 3 Config 1: Deadband Width			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 3 Configuration 1 in int16S14 notation.

2044.2Ah	Analog Input 3 Config 1: Deadband Setpoint			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 3 Configuration 1 in int16S14 notation.

2044.2Bh	Analog Input 4 Config 0: Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 4 Configuration 0.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.2Ch	Analog Input 4 Config 0: Input Boundaries			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 4 Configuration 0 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.2Dh	Analog Input 4 Config 0: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 4 Configuration 0 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.2Eh	Analog Input 4 Config 0: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 4 Configuration 0 in int32S30 notation.

2044.2Fh	Analog Input 4 Config 0: Deadband Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 4 Configuration 0 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.30h	Analog Input 4 Config 0: Deadband Width			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 4 Configuration 0 in int16S14 notation.

2044.31h	Analog Input 4 Config 0: Deadband Setpoint			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] - [2^{(15)} - 1]$	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 4 Configuration 0 in int16S14 notation.

2044.32h	Analog Input 4 Config 1: Configuration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 4 Configuration 1.

Bit(s)	Description
0	Invert Input; 0=Non-inverted; 1=Inverted
1	Enable Input Warnings; 0=Disabled; 1=Enabled
2	Enable Deadband; 0=Disabled; 1=Enabled
3-6	Output Left Shift: 0-15
7-15	Reserved (must be 0)

2044.33h	Analog Input 4 Config 1: Input Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}]$ - $[2^{(15)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the four Input Limits and Warning Boundaries of Analog Input 4 Configuration 1 in int16S14 notation.

Offset	Description
0	Upper Input Limit
1	Upper Input Warning
2	Lower Input Warning
3	Lower Input Limit

2044.34h	Analog Input 4 Config 1: Output Boundaries			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the two Output Boundaries of Analog Input 4 Configuration 1 in int32S20 notation.

Element	Description
0	Upper Output Limit
1	Lower Output Limit

2044.35h	Analog Input 4 Config 1: Low Pass Filter Coefficient			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	N/A	Read / Write	Yes

Description:
Contains the Low Pass Filter Coefficient of Analog Input 4 Configuration 1 in int32S30 notation.

2044.36h	Analog Input 4 Config 1: Deadband Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$ –1]	See Table 2.4	Read / Write	Yes

Description:
Contains the configuration parameters of Analog Input 4 Configuration 1 Deadband.

Element	Description
0	Non-Linear
1	Linear

2044.37h	Analog Input 4 Config 1: Deadband Width			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$ –1]	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Width of Analog Input 4 Configuration 1 in int16S14 notation.

2044.38h	Analog Input 4 Config 1: Deadband Setpoint			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$ –1]	See Table 2.4	Read / Write	Yes

Description:
Contains the Deadband Setpoint of Analog Input 4 Configuration 1 in int16S14 notation.

2040h: Programmable Limit Switch Parameters

The Programmable Limit Switch Parameters contains tables for the Configuration Control in Table 2.5 and the Pulse Generator Configurations (#1 and #2) in Table 2.6.

2040.01h	Programmable Limit Switch Structure			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	N/A	Read / Write	No

Description:
Configures all the parameters for the PLS module.

Word #	Data Type	Name	Description
0	Structure	Configuration Control	Configures the behavior of the PLS module. Allows host to select the input source signal and to select linear or rotary mode. See Table 2.5.
1 2	Integer	Roll-over count	The rotary roll-over value used. Default is 20,000
3	Structure	Pulse Generator #1 Configuration	Configuration for pulse generator #1. See Table 2.6.
4 5	Integer	Pulse Gen. #1 Lower Position	Lower position count for Pulse Gen. Default is 1,000.
6 7	Integer	Pulse Gen. #1 Upper Position	Upper position count for Pulse Gen. Default is 1750. Upper Position ≥ Lower Position
8 9	Integer	Pulse Gen. #1 Repeat Size	Specifies the number of counts between repeating pulses. Default: 2,000
10	Unsigned int	Pulse Gen. #1 Pulse Width (time)	Only used in Time Base mode: This specifies the width of the triggered pulse in terms of the number of position loop samples (2Ts). Must be greater than 0. Default: 16. See Table 2.5.
11	Structure	Pulse Generator #2 Configuration	Configuration for pulse generator #2. See Table 2.6.
12 13	Integer	Pulse Gen. #2 Lower Position	Lower position count for Pulse Gen. Default is 2,000.
14 15	Integer	Pulse Gen. #2 Upper Position	Upper position count for Pulse Gen. Default is 2,500. Upper Position ≥ Lower Position
16 17	Integer	Pulse Gen. #2 Repeat distance	Specifies the number of counts between repeating pulses. Default: 2,000
18	Unsigned int	Pulse Gen. #2 Pulse Width (time)	Only used in Time Base mode: This specifies the width of the triggered pulse in terms of the number of position loop samples (2Ts). Must be greater than 0. Default: 16

TABLE 2.5 Configuration Control

Bits	Name	Description
[3:0]	PLS Source Enum	Valid Values: 0: No source, (Master Disable) (default)
[14:4]	Reserved	Valid Values: 0
[15]	Linear/Rotary Mode Select	0: Rotary Mode (default) 1: Linear Mode

TABLE 2.6 Pulse Generator Configurations (#1 and #2)

Bits	Name	Description
[0]	Pulse #1 Generator Enable	0: Pulse Generator is disabled, (default) 1: Pulse Generator is enabled
[1]	Pulse #1 Output Active Level	0: Active Hi (default) 1: Active Lo
[2]	Pulse #1 Repeat Control	0: Pulse repeat count enabled (the value of the repeat counter will be used) (default) 1: Pulse repeat count disabled (infinite repeat count)
[3]	Pulse #1 Pulse Width Control	0: Pulse width is based on position counts (default) 1: Pulse width is based on time
[4:5]	Pulse #1 Direction Control	Valied Values: 0: Level sensitive/Both directions (default) 1: Rising Edge-Forward 2: Rising Edge-Reverse
[6:7]	Reserved	Valid Values: 0
[8:15]	Pulse #1 Repeat Count	Valid Values: $0 \leq RepeatCount < 256$ Total number of pulses in the pulse train = 1+Repeat Count (default = 0)

203Bh: Biquad Filter Configuration Parameters

203B.01h	Biquad Filter 1 Configuration Parameters			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read / Write	Yes

Description:

12-word structure containing the filter coefficients for Biquad Filter 1.

Word	Coefficient
0-1	K
2-3	A1
4-5	A2
6-7	B0
8-9	B1
10-11	B2

203B.02h	Biquad Filter 2 Configuration Parameters			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	N/A	N/A	Read / Write	Yes

Description:
12-word structure containing the filter coefficients for Biquad Filter 2.

Word	Coefficient
0-1	K
2-3	A1
4-5	A2
6-7	B0
8-9	B1
10-11	B2

203Dh: Deadband Parameters

Some deadband parameters have units that vary with the operating mode of the drive. For these parameters, refer to Table 2.7 for the correct unit selection.

TABLE 2.7 Deadband Units

Drive Operation Mode	Units
Current (Torque)	DC2
Velocity	DS1
Position (Around Velocity Or Current)	counts

203D.01h	Deadband Type: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 - 1	N/A	Read / Write	Yes

Description:
Deadband Type for Configuration 0.

Value	Description
0	Non-linear (starts smoothly after reaching end of deadband)
1	Linear (jumps to command after reaching end of deadband)

203D.02h	Deadband Width: Config 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	0 – [$2^{(31)}$-1]	See Table 2.7	Read / Write	Yes

Description:
The width from the midpoint to one end of the deadband in Configuration 0. Therefore, the total width is 2X this value.

203D.03h	Deadband Set Point: Config 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	See Table 2.7	Read / Write	Yes
Description: Midpoint of the Deadband in Configuration 0.				

203D.04h	Deadband Type: Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	0 - 1	N/A	Read / Write	Yes
Description: Deadband Type for Configuration 1.				

Value	Description
0	Non-linear (starts smoothly after reaching end of deadband)
1	Linear (jumps to command after reaching end of deadband)

203D.05h	Deadband Width: Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$0 – [2^{(31)}-1]$	See Table 2.7	Read / Write	Yes
Description: The width from the midpoint to one end of the deadband in Configuration 1. Therefore, the total width is 2X this value.				

203D.06h	Deadband Set Point: Config 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	See Table 2.7	Read / Write	Yes
Description: Midpoint of the Deadband in Configuration 1.				

2253h: Jogging

2253.01h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2253.02h	Max Acceleration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	1 – [2$^{(31)}$-1]	DA4	Read / Write	Yes

Description:
Sets the maximum acceleration for the selected Jog.

2253.03h	Max Deceleration			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	1 – [2$^{(31)}$-1]	DA4	Read / Write	Yes

Description:
Sets the maximum deceleration for the selected Jog.

2253.04h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2253.05h	Jog Speed 0			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	1 – [2$^{(31)}$-1]	DS1	Read / Write	Yes

Description:
Sets the target speed for Jog 0.

2253.06h	Jog Speed 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	1 – [2$^{(31)}$-1]	DS1	Read / Write	Yes

Description:
Sets the target speed for Jog 1.

2253.07h	Jog Speed 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	1 – [2$^{(31)}$-1]	DS1	Read / Write	Yes

Description:
Sets the target speed for Jog 2.

2253.08h	Jog Speed 3			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$1 – [2^{(31)}-1]$	DS1	Read / Write	Yes
Description: Sets the target speed for Jog 3.				

2253.09h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2253.0Ah	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2253.0Bh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2253.0Ch	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
-	-	-	-	-

2062h: Braking/Stop General Properties

2062.01h	Braking: Delay After Applying Brake			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: Specifies the delay, in milliseconds, after applying the external brake before disabling the power bridge or dynamic braking.				

2062.02h	Braking: Delay Before Disengaging Brake			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: Specifies the delay, in milliseconds, before releasing the external brake after enabling the power bridge or discontinuing dynamic braking.				

2062.03h	Stop Deceleration Limit - Position Mode			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	1 - $[2^{(31)} - 1]$	DA1	Read / Write	Yes
Description: Specifies the maximum position mode deceleration during a controlled Stop event. See “Appendix” on page 337 for unit conversion details.				

2062.04h	Stop Deceleration Limit - Velocity Mode			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	1 - $[2^{(31)} - 1]$	DA1	Read / Write	Yes
Description: Specifies the maximum velocity mode acceleration during a controlled Stop event. See “Appendix” on page 337 for unit conversion details.				

2062.05h	Stop Jerk Limit - Current Mode			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	1 - $[2^{(31)} - 1]$	DJ1	Read / Write	Yes
Description: Sets the rate at which the target current ramps down during a Stop event. Only valid for current mode. See “Appendix” on page 337 for unit conversion details.				

2064h: Event Response Time Parameters

2064.01h	Event Response Time: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Motor Over Temperature before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.02h	Event Response Time: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a Feedback Sensor Error before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.03h	Event Response Time: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a Log Entry Missed before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.04h	Event Response Time: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a User Disable before the power bridge is disabled. The event action is disabled when bit 15 is set to 1.				

2064.05h	Event Response Time: User Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a User Positive Limit input before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.06h	Event Response Time: User Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a User Negative Limit input before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.07h	Event Response Time: Current Limit Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	Milliseconds	Read / Write	Yes
Description: The time delay after the occurrence of Current Limit Active before its Event Action (2065h) is executed.				

2064.08h	Event Response Time: Continuous Current Foldback			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of reaching the Continuous Current Foldback setting before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.09h	Event Response Time: Current Limit Saturated			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Current Limit Saturated before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.0Ah	Event Response Time: User Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of User Under Voltage before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.0Bh	Event Response Time: User Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – $[2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a user-specified Over Voltage level before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.0Ch	Event Response Time: Motor Over Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Motor Over Speed before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.0Dh	Event Response Time: User Auxiliary Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a User Auxiliary Disable input before dynamic braking is applied. The event action is disabled when bit 15 is set to 1.				

2064.0Eh	Event Response Time: Shunt Regulator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Shunt Regulator activity before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.0Fh	Event Response Time: Command Limiter Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Command Limiter Active before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.10h	Event Response Time: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Velocity Following Error before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.11h	Event Response Time: Positive Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Positive Velocity Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.12h	Event Response Time: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Negative Velocity Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.13h	Event Response Time: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of At Home Position before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.14h	Event Response Time: Position Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Position Following Error before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.15h	Event Response Time: Max Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Max Target Position Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.16h	Event Response Time: Min Target Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Min Target Position Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.17h	Event Response Time: Max Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Maximum Measured Position Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.18h	Event Response Time: Min Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Minimum Measured Position Limit before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.19h	Event Response Time: PVT Buffer Full			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Buffer Full before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Ah	Event Response Time: PVT Buffer Empty			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Buffer Empty before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Bh	Event Response Time: PVT Buffer Under Threshold			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Buffer Under Threshold before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Ch	Event Response Time: PVT Buffer Failure			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Buffer Failure before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Dh	Event Response Time: PVT Buffer Empty Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Buffer Empty Stop before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Eh	Event Response Time: PVT Sequence Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PVT Sequence Error before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.1Fh	Event Response Time: Communication Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(15)} – 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of Communication Error before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.20h	Event Response Time: User Stop			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of a User Stop command before stopping the motor. The event action is disabled when bit 15 is set to 1.				

2064.21h	Event Response Time: PWM and Direction Broken Wire			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of PWM and Direction Broken Wire before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2064.22h	Event Response Time: High Current Indicator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(15)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after the occurrence of High Current Indicator before its Event Action (2065h) is executed. The event action is disabled when bit 15 is set to 1.				

2065h: Event Action Parameters

2065.01h	Event Action: Parameter Restore Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Parameter Restore Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.02h	Event Action: Parameter Store Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Parameter Store Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.03h	Event Action: Invalid Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after an Invalid Hall State. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.04h	Event Action: Phase Synch Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Phase Synch Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.05h	Event Action: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Motor Over Temperature. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.06h	Event Action: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Feedback Sensor Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.07h	Event Action: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Log Entry Missed. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.08h	Event Action: Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Current Limiting. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.09h	Event Action: Continuous Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Continuous Current. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Ah	Event Action: Current Loop Saturated			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after Current Loop Saturated. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Bh	Event Action: User Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Under Voltage. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Ch	Event Action: User Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Over Voltage. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Dh	Event Action: Shunt Regulator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after Shunt Regulator active. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Eh	Event Action: Command Limiter Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after Command Limiter Active. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.0Fh	Event Action: Motor Over Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Motor Over Speed. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.10h	Event Action: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after an At Command state. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.11h	Event Action: Zero Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Zero Velocity state. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.12h	Event Action: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Velocity Following Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.13h	Event Action: Positive Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Positive Velocity Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.14h	Event Action: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Negative Velocity Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.15h	Event Action: Max Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Max Measured Position Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.16h	Event Action: Min Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Min Measured Position Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.17h	Event Action: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after an At Home Position state. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.18h	Event Action: Position Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Position Following Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.19h	Event Action: Max Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Max Target Position Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.1Ah	Event Action: Min Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Min Target Position Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.1Bh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2065.1Ch	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2065.1Dh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2065.1Eh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2065.1Fh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2065.20h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2065.21h	Event Action: Comm Channel Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Comm Channel Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.22h	Event Action: User Positive Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Positive Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.23h	Event Action: User Negative Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Negative Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.24h	Event Action: Drive Reset			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Drive Reset. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.25h	Event Action: Drive Internal Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Drive Internal Error. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.26h	Event Action: Short Circuit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Short Circuit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.27h	Event Action: Over Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Over Current. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.28h	Event Action: Hardware Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Hardware Under Voltage. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.29h	Event Action: Hardware Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Hardware Over Voltage. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Ah	Event Action: Drive Over Temperature			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Drive Over Temperature. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Bh	Event Action: Software Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Software Disable. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Ch	Event Action: User Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Disable. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Dh	Event Action: User Auxiliary Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a User Auxiliary Disable. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Eh	Event Action: Phase Detection Fault			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Phase Detection Fault. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.2Fh	Event Action: Commanded Positive Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Commanded Positive Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.30h	Event Action: Commanded Negative Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 15	N/A	Read / Write	Yes
Description: The action of the drive immediately after a Commanded Negative Limit. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.31h	Event Action: PWM and Direction Broken Wire			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(15)} – 1]$	N/A	Read / Write	Yes
Description: The action of the drive immediately after a PWM and Direction Broken Wire. Refer to Table 2.8 below for the valid event actions and their respective values.				

2065.32h	Event Action: High Current Indicator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(15)} – 1]$	N/A	Read / Write	Yes
Description: The action of the drive immediately after a High Current Indicator Faultt. Refer to Table 2.8 below for the valid event actions and their respective values.				

TABLE 2.8 Event Action Options

Sub Index	Event	Valid Event Action Values (refer to Table 2.9 for value definitions)											
01h	Parameter Restore Error	-	1	-	-	4	-	-	-	8	9	10	11
02h	Parameter Store Error	-	1	-	-	4	-	-	-	8	9	10	11
03h	Invalid Hall State	-	1	-	-	4	-	-	-	8	9	10	11
04h	Phase Synch Error	0	1	-	-	4	-	-	-	8	9	10	11
05h	Motor Over Temperature	0	1	2	3	4	5	6	7	8	9	10	11
06h	Feedback Sensor Error	0	1	2	3	4	5	6	7	8	9	10	11
07h	Log Entry Missed	0	1	2	3	4	5	6	7	8	9	10	11

08h	Current Limiting	0	1	2	3	4	5	6	7	8	9	10	11
09h	Continuous Current	0	1	2	3	4	5	6	7	8	9	10	11
0Ah	Current Loop Saturated	0	1	2	3	4	5	6	7	8	9	10	11
0Bh	User Under Voltage	0	1	2	3	4	5	6	7	8	9	10	11
0Ch	User Over Voltage	0	1	2	3	4	5	6	7	8	9	10	11
0Dh	Shunt Regulator	0	1	-	-	4	-	-	-	8	9	10	11
0Eh	Command Limiter Active	0	-	-	-	-	-	-	-	-	-	-	-
0Fh	Motor Over Speed	0	1	2	3	4	5	6	7	8	9	10	11
10h	At Command	0	1	2	3	4	5	6	7	8	9	10	11
11h	Zero Velocity	0	-	-	-	-	-	-	-	-	-	-	-
12h	Velocity Following Error	0	1	2	3	4	5	6	7	8	9	10	11
13h	Positive Velocity Limit	0	1	2	3	4	5	6	7	8	9	10	11
14h	Negative Velocity Limit	0	1	2	3	4	5	6	7	8	9	10	11
15h	Max Measured Position Limit	0	1	2	3	4	5	6	7	8	9	10	11
16h	Min Measured Position Limit	0	1	2	3	4	5	6	7	8	9	10	11
17h	At Home Position	0	-	-	-	-	-	-	-	-	-	-	-
18h	Position Following Error	0	1	2	3	4	5	6	7	8	9	10	11
19h	Max Target Position Limit	0	1	2	3	4	5	6	7	8	9	10	11
1Ah	Min Target Position Limit	0	1	2	3	4	5	6	7	8	9	10	11
1Bh	Reserved	0	1	2	3	4	5	6	7	8	9	10	11
1Ch	Reserved	0	1	2	3	4	5	6	7	8	9	10	11
1Dh	Reserved	0	1	2	3	4	5	6	7	8	9	10	11
1Eh	Reserved	0	1	2	3	4	5	6	7	8	9	10	11
1Fh	Reserved	0	1	2	3	4	5	6	7	8	9	10	11
20h	Reserved	0	1	2	3	4	-	-	-	8	9	10	11
21h	Comm Channel Error	0	1	2	3	4	5	6	7	8	9	10	11
22h	User Positive Limit	-	-	2	-	-	5	-	-	-	-	-	-
23h	User Negative Limit	-	-	-	3	-	-	6	-	-	-	-	-
24h	Drive Reset	-	1	-	-	-	-	-	-	-	-	10	-
25h	Drive Internal Error	-	1	-	-	-	-	-	-	-	-	10	-
26h	Short Circuit	-	1	-	-	-	-	-	-	-	-	10	-
27h	Over Current	-	1	-	-	-	-	-	-	-	-	10	-
28h	Hardware Under Voltage	-	1	-	-	4	-	-	-	-	-	10	-
29h	Hardware Over Voltage	-	1	-	-	-	-	-	-	-	-	10	-
2Ah	Drive Over Temperature	-	1	-	-	-	-	-	-	-	-	10	-
2Bh	Software Disable	-	1	-	-	-	-	-	-	8	-	10	-
2Ch	User Disable	-	1	-	-	-	-	-	-	8	-	10	-
2Dh	User Auxiliary Disable	-	1	-	-	4	-	-	-	8	9	10	11
2Eh	Phase Detection Fault	-	1	-	-	-	-	-	-	8	-	10	-
2Fh	Commanded Positive Limit	-	-	2	-	-	5	-	-	-	-	-	-
30h	Commanded Negative Limit	-	-	-	3	-	-	6	-	-	-	-	-
31h	PWM and Dir Broken Wire	0	1	2	3	4	5	6	7	-	-	-	-
32h	High Current Indicator	0	1	2	3	-	5	6	-	8	-	10	-

TABLE 2.9 **Event Action Values Definition**

Event Action Values	Hex Values	Event Actions
0	00h	No Action
1	01h	Disable Power Bridge
2	02h	Disable Positive Direction
3	03h	Disable Negative Direction
4	04h	Dynamic Brake
5	05h	Positive Stop
6	06h	Negative Stop
7	07h	Stop
8	08h	Apply Brake **then** Disable Bridge
9	09h	Apply Brake **then** Dynamic Brake
10	0Ah	Apply Brake **and** Disable Bridge
11	0Bh	Apply Brake **and** Dynamic Brake

2066h: Event Recovery Time Parameters

2066.01h	Event Recovery Time: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Motor Over Temperature is no longer true before its Event Action (2065h) is removed.				

2066.02h	Event Recovery Time: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Feedback Sensor Error is no longer true before its Event Action (2065h) is removed.				

2066.03h	Event Recovery Time: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Log Entry Missed is no longer true before its Event Action (2065h) is removed.				

2066.04h	Event Recovery Time: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after User Disable is no longer true before its Event Action (2065h) is removed.				

2066.05h	Event Recovery Time: Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Positive Limit is no longer true before its Event Action (2065h) is removed.				

2066.06h	Event Recovery Time: Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Negative Limit is no longer true before its Event Action (2065h) is removed.				

2066.07h	Event Recovery Time: Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Current Limiting is no longer true before its Event Action (2065h) is removed.				

2066.08h	Event Recovery Time: Continuous Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Continuous Current Limiting is no longer true before its Event Action (2065h) is removed.				

2066.09h	Event Recovery Time: Current Loop Saturated			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Current Loop Saturated status is no longer true before its Event Action (2065h) is removed.				

2066.0Ah	Event Recovery Time: User Under Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after User Under Voltage is no longer true before its Event Action (2065h) is removed.				

2066.0Bh	Event Recovery Time: User Over Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after User Over Voltage is no longer true before its Event Action (2065h) is removed.				

2066.0Ch	Event Recovery Time: User Auxiliary Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after User Auxiliary Disable is no longer true before its Event Action (2065h) is removed.				

2066.0Dh	Event Recovery Time: Shunt Regulator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Shunt Regulator active is no longer true before its Event Action (2065h) is removed.				

2066.0Eh	Event Recovery Time: Command Limiter Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Command Limiter Active is no longer true before its Event Action (2065h) is removed.				

2066.0Fh	Event Recovery Time: Motor Over Speed			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Motor Over Speed is no longer true before its Event Action (2065h) is removed.				

2066.10h	Event Recovery Time: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after At Command is no longer true before its Event Action (2065h) is removed.				

2066.11h	Event Recovery Time: Zero Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Zero Velocity is no longer true before its Event Action (2065h) is removed.				

2066.12h	Event Recovery Time: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Velocity Following Error is no longer true before its Event Action (2065h) is removed.				

2066.13h	Event Recovery Time: Positive Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Positive Velocity Limit is no longer true before its Event Action (2065h) is removed.				

2066.14h	Event Recovery Time: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Negative Velocity Limit is no longer true before its Event Action (2065h) is removed.				

2066.15h	Event Recovery Time: Max Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Max Measured Position Limit status is no longer true before its Event Action (2065h) is removed.				

2066.16h	Event Recovery Time: Min Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Min Measured Position Limit status is no longer true before its Event Action (2065h) is removed.				

2066.17h	Event Recovery Time: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after no longer At Home Position before its Event Action (2065h) is removed.				

2066.18h	Event Recovery Time: Position Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Position Following Error is no longer true before its Event Action (2065h) is removed.				

2066.19h	Event Recovery Time: Max Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Max Target Position Limit is no longer true before its Event Action (2065h) is removed.				

2066.1Ah	Event Recovery Time: Min Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Min Target Position Limit is no longer true before its Event Action (2065h) is removed.				

2066.1Bh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2066.1Ch	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2066.1Dh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2066.1Eh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2066.1Fh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2066.20h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2066.21h	Event Recovery Time: Communication Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after Communication Error is no longer true before its Event Action (2065h) is removed.				

2066.22h	Event Recovery Time: User Stop			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after User Stop is no longer true before it is considered no longer active.				

2066.23h	Event Recovery Time: PWM and Direction Broken Wire			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after PWM and Direction Broken Wire is no longer true before it is considered no longer active.				

2066.24h	Event Recovery Time: High Current Indicator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time delay after High Current Indicator Fault is no longer true before it is considered no longer active.				

2067h: Event Time-Out Window Parameters

2067.01h	Event Time-Out Window: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Motor Over Temperature as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.02h	Event Time-Out Window: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Feedback Sensor Error as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.03h	Event Time-Out Window: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a User Disable as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.04h	Event Time-Out Window: User Positive Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Positive Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.05h	Event Time-Out Window: User Negative Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Negative Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.06h	Event Time-Out Window: Current Limiting			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Current Limiting as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.07h	Event Time-Out Window: Continuous Current			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Continuous Current as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.08h	Event Time-Out Window: Current Loop Saturated			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 - [2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Current Loop Saturated as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.09h	Event Time-Out Window: User Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a User Under Voltage as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.0Ah	Event Time-Out Window: User Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a User Over Voltage as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.0Bh	Event Time-Out Window: User Auxiliary Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a User Auxiliary Disable as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.0Ch	Event Time-Out Window: Shunt Regulator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Shunt Regulator as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.0Dh	Event Time-Out Window: Command Limiter Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Command Limiter Active as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.0Eh	Event Time-Out Window: Motor Over Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Motor Over Speed as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.0Fh	Event Time-Out Window: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of At Command as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.10h	Event Time-Out Window: Zero Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Zero Velocity as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.11h	Event Time-Out Window: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Velocity Following Error as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.12h	Event Time-Out Window: Positive Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Positive Velocity Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.13h	Event Time-Out Window: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Negative Velocity Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.14h	Event Time-Out Window: Max Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Max Measured Position Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.15h	Event Time-Out Window: Min Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Min Measured Position Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.16h	Event Time-Out Window: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of At Home Position as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.17h	Event Time-Out Window: Position Following Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Position Following Error as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.18h	Event Time-Out Window: Max Target Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Max Target Position Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.19h	Event Time-Out Window: Min Target Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)} –1]$	milliseconds (ms)	Read / Write	Yes

Description:
The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of Min Target Position Limit as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.

2067.1Ah	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.1Bh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.1Ch	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.1Dh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.1Eh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.1Fh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	Yes

2067.20h	Event Time-Out Window: Communication Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – $[2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a Communication Error as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.21h	Event Time-Out Window: User Stop			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – $[2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of a User Stop as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.22h	Event Time-Out Window: PWM and Direction Broken Wire			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – $[2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of PWM and Direction as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2067.23h	Event Time-Out Window: High Current Indicator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – $[2^{(16)} - 1]$	milliseconds (ms)	Read / Write	Yes
Description: The time, after the Recovery Time (2066h) and subsequent removal of the event action, during which the drive will NOT consider an occurrence of High Current Indicator as a new occurrence. The Event Action (2065h) will still be applied in case an event does occur within this window. However, that occurrence will not be counted as a new occurrence with regard to the Maximum Recoveries (2068h) attribute.				

2068h: Event Maximum Recoveries Parameters

2068.01h	Event Maximum Recoveries: Short Circuit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Short Circuit performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Short Circuit event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.02h	Event Maximum Recoveries: Hardware Under Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Hardware Under Voltage performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Hardware Under Voltage event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.03h	Event Maximum Recoveries: Hardware Over Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Hardware Over Voltage performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Hardware Over Voltage event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.04h	Event Maximum Recoveries: Drive Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Drive Over Temperature performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Drive Over Temperature event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.05h	Event Maximum Recoveries: Invalid Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of an Invalid Hall State performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Invalid Hall State event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.06h	Event Maximum Recoveries: Phase Synchronization Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Phase Synchronization Error performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Phase Synchronization Error event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.07h	Event Maximum Recoveries: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Motor Over Temperature performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Motor Over Temperature event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.08h	Event Maximum Recoveries: Phase Detection Failure			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Phase Detection Failure performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Phase Detection Failure event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.09h	Event Maximum Recoveries: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Feedback Sensor Error performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Feedback Sensor Error event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.0Ah	Event Maximum Recoveries: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a Log Entry Missed performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Log Entry Missed event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.0Bh	Event Maximum Recoveries: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a User Disable performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the User Disable event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.0Ch	Event Maximum Recoveries: User Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Positive Limit performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Positive Limit event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.0Dh	Event Maximum Recoveries: User Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Negative Limit performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Negative Limit event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.0Eh	Event Maximum Recoveries: Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Current Limiting performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Current Limiting event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.0Fh	Event Maximum Recoveries: Continuous Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Continuous Current Limiting performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Continuous Current Limiting event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.10h	Event Maximum Recoveries: Current Loop Saturated			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Current Loop Saturated performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Current Loop Saturated event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.11h	Event Maximum Recoveries: User Under Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a User Under Voltage performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the User Under Voltage event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.12h	Event Maximum Recoveries: User Over Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a User Over Voltage performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the User Over Voltage event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.13h	Event Maximum Recoveries: User Auxiliary Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of a User Auxiliary Disable performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the User Auxiliary Disable event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.14h	Event Maximum Recoveries: Shunt Regulator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Shunt Regulator performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Shunt Regulator event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.15h	Event Maximum Recoveries: Command Limiter Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Command Limiter Active performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Command Limiter Active event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.16h	Event Maximum Recoveries: Motor Over Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of a Motor Over Speed performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Motor Over Speed event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.17h	Event Maximum Recoveries: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of At Command performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the At Command event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.18h	Event Maximum Recoveries: Zero Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Zero Velocity performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Zero Velocity event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.19h	Event Maximum Recoveries: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Velocity Following Error performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Velocity Following Error event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.1Ah	Event Maximum Recoveries: Positive Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Positive Velocity Limit performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Positive Velocity Limit event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.1Bh	Event Maximum Recoveries: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Negative Velocity Limit performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Negative Velocity Limit event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.1Ch	Event Maximum Recoveries: Max Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Max Measured Position performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Max Measured Position event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.1Dh	Event Maximum Recoveries: Min Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Min Measured Position performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Min Measured Position event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.1Eh	Event Maximum Recoveries: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of At Home Position performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the At Home Position event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.1Fh	Event Maximum Recoveries: Position Following Errors			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Position Following Errors performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Position Following Errors event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.20h	Event Maximum Recoveries: Max Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Max Target Position performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Max Target Position event latches and must be actively reset in order to enable the bridge. Resetting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.21h	Event Maximum Recoveries: Min Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Min Target Position performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Min Target Position event latches and must be actively reset in order to enable the bridge. Resetting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.22h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.23h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.24h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.25h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.26h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.27h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

2068.28h	Event Maximum Recoveries: Communication Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of Communication Error performs the action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Communication Error event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.29h	Event Maximum Recoveries: User Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of User Stop performs the event action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the User Stop event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.2Ah	Event Maximum Recoveries: PWM and Direction Broken Wire			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 65535	N/A	Read / Write	Yes

Description:
Each occurrence of PWM and Direction Broken Wire performs the event action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the PWM and Direction Broken Wire event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.

2068.2Bh	Event Maximum Recoveries: Motion Engine Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of Motion Engine Error performs the event action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the Motion Engine Error event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help file associated with the AMC drive configuration software.				

2068.2Ch	Event Maximum Recoveries: High Current Indicator			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 – 65535	N/A	Read / Write	Yes
Description: Each occurrence of High Current Indicator Fault performs the event action assigned to this event. Each time the event is removed for longer than the addition of the values in the Time-Out Window (2067h) and Recovery Time (2066h), a recovery counter is incremented. This object sets the maximum recovery count allowed before the High Current Indicator event latches and must be actively reset in order to enable the bridge. Re-setting the recovery counter requires a connection to the AMC drive configuration software appropriate for this drive. For more information on event handling, see the Help File associated with the AMC drive configuration software.				

2069h: Event History Reset Parameters

2069.01h	Event History Reset - Action Status			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

2069.02h	Event History Reset - Drive Protection			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

2069.03h	Event History Reset - System Protection			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

2069.04h	Event History Reset - System Status 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

2069.05h	Event History Reset - System Status 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

2069.06h	Event History Reset - System Status 3			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	No
Description: When a digital input is configured to the Reset Event History function, any bit with a value of 1 will have the corresponding event be cleared, history reset, and recovery counter reset to 0. The function of each bit is given in Table 2.15 of object 2002h.				

205Bh: Programmable Status Parameters Determines which events will be mapped to the StatusWord (6041h) bits, indicated below. When multiple events are mapped to a single bit, they will be logically OR-ed.

TABLE 2.10 Programmable Status Mapping

Programmable Status Mask	Description
Bit 9	Bit 11 (Internal Limit Active) in 6041h (StatusWord)
Bit 10...13	Reserved

Bit 14	Bit 7 (Warning) in 6041h (StatusWord)
Bit 15	Bit 8 (manufacturer specific) in 6041h (StatusWord)

205B.01h	Programmable Status Mask: Drive Reset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Drive Reset event. See Table 2.10 above for mapping structure.				

205B.02h	Programmable Status Mask: Drive Internal Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Drive Internal Error event. See Table 2.10 above for mapping structure.				

205B.03h	Programmable Status Mask: Short Circuit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Short Circuit event. See Table 2.10 above for mapping structure.				

205B.04h	Programmable Status Mask: Over Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Over Current event. See Table 2.10 above for mapping structure.				

205B.05h	Programmable Status Mask: Hardware Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Hardware Under Voltage event. See Table 2.10 above for mapping structure.				

205B.06h	Programmable Status Mask: Hardware Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Hardware Over Voltage event. See Table 2.10 above for mapping structure.				

205B.07h	Programmable Status Mask: Drive Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Drive Over Temperature event. See Table 2.10 above for mapping structure.				

205B.08h	Programmable Status Mask: Parameter Restore Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Parameter Restore Error event. See Table 2.10 above for mapping structure.				

205B.09h	Programmable Status Mask: Parameter Store Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Parameter Store Error event. See Table 2.10 above for mapping structure.				

205B.0Ah	Programmable Status Mask: Invalid Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Invalid Hall State event. See Table 2.10 above for mapping structure.				

205B.0Bh	Programmable Status Mask: Phase Synchronization Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Phase Synchronization Error event. See Table 2.10 above for mapping structure.				

205B.0Ch	Programmable Status Mask: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Motor Over Temperature event. See Table 2.10 above for mapping structure.				

205B.0Dh	Programmable Status Mask: Phase Detection Fault			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Phase Detection Fault event. See Table 2.10 above for mapping structure.				

205B.0Eh	Programmable Status Mask: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Feedback Sensor Error event. See Table 2.10 above for mapping structure.				

205B.0Fh	Programmable Status Mask: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Log Entry Missed event. See Table 2.10 above for mapping structure.				

205B.10h	Programmable Status Mask: Software Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Software Disable Event. See Table 2.10 above for mapping structure.				

205B.11h	Programmable Status Mask: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Disable Event. See Table 2.10 above for mapping structure.				

205B.12h	Programmable Status Mask: Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Positive Limit event. See Table 2.10 above for mapping structure.				

205B.13h	Programmable Status Mask: Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Negative Limit event. See Table 2.10 above for mapping structure.				

205B.14h	Programmable Status Mask: Current Limiting (Foldback)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Current Limiting event. See Table 2.10 above for mapping structure.				

205B.15h	Programmable Status Mask: Continuous Current Limit Reached			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Continuous Current Limit Reached event. See Table 2.10 above for mapping structure.				

205B.16h	Programmable Status Mask: Current Loop Saturated			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to Current Loop Saturated event. See Table 2.10 above for mapping structure.				

205B.17h	Programmable Status Mask: User Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Under Voltage event. See Table 2.10 above for mapping structure.				

205B.18h	Programmable Status Mask: User Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Over Voltage event. See Table 2.10 above for mapping structure.				

205B.19h	Programmable Status Mask: Non-sinusoidal Commutation			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Non-sinusoidal Commutation event. See Table 2.10 above for mapping structure.				

205B.1Ah	Programmable Status Mask: Phase Detection			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Phase Detection event. See Table 2.10 above for mapping structure.				

205B.1Bh	Programmable Status Mask: User Auxiliary Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Auxiliary Disable event. See Table 2.10 above for mapping structure.				

205B.1Ch	Programmable Status Mask: Shunt Regulator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Shunt Regulator event. See Table 2.10 above for mapping structure.				

205B.1Dh	Programmable Status Mask: Phase Detection Complete			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Phase Detection Complete event. See Table 2.10 above for mapping structure.				

205B.1Eh	Programmable Status Mask: Command Limiter Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Command Limiter Active event. See Table 2.10 above for mapping structure.				

205B.1Fh	Programmable Status Mask: Motor Over Speed			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Motor Over Speed event. See Table 2.10 above for mapping structure.				

205B.20h	Programmable Status Mask: At Command			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the At Command event. See Table 2.10 above for mapping structure.				

205B.21h	Programmable Status Mask: Zero Velocity			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Zero Velocity event. See Table 2.10 above for mapping structure.				

205B.22h	Programmable Status Mask: Velocity Following Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Velocity Following Error event. See Table 2.10 above for mapping structure.				

205B.23h	Programmable Status Mask: Positive Velocity Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Positive Velocity Limit event. See Table 2.10 above for mapping structure.				

205B.24h	Programmable Status Mask: Negative Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Negative Velocity Limit event. See Table 2.10 above for mapping structure.				

205B.25h	Programmable Status Mask: Max Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Max Measured Position event. See Table 2.10 above for mapping structure.				

205B.26h	Programmable Status Mask: Min Measured Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Min Measured Position Limit event. See Table 2.10 above for mapping structure.				

205B.27h	Programmable Status Mask: At Home Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the At Home Position event. See Table 2.10 above for mapping structure.				

205B.28h	Programmable Status Mask: Position Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Position Following Error event. See Table 2.10 above for mapping structure.				

205B.29h	Programmable Status Mask: Max Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Max Target Position Limit event. See Table 2.10 above for mapping structure.				

205B.2Ah	Programmable Status Mask: Min Target Position Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Min Target Position Limit event. See Table 2.10 above for mapping structure.				

205B.2Bh	Programmable Status Mask: Set Measured Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Set Measured Position event. See Table 2.10 above for mapping structure.				

205B.2Ch	Programmable Status Mask: Homing Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Homing Active event. See Table 2.10 above for mapping structure.				

205B.2Dh	Programmable Status Mask: Apply Brake			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Apply Brake event. See Table 2.10 above for mapping structure.				

205B.2Eh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.2Fh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.30h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.31h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.32h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.33h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	Yes

205B.34h	Programmable Status Mask: Communication Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Communication Error Mask event. See Table 2.10 above for mapping structure.				

205B.35h	Programmable Status Mask: Homing Complete			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Homing Complete event. See Table 2.10 above for mapping structure.				

205B.36h	Programmable Status Mask: Commanded Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Commanded Stop event. See Table 2.10 above for mapping structure.				

205B.37h	Programmable Status Mask: User Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Stop event. See Table 2.10 above for mapping structure.				

205B.38h	Programmable Status Mask: Bridge Enabled			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Bridge Enabled event. See Table 2.10 above for mapping structure.				

205B.39h	Programmable Status Mask: Dynamic Brake Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Dynamic Brake Active event. See Table 2.10 above for mapping structure.				

205B.3Ah	Programmable Status Mask: Stop Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Stop Active event. See Table 2.10 above for mapping structure.				

205B.3Bh	Programmable Status Mask: Positive Stop Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Positive Stop Active event. See Table 2.10 above for mapping structure.				

205B.3Ch	Programmable Status Mask: Negative Stop Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Negative Stop Active event. See Table 2.10 above for mapping structure.				

205B.3Dh	Programmable Status Mask: Positive Inhibit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Positive Inhibit event. See Table 2.10 above for mapping structure.				

205B.3Eh	Programmable Status Mask: Negative Inhibit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Negative Inhibit event. See Table 2.10 above for mapping structure.				

205B.3Fh	Programmable Status Mask: User Bit 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 0 event. See Table 2.10 above for mapping structure.				

205B.40h	Programmable Status Mask: User Bit 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 1 event. See Table 2.10 above for mapping structure.				

205B.41h	Programmable Status Mask: User Bit 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 2 event. See Table 2.10 above for mapping structure.				

205B.42h	Programmable Status Mask: User Bit 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 3 event. See Table 2.10 above for mapping structure.				

205B.43h	Programmable Status Mask: User Bit 4			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 4 event. See Table 2.10 above for mapping structure.				

205B.44h	Programmable Status Mask: User Bit 5			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 5 event. See Table 2.10 above for mapping structure.				

205B.45h	Programmable Status Mask: User Bit 6			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 6 event. See Table 2.10 above for mapping structure.				

205B.46h	Programmable Status Mask: User Bit 7			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 7 event. See Table 2.10 above for mapping structure.				

205B.47h	Programmable Status Mask: User Bit 8			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 8 event. See Table 2.10 above for mapping structure.				

205B.48h	Programmable Status Mask: User Bit 9			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 9 event. See Table 2.10 above for mapping structure.				

205B.49h	Programmable Status Mask: User Bit 10			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 10 event. See Table 2.10 above for mapping structure.				

205B.4Ah	Programmable Status Mask: User Bit 11			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 11 event. See Table 2.10 above for mapping structure.				

205B.4Bh	Programmable Status Mask: User Bit 12			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 12 event. See Table 2.10 above for mapping structure.				

205B.4Ch	Programmable Status Mask: User Bit 13			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 13 event. See Table 2.10 above for mapping structure.				

205B.4Dh	Programmable Status Mask: User Bit 14			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 14 event. See Table 2.10 above for mapping structure.				

205B.4Eh	Programmable Status Mask: User Bit 15			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the User Bit 15 event. See Table 2.10 above for mapping structure.				

205B.4Fh	Programmable Status Mask: Capture 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Capture 1 event. See Table 2.10 above for mapping structure.				

205B.50h	Programmable Status Mask: Capture 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Capture 2 event. See Table 2.10 above for mapping structure.				

205B.51h	Programmable Status Mask: Thermal Monitor Fault			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Thermal Monitor Fault event. See Table 2.10 above for mapping structure.				

205B.52h	Programmable Status Mask: Commanded Positive Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Commanded Positive Limit event. See Table 2.10 above for mapping structure.				

205B.53h	Programmable Status Mask: Commanded Negative Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Commanded Negative Limit event. See Table 2.10 above for mapping structure.				

205B.54h	Programmable Status Mask: Safe Torque Off Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Safe Torque Off Active event. See Table 2.10 above for mapping structure.				

205B.55h	Programmable Status Mask: Zero Position Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Zero Position Error event. See Table 2.10 above for mapping structure.				

205B.56h	Programmable Status Mask: Motion Engine Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Motion Engine Error event. See Table 2.10 above for mapping structure.				

205B.57h	Programmable Status Mask: Motion Engine Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Motion Engine Active event. See Table 2.10 above for mapping structure.				

205B.58h	Programmable Status Mask: Active Motion Execute			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Execute event. See Table 2.10 above for mapping structure.				

205B.59h	Programmable Status Mask: Active Motion Busy			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Busy event. See Table 2.10 above for mapping structure.				

205B.5Ah	Programmable Status Mask: Active Motion Active			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Active event. See Table 2.10 above for mapping structure.				

205B.5Bh	Programmable Status Mask: Active Motion MotionDone			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion MotionDone event. See Table 2.10 above for mapping structure.				

205B.5Ch	Programmable Status Mask: Active Motion SequenceDone			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion SequenceDone event. See Table 2.10 above for mapping structure.				

205B.5Dh	Programmable Status Mask: Active Motion Done			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Done event. See Table 2.10 above for mapping structure.				

205B.5Eh	Programmable Status Mask: Active Motion Aborted			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Aborted event. See Table 2.10 above for mapping structure.				

205B.5Fh	Programmable Status Mask: Active Motion Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Active Motion Error event. See Table 2.10 above for mapping structure.				

205B.60h	Programmable Status Mask: PWM and Direction Broken Wire			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the PWM and Direction Broken Wire event. See Table 2.10 above for mapping structure.				

205B.61h	Programmable Status Mask: Motion Engine Abort			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Motion Engine Abort event. See Table 2.10 above for mapping structure.				

205B.62h	Programmable Status Mask: Current Monitor Warning			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the Sustained Current Indicator event. See Table 2.10 above for mapping structure.				

205B.63h	Programmable Status Mask: Current Monitor Fault			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	N/A	Read / Write	Yes
Description: Specifies which StatusWord bit, if any, is assigned to the High Current Indicator event. See Table 2.10 above for mapping structure.				

208Ch: Product Information

208C.01h	Hardware Information			
Data Type	Data Range	Units	Accessibility	Stored to NVM
String(390)	ASCII	N/A	Read Only	Yes
Description: Provides all the drive information in a single 390-byte string. The meaning of each byte in the string is divided into sections according to the following table. Bytes 2 through 33 provide the “Control Board Name” for example.				

Byte Definitions	Description
0...1	Reserved
2...33	Control Board Name
34...65	Control Board Version
66...97	Control Board Serial Number
98...129	Control Board Build Date
130...161	Control Board Build Time
162...191	Reserved
192...223	Product Part Number (including revision letter)
224...255	Product Version
256...287	Product Serial Number
288...319	Product Build Date
320...351	Product Build Time
352...390	Reserved

2090h: Firmware Information

2090.01h	Main Firmware Version			
Data Type	Data Range	Units	Accessibility	Stored to NVM
String(32)	ASCII	N/A	Read Only	Yes
Description: Returns a 32-byte string containing the firmware version that is currently running on the drive.				

2090.02h	Bootloader Firmware Version			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
String(32)	ASCII	N/A	Read Only	Yes
Description: Returns a 32-byte string containing the bootloader version that is currently running on the drive.				

20D8h: Power Board Values

20D8.01h	Power Board Map ID			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	N/A	Read Only	No
Description: Contains the bitfield for the Power Board Map ID.				

Bits	Name	Description
Low Byte High Byte	Power Board Map ID Minor Bit #0-7	Part of an 8-bit field used to store the Power Board Map ID's Minor Revision Number
8 - 15	Power Board Map ID Major Bit #0-7	Part of an 8-bit field used to store the Power Board Map ID's Major Revision Number

20D8.02h	Power Board Build Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No
Description: Contains the Power Board Build Data Structure.				

Member Name	Member Offset	Member Data Type	Member Unit
Power Board Name	0	String(50)	Text - 50 bytes
Power Board Version	1	String(8)	Text - 8 bytes
Power Board Serial Number	2	String(16)	Text - 16 bytes
Power Board Build Date	3	String(8)	Text - 8 bytes
Power Board Build Time	4	String(8)	Text - 8 bytes

20D8.03h	Bus Voltage Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No

Description:
Contains the Bus Voltage Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
Rated Bus Voltage	0	Unsigned16	.1 Volt
Hardware Under Voltage	1	Unsigned16	.1 Volt
Hardware Over Voltage	2	Unsigned16	.1 Volt
Per Unit Voltage	3	Unsigned16	.1 Volt

20D8.04h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

20D8.05h	Phase Current Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No

Description:
Contains the Phase Current Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
Rated Peak Current	0	Unsigned16	.1 Amps
Rated Continuous Current	1	Unsigned16	.1 Amps
Over Current	2	Unsigned16	.1 Amps
Maximum Measurable Current	3	Unsigned16	.1 Amps
Rated Peak Current Hold Time	4	Unsigned16	msec
Rated Peak to Rated Continuous Foldback Time	5	Unsigned16	msec

20D8.06h	Commutation Frequency Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No

Description:
Contains the Commutation Frequency Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
DC Cutoff Frequency	0	Unsigned16	100 uHz
Rms Cutoff Frequency	1	Unsigned16	100 uHz

20D8.07h	PWM Period Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No

Description:
Contains the PWM Period Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
Max PWM Period	0	Unsigned16	100nsec
Min PWM Period	1	Unsigned16	100nsec
Nom PWM Period	2	Unsigned16	100nsec
Default PWM Period	3	Unsigned16	100nsec

20D8.08h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	N/A	N/A	Read Only	No

20D8.09h	Shunt Regulator Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read Only	No

Description:
Contains the Shunt Regulator Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
Max Shunt PWM Period	0	Unsigned16	100nsec
Internal Rate Shunt Power	1	Unsigned16	Watts
Internal Shunt Resistance	2	Unsigned16	10 milliohms
Continuous Shunt Current	3	Unsigned16	10 milliamps

20D8.0Ah	Thermal Limit Data			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
See Table	N/A	See Table	Read only	No

Description:
Contains the Thermal Limit Data Structure.

Member Name	Member Offset	Member Data Type	Member Unit
Drive Disable Temperature	0	Unsigned16	10 millidegrees C
Drive Enable Temperature	1	Unsigned16	10 millidegrees C
Rate Temperature	2	Unsigned16	10 millidegrees C

20D8.0Bh	Load Filter Efficiency			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 10000	% Efficiency * 0.01	Read Only	No
Description: External motor filter efficiency (* .01 = % efficient).				

20D8.0Ch	Current Slew Rate			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	0 - [$2^{(32)}$ –1]	A/s	Read Only	No
Description: Contains a value corresponding to the maxim8um current slew rate limit supported by the drive's power board.				

2.4 Drive Operation Objects

The following objects are typically used during operation. They are either used to perform specific tasks or to obtain information from the drive. These objects have been divided into the following three categories: Control Objects, Command Objects, and Monitor Objects.

2.4.1 Control Objects

6040h: ControlWord

6040h	ControlWord			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 65535	N/A	Read / Write	No

Description:

The ControlWord object sets the control state machine in the drive. “State Machine Overview” on page 35 explains each drive state and how to use the ControlWord to move the drive to that state. Below is a table providing the basic ControlWord commands and bit field definitions.

Value (Hex)	Command	Description
80	Reset Fault	On any transition to "1" of bit 7 causes a Reset Fault
04	Disable Voltage	Drive in "Switch On Disabled" state
06	Shutdown	Drive in "Ready to Switch On" state
07	Switch On	Drive in "Switched On" state
0F	Enable Operation	Drive in "Operation Enabled" state
02	Stop	Drive in "Stop Active" state
1F	Start Homing	Starts Homing (when in homing mode)
0F	End Homing	Ends Homing

Bit	Name	Description
0	Switch On	A transition from 0 to 1 commands the state machine into the Switched On state.
1	Disable Voltage	A transition from 0 to 1 commands the state machine into the Switch On Disabled State.
2	Quick Stop	A value of 0 activates a commanded stop.
3	Enable Operation	A transition from 0 to 1 commands the state machine into Operation Enabled state.
4	Mode Specific 1	In Jog Mode, Jog Select 0: Writing a 1 sets bit 0 of the Jog Speed Select. Writing a 0 clears it. In Homing, Home Execute: Writing a 1 causes the homing routine to be active. Writing a 0 ends it.
5	Mode Specific 2	In Jog Mode, Jog Plus: Writing a 1 asserts Jog Plus. Writing a 0 deasserts Jog Plus.
6	Mode Specific 3	In Jog Mode, Jog Minus: Writing a 1 asserts Jog Minus. Writing a 0 deasserts Jog Minus.
7	Reset Fault	A transition from 0 to 1 activates a fault reset.
8	Reserved	Read as zero / write as zero.
9	Mode Specific 4	In Jog Mode, Jog Select 1: Writing a 1 sets bit 1 of the Jog Speed Select. Writing a 0 clears it.
10	Reserved	Read as zero / write as zero.
11	Dynamic Brake	Activates the Dynamic Brake
12	Commanded Negative Limit	Activates negative limiting.
13	Commanded Positive Limit	Activates positive limiting.
14-15	Reserved	Read as zero / write as zero.

See “ControlWord (6040h)” on page 38 for more information on this subject.

2001h: Control Parameters

2001.01h	Drive Control Word 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 1FFFh	N/A	Read/Write*	No

Description:
This bit field enables/disables certain drive functions according to the table below.

Bit	Name	Description
0	Reserved	Read as zero / write as zero.
1	Zero Position Error	Sets the target position equal to the measured position.
2	Phase Detect	Activates the phase detection routine.
3	Set Position	Causes the position counter to be loaded with the preset position value.
4	Reserved	Read as zero / write as zero.
5	Reserved	Read as zero / write as zero.
6	Reserved	Read as zero / write as zero.
7	Capture 1 Arm	A change from 0 to 1 arms/rearms Capture unit 1. A change from 1 to 0 Disarms it.
8	Capture 2 Arm	A change from 0 to 1 arms/rearms Capture unit 2. A change from 1 to 0 Disarms it.
9	Capture 3 Arm	A change from 0 to 1 arms/rearms Capture unit 3. A change from 1 to 0 Disarms it.
10	Reserved	Read as zero / write as zero.
11	Reserved	Read as zero / write as zero.
12	Reset Events	Resets all but the following events: Over Current, Parameter Restore Error, Parameter Store Error, Phase Detection Failure, Software Disable
13-15	Reserved	Read as zero / write as zero.

2001.02h	Drive Control Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 1FFFh	N/A	Read/Write*	No

Description:
This bit field enables/disables certain drive functions according to the table below.

Bit	Name	Description
0	Gain Parameters Set	A change from 0 to 1 selects Gain Set 1. A change from 1 to 0 selects Gain Set 0.
1	Command Limiter Parameters Set	A change from 0 to 1 selects Command Limiter Set 1. A change from 1 to 0 selects Command Limiter Set 0.
2	Command Source Modifier Set	A change from 0 to 1 selects Source Modifier Set 1. A change from 1 to 0 selects Source Modifier Set 0.
3-15	Reserved	Read as zero / write as zero.

2001.03h	User Bit Control			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – FFFFh	N/A	Read / Write	No

Description:

Toggles the User Bits on or off by assigning a 1 or 0 to the appropriate bit. See the table below for bit assignment. Note that User Bits can be mapped to digital outputs through the configuration software.

Bit	Assignment (1 = asserted, 0 = not asserted)
0	User Bit 0
1	User Bit 1
2	User Bit 2
3	User Bit 3
4	User Bit 4
5	User Bit 5
6	User Bit 6
7	User Bit 7
8	User Bit 8
9	User Bit 9
10	User Bit 10
11	User Bit 11
12	User Bit 12
13	User Bit 13
14	User Bit 14
15	User Bit 15

6060h: Modes Of Operation

6060h	Modes Of Operation			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	-128 - 127	N/A	Read / Write	No

Description:

This object indicates the requested mode of operation. This may differ from the actual mode of operation if the mode change is not yet possible (for example, if the mode change is requested while the drive is in the operation enabled state). The actual mode of operation can be found using the read-only object 6061. "Modes of Operation" on page 49 explains the valid control loop configurations for an AMC servo drive.

Value	Operation Mode
1	Profile Position Mode
3	Profile Velocity Mode
4	Profile Torque Mode (current mode)
6	Homing Mode
7	Interpolated Position Mode (PVT)
8	Cyclic Synchronous Position Mode
9	Cyclic Synchronous Velocity Mode
A	Cyclic Synchronous Torque Mode (current mode)
8C	Jog Mode
9E	Config 0
DE	Config 1
EC	Motion Engine Mode
FF	None (Use active configuration settings)

2.4.2 Command Objects

6071h: Target Current

6071h	Target Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$-2^{15} – (2^{15}-1)$	DC2	Read / Write	No

Description:

Sets the Target Current while in Current Mode (set by object 6060h). See "Appendix" on page 337 for units conversion.

20C2h: Dynamic Current Target

20C2.01h	Dynamic Current Target Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Signed16	$0 – (2^{14})$	DC1	Read / Write	No

Description:

Contains the value of the current target that will override the stored current limits when written.

20C2.02h	Dynamic Positive Current Target Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Signed16	$0 – (2^{14})$	DC1	Read / Write	No
Description: Contains the value of the positive current target that will override the stored current limits when written.				

20C2.03h	Dynamic Negative Current Target Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Signed16	$0 – (2^{14})$	DC1	Read / Write	No
Description: Contains the value of the negative current target that will override the stored current limits when written.				

60FFh: Target Velocity

60FFh	Target Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} – (2^{31}-1)$	DS1	Read / Write	No
Description: Use this object to set the Target Velocity when the drive is in Velocity mode. See “Appendix” on page 337 for unit conversion.				

607Ah: Target Position

607Ah	Target Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} – (2^{31}-1)$	counts	Read / Write	No
Description: Sets the Target Position value while in position mode (set by object 6060h). This is the target position before limiting and profiling is applied. Position error is derived from demanded position, which is this signal after limiting and profiling is applied.				

6078h: Current Monitor

6078h	Current Monitor			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} -1]$	DC1	Read Only	No
Description: Contains a value corresponding to the measured current after the Current Monitor biquad filter.				

60B0h: Position Offset

60B0h	Position Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	counts	Read / Write	No
Description: Contains a value corresponding to offset for the target position value. Used with cycle synchronous position mode..				

60B1h: Velocity Offset

60B1h	Velocity Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$-2^{31} - (2^{31}-1)$	DS1	Read / Write	No
Description: Contains a value corresponding to offset for the target velocity value. Used with cyclic synchronous position and cyclic synchronous velocity modes. In cyclic synchronous position mode, this object contains the input value for velocity feed forward. In cyclic synchronous velocity mode it contains the commanded velocity offset.				

60B2h: Current Offset

60B2h	Current Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$-2^{14} - (2^{14}-1)$	DC2	Read / Write	No
Description: Contains a value corresponding to offset for the target current value. Used with cyclic synchronous modes of operation. In cyclic synchronous position mode and cyclic synchronous velocity mode, this object contains the input value for current feed forward. In cyclic synchronous torque mode it contains the commanded current offset.				

2045h: Interface Inputs

Interface inputs can be used in place of analog inputs for any function that can be assigned to an analog input. Examples of this include command source, feedback source, and motor temperature source. The units for interface inputs are dependent upon the function the interface input is assigned to as given in Table 2.11. For details on unit conversion see “Appendix” on page 337.

TABLE 2.11 Interface Input Units

Interface Input Function	Units
Position Command Source	counts
Velocity Command Source	DS1
Torque/Current Command Source	DC2
Position Feedback Source	counts
Velocity Feedback Source	DS1
Motor Temperature Source	DT1

2045.01h	Interface Input 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	See Table 2.11	Read / Write	No
Description: Defines the value used with interface input 1.				

2045.02h	Interface Input 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	See Table 2.11	Read / Write	No
Description: Defines the value used with interface input 2.				

2045.03h	Interface Input 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	See Table 2.11	Read / Write	No
Description: Defines the value used with interface input 3.				

2045.04h	Interface Input 4			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	See Table 2.11	Read / Write	No
Description: Defines the value used with interface input 4.				

2.4.3 Motion Engine Command Objects

20C9h: Motion Engine Control

20C9.01h	Start-Up Motion Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	Yes

Description:

Defines the startup behavior when running a motion engine index upon power-up. The bit values are broken up as defined below.

Bits 0:15 - Enumerated values

0: Select Motion (This enum is only used when motion is initiated via a digital input.)

1: Initiate Selected Motion (Run the index or sequence specified in the Motion Engine Control Data)

2: Abort Active Motion (No fault, Motion Engine will return to ready for motion start)

3: Reserved. Write zero.

4: Initiate Dynamic Index

5: Set Motion Select Source

6: Indexer / Sequencer Select

7-15: Reserved

Bits 16:31 - This is the data that is associated with each of the action enums above. The allowable values for each enum are as follows

0: Select Index - When the communication channel is the motion select source, the valid range is [0,15], otherwise it is an error

1: Initiate Selected Motion - When the communication channel is the motion select source, this value will be the motion that is initiated. Otherwise it will be ignored.

2: Abort Active Motion - Values are ignored

3: Reserved. Write zero.

4: Initiate Dynamic Index - Values are ignored

5: Set Motion Select Source - 0:Hardware, 1:Communication Channel - all other values are invalid

6: Indexer / Sequencer Select - When the communication channel is the motion select source, this value will be the motion type that is selected. Valid values are 0: Indexer, 1: Sequencer - all other values are invalid

7-15: Reserved

20CAh: Motion Engine Dynamic Index Data

20CA.01h	Move Index			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	-	Read / Write	No

Description:

When defining a dynamic index, this value should be set to 0x0020.

20CA.02h	Move Type			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	-	Read / Write	No

Description:
Defines the type of move.

Value	Move Type
0x0008	Absolute
0x0018	Relative

20CA.03h	Repeat Count			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	-	Read / Write	No

Description:
Specifies the number of times to repeat the move. Only valid for relative moves.

20CA.04h	Dwell Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	milliseconds (ms)	Read / Write	No

Description:
Specifies the time after the move is complete before the Index Done status becomes active.

20CA.05h	Position Target - Word 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	counts	Read / Write	No

Description:
The least significant word in the 2-word (32-bit) position command. Depending on the assigned move type, will apply to an absolute or relative position target.

20CA.06h	Position Target - Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	counts	Read / Write	No

Description:
The most significant word in the 2-word (32-bit) position command. Depending on the assigned move type, will apply to an absolute or relative position target.

20CA.07h	Max Velocity - Word 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DS3	Read / Write	No
Description: The least significant word in the 4-word (64-bit) maximum velocity value. See “Appendix” on page 337 for unit conversion.				

20CA.08h	Max Velocity - Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DS3	Read / Write	No
Description: The second word in the 4-word (64-bit) maximum velocity value. See “Appendix” on page 337 for unit conversion.				

20CA.09h	Max Velocity - Word 2			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DS3	Read / Write	No
Description: The third word in the 4-word (64-bit) maximum velocity value. See “Appendix” on page 337 for unit conversion.				

20CA.0Ah	Max Velocity - Word 3			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DS3	Read / Write	No
Description: The most significant word in the 4-word (64-bit) maximum velocity value. See “Appendix” on page 337 for unit conversion.				

20CA.0Bh	Max Acceleration - Word 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DA5	Read / Write	No
Description: The least significant word in the 2-word (32-bit) maximum acceleration value. See “Appendix” on page 337 for unit conversion.				

20CA.0Ch	Max Acceleration - Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DA5	Read / Write	No
Description: The most significant word in the 2-word (32-bit) maximum acceleration value. See “Appendix” on page 337 for unit conversion.				

20CA.0Dh	Max Deceleration - Word 0			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DA5	Read / Write	No
Description: The least significant word in the 2-word (32-bit) maximum deceleration value. See "Appendix" on page 337 for unit conversion.				

20CA.0Eh	Max Deceleration - Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - FFFFh	DA5	Read / Write	No
Description: The most significant word in the 2-word (32-bit) maximum deceleration value. See "Appendix" on page 337 for unit conversion.				

20CA.0Fh	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	-	-	-	No

20CA.10h	Dynamic Index Confirmation Code			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read / Write	No
Description: A value of 1000h must be written to this index when initiating dynamic indexes via network command.				

20CA.11h - 20CA.1Ch	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	-	-	-	No

2.4.4 Monitor Objects

6041h: StatusWord

6041h	StatusWord			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 655535	N/A	Read Only	No

Description:

The StatusWord is used to determine which state the drive is in. “Drive States” on page 36 explains each drive’s state and the StatusWord bit definitions. Below is a table of the hex values for each state.

Value	State	Description
xxxx xxxx x0xx 0000	Not Ready to Switch On	Drive is initializing, drive is disabled
xxxx xxxx x1xx 0000	Switch On Disabled	Drive completed initialization, drive is disabled
xxxx xxxx x01x 0001	Ready to Switch On	Bus power may be applied, drive is disabled
xxxx xxxx x01x 0011	Switched On	Bus power is applied, drive is disabled
xxxx xxxx x01x 0111	Operation Enabled	Drive is enabled
xxxx xxxx x0xx 1111	Fault Reaction Active	Drive will execute fault reaction event
xxxx xxxx x0xx 1000	Fault	Drive is in the fault state
xxxx xxxx x00x 0111	Stop Active	Stop received from host and now in this state

20ECh: NMT State

20EC.01h	NMT State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – [2(16)-1]	N/A	Read Only	No

Description:

Contains the NMT State. For more information, see “NMT Error Control” on page 7.

2002h: Drive Status

2002.01h	Drive Bridge Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:

The function of each bit is given in Table 2.12 below.

2002.02h	Drive Protection Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only	No

Description:

The function of each bit is given in Table 2.12 below.

2002.03h	System Protection Status			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No
Description: The function of each bit is given in Table 2.12 below.				

2002.04h	Drive/System Status 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No
Description: The function of each bit is given in Table 2.12 below.				

2002.05h	Drive/System Status 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No
Description: The function of each bit is given in Table 2.12 below.				

2002.06h	Drive/System Status 3			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No
Description: The function of each bit is given in Table 2.12 below.				

2002.07h	Active Configuration Status			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No
Description: The function of each bit is given in Table 2.12 below.				

TABLE 2.12 Drive Status bit-field definitions

Bit	Drive Bridge Status	Drive Protection Status	System Protection Status	Drive System Status 1	Drive System Status 2	Drive System Status 3	Active Configuration Status
0	Bridge Enabled	Drive Reset	Parameter Restore Error	Log Entry Missed	Zero Velocity	Reserved	Absolute Position Valid
1	Dynamic Brake Enabled	Drive Internal Error	Parameter Store Error	Software Disable	At Command	Reserved	Positive Stop Active
2	Stop Enabled	Short Circuit	Invalid Hall State	User Disable	Velocity Following Error	Reserved	Negative Stop Active
3	Positive Stop Enabled	Over Current	Phase Sync. Error	User Positive Inhibit	Positive Target Velocity Limit	Reserved	Reserved
4	Negative Stop Enabled	Under Voltage	Motor Over Temperature	User Negative Inhibit	Negative Target Velocity Limit	Reserved	Reserved
5	Positive Torque Inhibit Active	Over Voltage	Phase Detection Fault	Current Limiting	Command Limiter Active	Reserved	Reserved
6	Negative Torque Inhibit Active	Drive Over Temperature	Feedback Sensor Error	Continuous Current Foldback	In Home Position	Commanded Stop	Reserved
7	External Brake Active	Reserved	Motor Over Speed	Current Loop Saturated	Position Following Error	User Stop	Reserved
8	Reserved	Reserved	Max Measured Position	User Under Voltage	Max Target Position Limit	Capture 1 Active	Reserved
9	Reserved	Reserved	Min Measured Position	User Over Voltage	Min Target Position Limit	Capture 2 Active	Reserved
10	Reserved	Reserved	Comm. Error (Node Guarding)	Non-sinusoidal Commutation	Set Position	Capture 3 Active	Reserved
11	Reserved	Reserved	PWM Input Broken Wire	Phase Detect Active	Reserved	Commanded Positive Limit	Reserved
12	Reserved	Reserved	Motion Engine Error	Motion Engine Active	Homing Active	Commanded Negative Limit	Reserved
13	Reserved	Reserved	Motion Engine Abort	User Auxiliary Disable	Safe Torque Off Status	Reserved	Reserved
14	Reserved	Reserved	Reserved	Shunt Regulator	Homing Complete	Reserved	Reserved
15	Reserved	Reserved	Reserved	Phase Detect Done	Zero Position Error	Reserved	Reserved

2003h: Drive Status History

2003.01h	Drive Bridge Status History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No

Description:

If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h.

*Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.

2003.02h	Drive Protection Status History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No

Description:

If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h.

*Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.

2003.03h	System Protection Status History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No

Description:

If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h.

*Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.

2003.04h	Drive/System Status 1 History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No

Description:

If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h.

*Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.

2003.05h	Drive/System Status 2 History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No
Description: If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h. *Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.				

2003.06h	Drive/System Status 3 History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No
Description: If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h. *Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.				

2003.07h	Active Configuration Status History			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read Only*	No
Description: If an event becomes active and then becomes inactive, Drive Status History will mark the event with a history bit. If a bit is 1, that event has occurred sometime in the past; 0 indicates the event has never occurred since power-up. The function of each bit is given in Table 2.12 of object 2002h. *Features a Read / Write function, in that any history bit can be cleared by writing a 1 to that bit.				

2029h: Motion Engine Status

2029.01h	Active Sequence			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	-2 - 15	N/A	Read Only	No

Description:
Displays the active sequence number when using motion engine sequencing.

Bits 0:7

0-15 for index 0 to 15

FE: Dynamic Index

FF: No Invalid Index

Bits 8:15

Reserved

2029.02h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A			Read Only	No

2029.03h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A			Read Only	No

2029.04h	Motion Engine Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
N/A	0 - 9	N/A	Read Only	No

Description:

Defines the present state of the motion engine.

Value	Motion Engine State
0	Inactive
1	Waiting for Motion Start (Motion Engine is enabled and ready for an index)
2	Executing Motion (Index is currently running)
3	Program Load in Progress (Motion Engine is not ready for commanded index)
4	Program Load Failure - CRC Error (Problem loading Index. Must reset Motion Engine to continue)
5	Halt Asserted (Motion has been interrupted)
6	Single Step Active
7	Break Point Active
8	No Errors
9	Invalid Data Parameter (Problem loading Index. Must reset Motion Engine to continue)
10	Invalid Op-Code (Problem loading Index. Must reset Motion Engine to continue)
11	Invalid Op-code for Dynamic Motion (Problem with index parameters)
12	Invalid Reference Frame (Problem with index parameters)
13	Invalid Bridge State (Bridge must be enabled to begin indexed motion)
14	User Defined Fault

6061h: Modes Of Operation Display

6061h	Modes Of Operation Display			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	-128 - 127	N/A	Read Only	No

Description:

A “Mode Of Operation” refers to how the drive’s internal control loops are configured. “Modes of Operation” on page 49 explains the valid control loop configurations for an AMC CANopen servo drive.

Value	Operation Mode
1	Profile Position Mode
3	Profile Velocity Mode
4	Profile Torque Mode (current mode)
6	Homing Mode
8	Cyclic Synchronous Position Mode
9	Cyclic Synchronous Velocity Mode
A	Cyclic Synchronous Torque Mode
FF	Custom Configured Modes

200Eh: Feedback Sensor Values

200E.01h	Electrical Cycle Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	counts	Read Only	No
Description: Contains a value corresponding to the electrical cycle position.				

200E.02h	Latched Encoder Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	counts	Read Only	No
Description: Contains a value corresponding to the encoder position read when a capture edge occurs during phase detect.				

200E.03h	Phase Sync Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}]$ - $[2^{(31)} - 1]$	counts	Read Only	
Description: Contains a value corresponding to the phase sync error.				

200E.04h	Present Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read Only	No
Description: Contains a value corresponding to the present Hall state.				

200E.05h	Stator Angle			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read Only	No
Description: Contains a value corresponding to the stator angle.				

200E.06h	Rotor Angle			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	N/A	Read Only	No
Description: Contains a value corresponding to the rotor angle.				

200E.07h	Stator Frequency			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$0 – [2^{(15)} –1]$	e.c./min	Read Only	No

Description:
Contains a value corresponding to the stator frequency of the motor.

200E.08h	Rotor Frequency			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$0 – [2^{(15)} –1]$	e.c./min	Read Only	No

Description:
Contains a value corresponding to the rotor frequency of the motor.

200E.09h	Cumulative Commutation Counts			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$0 – [2^{(31)} –1]$	counts	Read Only	No

Description:
Contains a value corresponding to the cumulative commutation counts.

200E.0Ah	Captured Electrical Cycle Position			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} –1]$	counts	Read Only	No

Description:
Contains a value corresponding to the captured electrical cycle position.

200E.0Bh	Phase Sync Adjustment			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} –1]$	counts	Read Only	No

Description:
Contains a value corresponding to the phase sync adjustment.

200E.0Ch	Step Cycle Position			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$[-2^{(31)}] - [2^{(31)} –1]$	counts	Read Only	No

Description:
Contains a value corresponding to the step cycle position.

200E.0Dh	Estimated Drive Current in Phase 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[-2$^{(31)}$] - [2$^{(31)}$ –1]	DC2	Read Only	No
Description: Contains a value corresponding to the estimated drive current in phase 1. See “Appendix” on page 337 for unit conversion details.				

200E.0Eh	Estimated Generated Current in Phase 1			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[-2$^{(31)}$] - [2$^{(31)}$ –1]	DC2	Read Only	No
Description: Contains a value corresponding to the estimated generated current in phase 1. See “Appendix” on page 337 for unit conversion details.				

200E.0Fh	Estimated Drive Current in Phase 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[-2$^{(31)}$] - [2$^{(31)}$ –1]	DC2	Read Only	No
Description: Contains a value corresponding to the estimated drive current in phase 2. See “Appendix” on page 337 for unit conversion details.				

200E.10h	Estimated Generated Current in Phase 2			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	[-2$^{(31)}$] - [2$^{(31)}$ –1]	DC2	Read Only	No
Description: Contains a value corresponding to the estimated generated current in phase 2. See “Appendix” on page 337 for unit conversion details.				

200E.11h	Local Error Raw			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	[-2$^{(31)}$] - [2$^{(31)}$ –1]	counts	Read Only	No
Description: Contains a value corresponding to the position error before active damping is applied for stepper motors.				

200E.12h	Local Error Filtered			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	[-2$^{(31)}$] - [2$^{(31)}$ –1]	counts	Read Only	No
Description: Contains a value corresponding to the position error after active damping is applied for stepper motors.				

2027h: Feedback Hardware Diagnostics

2027.01h	Sin/Cos Encoder Sine			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	Volts (SF1)	Read Only	No

Description:
Represents the differential voltage of the +/- sine input of a 1V peak-to-peak encoder. Only applicable to drives that support Sin/Cos encoders. See “Appendix” on page 337 for information on scaling.

2027.02h	Sin/Cos Encoder Cosine			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	Volts (SF1)	Read Only	No

Description:
Represents the differential voltage of the +/- cosine input of a 1V peak-to-peak encoder. Only applicable to drives that support Sin/Cos encoders. See “Appendix” on page 337 for information on scaling.

2027.03h	Sin/Cos Encoder Health			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	Volts (SF1)	Read Only	No

Description:
Represents the health of the Sin/Cos encoder inputs according the formula below, where a value closer to 1 is healthy and a value closer to 0 is unhealthy. See “Appendix” on page 337 for information on scaling.

Encoder Health = $Sin^2 + Cos^2$

2027.04h	Absolute Encoder Fault Word 1			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 – [$2^{(16)}$ –1]	N/A	Read Only	No

Description:

Contains a value that corresponds to an absolute encoder fault code. Fault codes are listed below by encoder type. The drive checks for faults and attempts to clear them during a phase detection routine. If a fault cannot be cleared, the appropriate fault code will be given by this sub-index and the drive will activate a feedback sensor error.

Hiperface (Stegmann):

Status Value	Status Name
00h	No Error
01h	Analog signals outside of specification
02h	Internal angle offset erroneous
03h	Data field partition destroyed
04h	Analog limit is not available
05h	Internal I^2C is not serviceable
06h	Internal checksum error
07h	Encoder reset occurred
08h	Counter overflow
09h	Parity error
0Ah	Checksum of transmitted data is wrong
0Bh	Unknown command code
0Ch	Number of data transmitted is wrong
0Dh	Command argument transmitted is impermissible
0Eh	Data may not be written to the data field selected
0Fh	Wrong access code
10h	Size of specified data field cannot be changed
11h	Specified word address outside data field
12h	Access to non-existent data field
1Ch	Monitoring the magnitude of the analog signals
1Dh	Critical encoder current
1Eh	Critical encoder temperature
1Fh	Speed too high, position information not possible
20h	Position of single turn impermissible
21h	Position error, multi-turn
22h	Position error, multi-turn
23h	Position error, multi-turn
28h	Error absolute value formation linear measuring system

EnDat (Heidenhein):

Bit	Fault Name
0	Light Source
1	Signal Amplitude
2	Position Value
3	Over Voltage
4	Under Voltage
5	Over Current
6	Battery
7-15	RFU

2027.05h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$0 – [2^{(16)} –1]$	N/A	Read Only	No

2027.06h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$0 – [2^{(16)} –1]$	N/A	Read Only	No

201Ch: Gearing Values

201C.01h	Gear Input			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	Counts	Read Only	No
Description: Contains a value corresponding to the number of encoder counts sent to the gearing module.				

201C.02h	Present Gear Input Counts			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No
Description: Value corresponding to the denominator of the gear ratio.				

201C.03h	Present Gear Output Counts			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No
Description: Value corresponding to the numerator of the gear ratio.				

6077h: Actual Current

6077h	Actual Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$-2^{15} – (2^{15}-1)$	DC1	Read Only	No
Description: Contains the instantaneous current applied to the motor. See “Appendix” on page 337 for units conversion.				

2230h: Current Monitor Configuration

2230.01h	Current Monitor Configuration			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	N/A	N/A	Read/Write	Yes

Description:
Contains the bitfield detailing the Current Monitor Configuration.

Bits	Name	Description
0	Enable Sustained Current Indicator	0: Disabled (default) 1: Enabled
1	Enable High Current Indicator	0: Disabled (default) 1: Enabled
3-2	Reserved	Must be 0
7-4	Current Monitor Source	Specifies what currents are to be monitored: Valid Values 0: Torque Current, (Loop 1 measured current) - Default 1: Flux Producing Current, (Loop 2 measured current) 2: Drive Current, (Vector sum of the two loop currents)
15-8	Reserved	Must be 0

2230.02h	Sustained Current Indicator Dwell Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - 60000	milliseconds (ms)	Read/Write	Yes

Description:
Contains a value corresponding to the amount of time the measured current must be above the Sustained Current Indicator Enable Level before the Sustained Current Indicator is triggered.

2230.03h	Current Monitor Levels			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Structure	$0 – (2^{16}-1)$	DC1	Read/Write	Yes

Description:
Contains a structure detailing the configuration of the Current Monitor Levels.

Offset	Name	Description
0	High Current Indicator Enable Level	The measured current value when the High Current Indicator Fault is triggered.
1	Sustained Current Indicator Enable Level	The measured current value when the Sustained Current Indicator is triggered.
2	Sustained Current Indicator Disable Level	The measured current value when the Sustained Current Indicator is cleared.

606Ch: Actual Velocity

606Ch	Actual Velocity			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} - (2^{31}-1)$	DS1	Read Only	No
Description: Actual Velocity is defined as the measured velocity, after conditioning, used to close the drive's velocity loop. See "Appendix" on page 337 for unit conversion.				

606Dh: Velocity Window

606Dh	Velocity Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	$0 - [2^{(16)} - 1]$	Ct/s	Read / Write	Yes
Description: The maximum allowed difference between the target velocity and the velocity actual value. Bit 10 of the statusword shall be set to 1 (*target reached)* when the difference between the target velocity and velocity actual value is within the velocity window longer than the velocity window time.				

606Fh: Zero Velocity Window

606Fh	Zero Velocity Window			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} - 1]$	Ct/s	Read / Write	No
Description: Contains a value corresponding to the motor zero speed limit set in the drive. When the velocity of the motor reaches this value or lower, the drive will indicate that it has reached a zero speed position.				

6068h: Position at Command Time

6068h	Position at Command Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0\text{-}[2^{(16)}\text{-}1]$	milliseconds (ms)	Read/Write	No
Description: Contains a value corresponding to the time that the position error must be within the In-position window value before the At Command event becomes active when the drive is in one of the supported position modes.				

6069h: Velocity Sensor Actual Value

6069h	Velocity Sensor Actual Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} - (2^{31}-1)$	DS1	Read Only	No

Description:
The value read from this object is the velocity measured directly from the primary feedback device before filtering or conditioning is applied. To read the actual velocity value used by the velocity control loop, see "606Ch: Actual Velocity". See "Appendix" on page 337 for unit conversion.

2010h: Current Values

2010.01h	Continuous Current Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)} -1]$	DC1	Read Only	No

Description:
Contains a value corresponding to the continuous current limit.

2010.02h	Peak Current Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$0 -[2^{(16)} -1]$	DC1	Read Only	No

Description:
Contains a value corresponding to the peak current limit

2010.03h	Current Pre-filtered Reference-Torque			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)} - 1]$	DC2	Read Only	No

Description:
Contains the raw current command before filtering or an offset has been applied. See"Appendix" on page 337 for unit conversion.

2010.04h	Torque Summation Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DC2	Read Only	No

Description:
Contains the offset of the commanded current in the current loop. Contains the raw current command before filtering or an offset has been applied. See "Appendix" on page 337 for unit conversions.

2010.05h	Current Target-Torque			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	[-2$^{(31)}$] - [2$^{(31)}$-1]	DC2	Read Only	No
Description: Contains the value of the target current (torque producing). See "Appendix" on page 337 for conversion.				

2010.06h	Current Demand-Torque			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$-1]	DC1	Read Only	No
Description: Contains the value of the demand current (torque-producing). See"Appendix" on page 337 for unit conversion.				

2010.07h	Current Measured-Torque			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$-1]	DC1	Read Only	No
Description: Contains the value of the measured current (torque producing). See "Appendix" on page 337 for conversion.				

2010.08h	Current Error-Torque			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-2$^{(15)}$] - [2$^{(15)}$-1]	DC1	Read Only	No
Description: Contains the error between the target current and the measured current (torque-producing). This is equivalent to: demand current minus measured current. When the demand current is reached, the current error is zero. See "Appendix" on page 337 for unit conversion.				

2010.09h	Current Target - Flux			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	[-2$^{(31)}$] - [2$^{(31)}$-1]	DC2	Read Only	No
Description: Contains the value of the target current (flux producing). See "Appendix" on page 337 for conversion.				

2010.0Ah	Current Demand - Flux			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains the value of the demand current (flux producing). See “Appendix” on page 337 for conversion.				

2010.0Bh	Current Measured - Flux			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains the value of the measured current (flux producing). See “Appendix” on page 337 for conversion.				

2010.0Ch	Current Error - Flux			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains the value of the current error (flux producing). See “Appendix” on page 337for conversion.				

2010.0Dh	Current Measured - Phase A			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current measured in phase A. See “Appendix” on page 337 for conversion.				

2010.0Eh	Current Measured - Phase B			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current measured in phase B. See “Appendix” on page 337 for conversion.				

2010.0Fh	Current Measured - Phase C			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current measured in phase C. See “Appendix” on page 337 for conversion.				

2010.10h	Current Measured - Phase D			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current measured in phase D. See “Appendix” on page 337 for conversion.				

2010.11h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

2010.12h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

2010.13h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

2010.14h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	N/A	N/A	Read Only	No

2010.15h	Current Measured - Alpha			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains the first current value calculated from the transformation from the phase current reference frame. See “Appendix” on page 337 for conversion.				

2010.16h	Current Measured - Beta			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains the second current value calculated from the transformation from the phase current reference frame. See "Appendix" on page 337 for unit conversion.				

2010.17h	Current Target - Flux Reference			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DC2	Read Only	No
Description: Contains a value corresponding to the current target flux reference for AC induction motors. See "Appendix" on page 337 for unit conversion.				

2010.18h	Current Demand - Flux Reference			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current demand flux reference for AC induction motors. See "Appendix" on page 337 for unit conversion.				

2010.19h	Current Measured - Flux Reference			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current measured flux reference for AC induction motors. See "Appendix" on page 337 for unit conversion.				

2010.1Ah	Current Error - Flux Reference			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	DC1	Read Only	No
Description: Contains a value corresponding to the current error flux reference for AC induction motors. See "Appendix" on page 337 for unit conversion.				

2011h: Velocity Values

2011.01h	Velocity Measured Pre-Filter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the measured velocity before the feedback cutoff filter. See "Appendix" on page 337 for unit conversion.				

2011.02h	Velocity Measured Post-Filter			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the measured velocity after the feedback cutoff filter. See "Appendix" on page 337 for unit conversion.				

2011.03h	Velocity Target			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the current velocity target when the drive is in velocity mode. See "Appendix" on page 337 for unit conversion.				

2011.04h	Velocity Demand			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the current velocity demand when the drive is in velocity mode. See "Appendix" on page 337 for unit conversion.				

2011.05h	Velocity Loop Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the error between the target velocity and the measured velocity. This is equivalent to target velocity minus measured velocity. When the current commanded velocity is reached, the velocity loop error will be zero. See "Appendix" on page 337 for unit conversion.				

2011.06h	Velocity Summation Input			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] - [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the raw velocity command before filtering or an offset has been applied. See "Appendix" on page 337 for unit conversion.				

2011.07h	Velocity Summation Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	DS1	Read Only	No
Description: Contains the offset of the commanded velocity in the velocity loop. See “Appendix” on page 337 for unit conversion.				

6064h: Actual Position

6064h	Actual Position			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$-2^{31} – (2^{31}-1)$	counts	Read Only	No
Description: Position Actual Value contains the measured position of the primary feedback device. This is the actual value used to create position error in position mode.				

2012h: Position Values

2012.01h	Position Measured			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the current measured position in counts.				

2012.02h	Position Target			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the current commanded position when the drive is used in the position mode.				

2012.03h	Position Demand			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the current position demand in counts.				

2012.04h	Position Loop Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the error between the target position (in counts) and the measured position (in counts). This is equivalent to target position (counts) minus measured position (counts). When the current commanded position is reached, the position loop error will be zero.				

2012.05h	Position Summation Input			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the raw position command before filtering or an offset has been applied.				

2012.06h	Position Summation Offset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the offset of the commanded position in the position loop.				

2012.07h	Position Index Capture Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No
Description: Contains the position of the last encoder index captured by the drive. Requires encoder with index.				

200Ch: PVT Quick Status

200C.01h	PVT Quick Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)} –1]$	N/A	Read Only	No

Description:

Consolidates status information with regards to PVT. Bit definitions are given below.

Bit	PVT Drive Status
0-4	Number of PVT points in the drive
5-7	Reserved
8	Zero Speed
9	At Command
10	Homing Active
11	Homing Complete
12	Bridge Enabled
13	Brake Enabled
14	Stop
15	PVT Executing

201Dh: PVT Status Values

201D.01h	PVT Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:

A bit field corresponding to the current status of PVT. The bit field definitions are given below.

Bit	PVT Status	Description
0	Buffer Full	The PVT Buffer is Full
1	Buffer Empty	The PVT Buffer is Empty
2	Buffer Threshold	The PVT Buffer has reached its threshold
3	Buffer Failure	Problem Reading Point from PVT Buffer
4	Buffer Empty Stop	The PVT Buffer is Empty, Last PVT Point has been reached
5	PVT point wrong sequence	A PVT Point Sequence Error has occurred
6	PVT Buffer Executing	The PVT Buffer is presently in use
7...15	Reserved	Reserved for future use

201D.02h	PVT Points Remaining			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read Only	No
Description: Contains a value corresponding to the number of PVT points remaining in the PVT buffer. This value gets decremented by 1 after each PVT point is executed. When it reaches zero, the PVT buffer is empty.				

201D.03h	PVT Sequence Number			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 – 15	N/A	Read Only	No
Description: Contains a value corresponding to the current PVT point in the PVT buffer that is being executed.				

201D.04h	PVT Quick Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No
Description: A bit field corresponding various statuses used by Click&Move to maintain its PVT sequencer.				

Bit	PVT Status	Description
0...7	Remaining Points	Indicates the number of points left in the trajectory buffer
6	Zero Speed	Indicates if the Drive's measured speed is within the zero velocity window
8	At Command	Indicates if the Drive's measured position is within the At Command window
10	Homing Active	Indicates that the homing algorithm is running
11	Homing Complete	Indicates that the homing algorithm is complete
12	Bridge Enabled	Indicates that the motor bridge is active and driving current
13	Brake Enabled	Indicates that the Drive's brake action is active
14	Quick Stop Active	Indicates that the Drive's Quick Stop action is active
15	Sequencer Executing	Indicates that the PVT trajectory generator is sequencing through the points

2014h: Command Limiter Input

2014.01h	Input Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	N/A	Read Only	No
Description: Contains a value corresponding to the input of the command limiter.				

200Fh: Power Bridge Values

200F.01h	DC Bus Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	0 – [$2^{(15)}$-1]	DV1	Read Only	No
Description: Contains a value corresponding to the DC Bus Voltage. See "Appendix" on page 337 for unit conversions.				

200F.02h	Control Loop 1 Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-$2^{(15)}$] – [$2^{(15)}$-1]	DV1	Read Only	No
Description: Contains a value corresponding to the Control Loop 1 Output Voltage. See "Appendix" on page 337 for unit conversions.				

200F.03h	Control Loop 2 Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-$2^{(15)}$] – [$2^{(15)}$-1]	DV1	Read Only	No
Description: Contains a value corresponding to the Control Loop 2 Output Voltage. See "Appendix" on page 337 for unit conversions.				

200F.04h	Ualpha Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-$2^{(15)}$] – [$2^{(15)}$-1]	DV1	Read Only	No
Description: Contains a value corresponding to the Ualpha Output Voltage. See "Appendix" on page 337 for unit conversions.				

200F.05h	Ubeta Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	[-$2^{(15)}$] – [$2^{(15)}$-1]	DV1	Read Only	No
Description: Contains a value corresponding to the Ubeta Output Voltage. See "Appendix" on page 337 for unit conversions.				

200F.06h	Trap Mode Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DPV	Read Only	No
Description: Contains a value corresponding to the trap mode output voltage. See "Appendix" on page 337 for unit conversion details.				

200F.07h	Phase A Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DPV	Read Only	No
Description: Contains a value corresponding to the Phase A Output Voltage. See "Appendix" on page 337 for unit conversion details.				

200F.08h	Phase B Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DPV	Read Only	No
Description: Contains a value corresponding to the Phase B Output Voltage. See "Appendix" on page 337 for unit conversion details.				

200F.09h	Phase C Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DPV	Read Only	No
Description: Contains a value corresponding to the Phase C Output Voltage. See "Appendix" on page 337 for unit conversion details.				

200F.0Ah	Phase D Output Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DPV	Read Only	No
Description: Contains a value corresponding to the Phase D Output Voltage. See "Appendix" on page 337 for unit conversion details.				

200F.0Bh	Va Measured Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DV1	Read Only	No
Description: Contains a value corresponding to the Va Measured Voltage. See "Appendix" on page 337 for unit conversion details.				

200F.0Ch	Vb Measured Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DV1	Read Only	No
Description: Contains a value corresponding to the Vb Measured Voltage. See “Appendix” on page 337 for unit conversion details.				

200F.0Dh	Vc Measured Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DV1	Read Only	No
Description: Contains a value corresponding to the Vc Measured Voltage. See “Appendix” on page 337 for unit conversion details.				

200F.0Eh	Vd Measured Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DV1	Read Only	No
Description: Contains a value corresponding to the Vd Measured Voltage. See “Appendix” on page 337 for unit conversion details.				

2023h: Digital I/O Values

2023.01h	Digital Inputs (Post Active Level)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:

Bit field corresponding to the state of the digital inputs. Bit field definitions are given below.

Bit	Digital Inputs*
0	Digital Input 1
1	Digital Input 2
2	Digital Input 3
3	Digital Input 4
4	Digital Input 5
5	Digital Input 6
6	Digital Input 7
7	Digital Input 8
8	Digital Input 9
9	Digital Input 10
10	Digital Input 11
11	Digital Input 12
12	Digital Input 13
13	Digital Input 14
14	Digital Input 15
15	Digital Input 16

*Number of actual inputs depends on drive model

2023.02h	Digital Inputs (Pre Active Level)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:

Bit field corresponding to the current voltage level of the digital inputs. Bit field definitions are given below.

Bit	Digital Inputs*
0	Digital Input 1
1	Digital Input 2
2	Digital Input 3
3	Digital Input 4
4	Digital Input 5
5	Digital Input 6
6	Digital Input 7
7	Digital Input 8
8	Digital Input 9
9	Digital Input 10
10	Digital Input 11
11	Digital Input 12
12	Digital Input 13
13	Digital Input 14
14	Digital Input 15
15	Digital Input 16

*Number of actual inputs depends on drive model

2023.03h	Digital Outputs (Post Active Level)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:

Bit field corresponding to the current voltage level of the digital outputs. Bit field definitions are given below.

Bit	Digital Outputs*
0	Digital Output 1
1	Digital Output 2
2	Digital Output 3
3	Digital Output 4
4	Digital Output 5
5	Digital Output 6
6	Digital Output 7
7	Digital Output 8
8	Digital Output 9
9	Digital Output 10
10	Digital Output 11
11	Digital Output 12
12	Digital Output 13
13	Digital Output 14
14	Digital Output 15
15	Digital Output 16

*Number of actual outputs depends on drive model

2023.04h	Digital Outputs (Pre Active Level)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:
Bit field corresponding to the state of the digital outputs. Bit field definitions are given below.

Bit	Digital Outputs*
0	Digital Output 1
1	Digital Output 2
2	Digital Output 3
3	Digital Output 4
4	Digital Output 5
5	Digital Output 6
6	Digital Output 7
7	Digital Output 8
8	Digital Output 9
9	Digital Output 10
10	Digital Output 11
11	Digital Output 12
12	Digital Output 13
13	Digital Output 14
14	Digital Output 15
15	Digital Output 16

*Number of actual outputs depends on drive model

2023.05h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**

2023.06h	Reserved			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**

2024h: Digital Outputs

2024.01h	Digital Outputs (Pre Active Level)			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	See Table	N/A	Read Only	No

Description:
Bit field corresponding to the state of the digital inputs. Bit field definitions are given below.

Bit	Digital Outputs*
1	Digital Output 1
1	Digital Output 2
2	Digital Output 3
3	Digital Output 4
4	Digital Output 5
5	Digital Output 6
6	Digital Output 7
7	Digital Output 8
8	Digital Output 9
9	Digital Output 10
10	Digital Output 11
11	Digital Output 12
12	Digital Output 13
13	Digital Output 14
14	Digital Output 15
15	Digital Output 16

*Number of actual outputs depends on drive model

60FDh: Digital Inputs

60FD.00h	Digital Inputs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read Only	No

Description:
Contains the bitfield for the state of the digital input assigned to the following events.

Bit	Event
0	User Negative Limit
1	User Positive Limit
2	Home Switch
3-15	Reserved
16	User Disable
17	User Aux Disable
18	User Stop
19	Motor Over-Temp
20-31	Reserved

60FEh: Digital Outputs

60FE.00h	Digital Outputs			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned32	N/A	N/A	Read / Write	No

Description:
Contains the bitfield to trigger the digital output assigned to the following events.

Bit	Event
0	Brake Active
1-31	Reserved

201Ah: Analog Input Values

201A.01h	Analog Input 1 Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The internal status of the Analog Input 1 module.

Bit	Description
0	Upper Bound Exceeded
1	Lower Bound Exceeded
2	Upper Warning Active
3	Lower Warning Active
4-15	Reserved

201A.02h	Analog Input 1 Raw ADC Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The upper word of the Raw ADC 1 Value.

201A.03h	Analog Input 1 Normalized Value 16bitS14			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	N/A	Read Only	No

Description:
The ADC 1 result value normalized to +/-1 in 16bitS14 Notation.

201A.04h	Analog Input 1 Normalized Value 32bitS30			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - [2^{(31)}-1]$	N/A	Read Only	No

Description:
The ADC 1 result value normalized to +/-1 in 32bitS30 Notation.

201A.05h	Analog Input 2 Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	N/A	Read Only	No

Description:
The internal status of the Analog Input 2 module.

Bit	Description
0	Upper Bound Exceeded
1	Lower Bound Exceeded
2	Upper Warning Active
3	Lower Warning Active
4-15	Reserved

201A.06h	Analog Input 2 Raw ADC Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)}-1]$	N/A	Read Only	No

Description:
The upper word of the Raw ADC 2 Value.

201A.07h	Analog Input 2 Normalized Value 16bitS14			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] - [2^{(15)}-1]$	N/A	Read Only	No

Description:
The ADC 2 result value normalized to +/-1 in 16bitS14 Notation.

201A.08h	Analog Input 2 Normalized Value 32bitS30			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 - [2^{(31)}-1]$	N/A	Read Only	No

Description:
The ADC 2 result value normalized to +/-1 in 32bitS30 Notation.

201A.09h	Analog Input 3 Status			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The internal status of the Analog Input 3 module.

Bit	Description
0	Upper Bound Exceeded
1	Lower Bound Exceeded
2	Upper Warning Active
3	Lower Warning Active
4-15	Reserved

201A.0Ah	Analog Input 3 Raw ADC Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The upper word of the Raw ADC 3 Value.

201A.0Bh	Analog Input 3 Normalized Value 16bitS14			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	N/A	Read Only	No

Description:
The ADC 3 result value normalized to +/-1 in 16bitS14 Notation.

201A.0Ch	Analog Input 3 Normalized Value 32bitS30			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$0 – [2^{(31)}-1]$	N/A	Read Only	No

Description:
The ADC 3 result value normalized to +/-1 in 32bitS30 Notation.

201A.0Dh	Analog Input 4 Status			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The internal status of the Analog Input 4 module.

Bit	Description
0	Upper Bound Exceeded
1	Lower Bound Exceeded
2	Upper Warning Active
3	Lower Warning Active
4-15	Reserved

201A.0Eh	Analog Input 4 Raw ADC Value			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	$0 – [2^{(16)}-1]$	N/A	Read Only	No

Description:
The upper word of the Raw ADC 4 Value.

201A.0Fh	Analog Input 4 Normalized Value 16bitS14			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	N/A	Read Only	No

Description:
The ADC 4 result value normalized to +/-1 in 16bitS14 Notation.

201A.10h	Analog Input 4 Normalized Value 32bitS30			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Integer32	$0 – [2^{(31)}-1]$	N/A	Read Only	No

Description:
The ADC 4 result value normalized to +/-1 in 32bitS30 Notation.

2025h: Analog Output Values

2025.01h	Analog Output 1 Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DAO	Read Only	No

Description:
Contains a value corresponding to the value of analog output 1. The analog outputs have a range of 0 to 10 Volts. See "Appendix" on page 337 for unit conversion details.

2025.02h	Analog Output 2 Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer16	$[-2^{(15)}] – [2^{(15)}-1]$	DAO	Read Only	No

Description:
Contains a value corresponding to the value of analog output 2. The analog outputs have a range of 0 to 10 Volts. See "Appendix" on page 337 for unit conversion details.

2015h: Deadband Input Value

2015.01h	Deadband Input Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	DC2, DS1, counts	Read Only	No

Description:
Value of the command input to the Deadband function. Mode dependant units.

2018h: Programmable Limit Switch Values

2018.01h	PLS Input Value			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Integer32	$[-2^{(31)}] – [2^{(31)}-1]$	counts	Read Only	No

Description:
Contains the value of the programmable limit switch position input. If a rollover value has been defined, this value will range between zero and the rollover value.

2018.02h	PLS 1 State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Bits	0-1	-	Read Only	No

Description:
Contains the current state of programmable limit switch 1. This bit is high when PLS 1 is active.

2018.03h	PLS 2 State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Bits	0-1	-	Read Only	No
Description: Contains the current state of programmable limit switch 2. This bit is high when PLS 2 is active.				

2028h: Fault Log Counter

2028.01h	Log Counter: Total Run Time			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned48	$0 – 2^{48}$	msec	Read Only	No
Description: This object holds the total run time of the drive.				

2028.02h	Log Counter: Drive Reset			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} – 1]$	count	Read Only	No
Description: Number of times Drive Reset occurred in the life of the drive.				

2028.03h	Log Counter: Drive Internal Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} – 1]$	count	Read Only	No
Description: Number of times Drive Internal Error occurred in the life of the drive.				

2028.04h	Log Counter: Short Circuit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	$0 - [2^{(16)} – 1]$	count	Read Only	No
Description: Number of times Short Circuit occurred in the life of the drive.				

2028.05h	Log Counter: Over Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Over Current occurred in the life of the drive.				

2028.06h	Log Counter: Hardware Under Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Hardware Under Voltage occurred in the life of the drive.				

2028.07h	Log Counter: Hardware Over Voltage			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Hardware Over Voltage occurred in the life of the drive.				

2028.08h	Log Counter: Drive Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Drive Over Temperature occurred in the life of the drive.				

2028.09h	Log Counter: Parameter Restore Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Parameter Restore Error occurred in the life of the drive.				

2028.0Ah	Log Counter: Parameter Store Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Parameter Store Error occurred in the life of the drive.				

2028.0Bh	Log Counter: Invalid Hall State			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Invalid Hall State occurred in the life of the drive.				

2028.0Ch	Log Counter: Phase Synchronization Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Phase Sync. Error occurred in the life of the drive.				

2028.0Dh	Log Counter: Motor Over Temperature			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Motor Over Temperature occurred in the life of the drive.				

2028.0Eh	Log Counter: Phase Detection Fault			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Phase Detection Fault occurred in the life of the drive.				

2028.0Fh	Log Counter: Feedback Sensor Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Feedback Sensor Error occurred in the life of the drive.				

2028.10h	Log Counter: Log Entry Missed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Log Entry Missed occurred in the life of the drive.				

2028.11h	Log Counter: Software Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Software Disable occurred in the life of the drive.				

2028.12h	Log Counter: User Disable			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times User Disable occurred in the life of the drive.				

2028.13h	Log Counter: User Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times User Positive Limit occurred in the life of the drive.				

2028.14h	Log Counter: User Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times User Negative Limit occurred in the life of the drive.				

2028.15h	Log Counter: Current Limiting			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Current Limiting occurred in the life of the drive.				

2028.16h	Log Counter: Continuous Current			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Continuous Current occurred in the life of the drive.				

2028.17h	Log Counter: Current Loop Saturated			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Current Loop Saturated occurred in the life of the drive.				

2028.18h	Log Counter: User Under Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times User Under Voltage occurred in the life of the drive.				

2028.19h	Log Counter: User Over Voltage			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times User Over Voltage occurred in the life of the drive.				

2028.1Ah	Log Counter: User Auxiliary Disable			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times User Auxiliary Disable occurred in the life of the drive.				

2028.1Bh	Log Counter: Shunt Regulator Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Shunt Regulator Active occurred in the life of the drive.				

2028.1Ch	Log Counter: Command Limiter Active			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Command Limiter Active occurred in the life of the drive.				

2028.1Dh	Log Counter: Motor Overspeed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Motor Overspeed occurred in the life of the drive.				

2028.1Eh	Log Counter: At Command			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times At Command occurred in the life of the drive.				

2028.1F0h	Log Counter: Zero Speed			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Zero Speed occurred in the life of the drive.				

2028.20h	Log Counter: Velocity Following Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Velocity Following Error occurred in the life of the drive.				

2028.21h	Log Counter: Positive Target Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Positive Target Velocity Limit occurred in the life of the drive.				

2028.22h	Log Counter: Negative Target Velocity Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - [$2^{(16)}$ –1]	count	Read Only	No
Description: Number of times Negative Target Velocity Limit occurred in the life of the drive.				

2028.23h	Log Counter: Upper Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Upper Measured Position Limit occurred in the life of the drive.				

2028.24h	Log Counter: Lower Measured Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Lower Measured Position Limit occurred in the life of the drive.				

2028.25h	Log Counter: At Home Position			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times At Home Position occurred in the life of the drive.				

2028.26h	Log Counter: Position Following Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Position Following Error occurred in the life of the drive.				

2028.27h	Log Counter: Upper Target Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Upper Target Position Limit occurred in the life of the drive.				

2028.28h	Log Counter: Lower Target Position Limit			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Lower Target Position Limit occurred in the life of the drive.				

2028.29h	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Ah	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Bh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Ch	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Dh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Eh	Reserved			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	N/A	N/A	Read Only	No

2028.2Fh	Log Counter: Communication Channel Error			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0- $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Communication Channel Error occurred in the life of the drive.				

2028.30h	Log Counter: Commanded Stop			
Data Type	Data Range	Units	Accessibility	Stored to NVM
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Commanded Stop occurred in the life of the drive.				

2028.31h	Log Counter: User Stop			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times User Stop occurred in the life of the drive.				

2028.32h	Log Counter: Commanded Positive Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Commanded Positive Limit occurred in the life of the drive.				

2028.33h	Log Counter: Commanded Negative Limit			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times Commanded Negative Limit occurred in the life of the drive.				

2028.34h	Log Counter: PWM and Direction Broken Wire Error			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times PWM and Direction Broken Wire Error occurred in the life of the drive.				

2028.35h	Log Counter: High Current Indicator			
Data Type	**Data Range**	**Units**	**Accessibility**	**Stored to NVM**
Unsigned16	0 - $[2^{(16)} - 1]$	count	Read Only	No
Description: Number of times High Current Indicator Fault occurred in the life of the drive.				

A Appendix

A.1 Appendix A - Units

Table A.1 below shows scaling factors and formulas for converting physical units to drive units.

TABLE A.1 Drive Units and Scaling Factors

Abbreviation	Drive Unit Type	Physical Units	Data Type	Scaling Factor
DA1	Acceleration	counts/s^2	Integer32/Unsigned32	$2^{34}/K_S{}^2$
DA2	Acceleration	counts/s^2	Unsigned48	$2^{34}/K_S{}^2$
DA3	Acceleration	counts/s^2	Integer32	$2^{28}/K_{MS}\ K_S$
DA4	Acceleration	counts/s^2	Integer32	$(2^{18})/(K_S{}^2)$
DA5	Acceleration	counts/s^2	Unsigned48	$2^{28}/K_{DS}\ K_S$
DC1	Current	A	Integer16	$2^{14}/K_P$
DC2	Current	A	Integer16/Integer32	$1000/K_P$
DJ1	Jerk	A/s	Unsigned48	$2^{32}/(K_P\ K_S)$
DG1	Angle	degrees	Integer16/Unsigned16	$2^{16}/360$
DS1	Speed/Velocity	counts/s	Integer32	$2^{17}/K_S$
DS2	Speed/Velocity	counts/s	Unsigned48	$2^{17}/K_S$
DS3	Speed/Velocity	counts/s	Integer64	$2^{33}/K_S$
DS4	Speed/Velocity	counts/s	Unsigned32	$2^{17}/K_S$
DV1	Voltage	V	Integer16	$2^{14}/(1.05\ K_{OV})$
DPV	Phase Voltage	V	Integer16	$2^{14}/K_B$
DAI	Analog Input Voltage	V	Integer16	$2^{14}/20$
DAO	Analog Output Voltage	V	Integer16	$2^{14}/10$
DT1	Temperature	°C	Integer32	2^{16}
PBC	Power Board Current	A	Unsigned16	10
PBV	Power Board Voltage	V	Unsigned16	10
PBT	Power Board Time	s	Unsigned16	100
PBF	Power Board Frequency	Hz	Unsigned32	$2^{16}/1000$
SF1	Scale Factor 1	-	-	2^{14}

1.Multiply physical units by the scaling factor to obtain drive units. Divide drive units by the scaling factor to obtain physical units.

The drive units used for a parameter depend upon the parameter type and size. Drive units must be rounded to the nearest integer and then converted to a hexadecimal base of the appropriate data type before they are written to the drive. When converting to a signed integer data type, use two's complement for representation of negative numbers (see "Conversion Example 3" on page 339). Some scaling factors involve drive dependent constants. These constants are given in Table A.2, along with details on determining their values.

TABLE A.2 Drive dependent conversion constants

Constant	Value
K_B	DC Bus Voltage in volts. This value can be read from 200F.01h.
K_{DS}	Maximum dynamic index speed (in counts/s). This value can be read from 20CA.07h, 20CA.08h, 20CA.09h, and 20CA.0Ah.
K_{MS}	Maximum profiler speed (in counts/s) for an Accel/Decel command profile. This value can be read from 203C.09h for Configuration 0 and 203C.0Ch for Configuration 1.
K_{OV}	The hardware defined, DC bus, over-voltage limit of the drive in volts. This value can be read from 20D8.03h.
K_P	The maximum rated peak current of the drive in amps. This value can be read from 20D8.05h.
K_S	Switching frequency of the drive in Hz. This value can be found on the drive datasheet, or can be calculated from the Default PWM Period in object 20D8.07h.

A.1.1 Conversion Example 1

- **Feedback:** 1000 Line Incremental Encoder

To specify a Jog Speed 0 (2253.05h) of 10,000 RPM, first convert to the appropriate physical unit as shown below, keeping in mind that counts have a quadrature resolution (4X) over lines.

$$10{,}000\,\frac{\text{rev}}{\text{min}}\times\frac{1000\,\text{lines}}{1\,\text{rev}}\times\frac{4\,\text{counts}}{1\,\text{line}}\times\frac{1\,\text{min}}{60\,\text{sec}}=666{,}666.7\,\frac{\text{counts}}{\text{sec}}$$

Jog Speed 0 is of data type Integer32 and uses DS1 drive units. Taking the appropriate 32-bit scaling factor from Table A.1 yields

$$666{,}666.7\times\frac{2^{17}}{K_I K_S}=666{,}666.7\times\frac{2^{17}}{1\times 20{,}000}=4369066.9$$

where $K_I = 1$ because we are not dealing with 1 V_{PP} Sin/Cos feedback. Rounding this to the nearest integer and converting to a hexadecimal base then results in

$$4369067_{10}=42AAAB_{16}.$$

Now, to apply the setting, a value of 42AAABh would be written to sub-index 2253.05h.

A.1.2 Conversion Example 2

- **Feedback:** 1000 cycles per revolution; 1Vp-p Sine/Cosine Encoder

To specify a Jog Speed 0 (2253.05h) of 10,000 RPM, first convert to the appropriate physical unit as shown below, keeping in mind that counts have a quadrature resolution (4X) over each cycle.

$$10{,}000\frac{\text{rev}}{\text{min}}\times\frac{\text{K}_\text{I}\cdot\#\text{cycles}}{1\,\text{rev}}\times\frac{4\,\text{counts}}{1\,\text{cycle}}\times\frac{1\,\text{min}}{60\,\text{sec}}=666.7\cdot K_I\cdot\#\frac{\text{counts}}{\text{sec}}$$

Jog Speed 0 is of data type Integer32 and uses DS1 drive units. Taking the appropriate 32-bit scaling factor from Table A.1 yields:

$$666.7\cdot K_I\cdot\#\times\frac{2^{17}}{K_I K_S}=666.7\cdot\#\times\frac{2^{17}}{20{,}000}=4369.0669\cdot\#$$

where the K_I term cancels out. Note that the “#” in the two conversions (shown above) equal 1000. Rounding this to the nearest integer and converting to a hexadecimal base then results in:

$$4369067_{10}=42\text{AAAB}_{16}.$$

Now, to apply the setting, a value of 42AAABh would be written to sub-index 2253.05h.

A.1.3 Conversion Example 3

To set a temperature parameter to 23°F first convert to the appropriate physical unit as shown below.

$$\frac{5}{9}(23-32)=-5\,°\text{C}.$$

Referring to Table A.1, the appropriate scaling factor yields:

$$-5\times 2^{16}=-327680.$$

Because the resulting integer value is negative, two’s complement notation will be used to represent its hexadecimal equivalent. To obtain the two’s complement, the positive version of the desired number should be subtracted from 2^N, where N is the number of bits in the data type. Temperature parameters use the data type Integer32 so the calculation is as follows:

$$2^N-327680=2^{32}-327680=4294639616$$

$$4294639616_{10}=\text{FFFB0000}_{16}$$

The final step would be to write a value of FFFB0000h to the appropriate parameter.

A.2 Drive Signal Enums

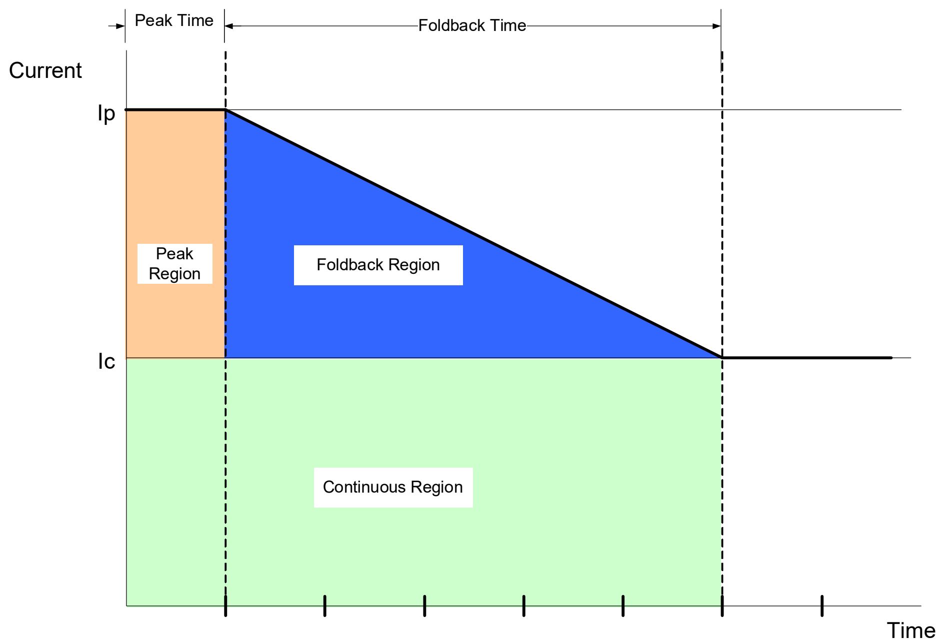
TABLE A.3 Drive Signal Enums

Enum Value	Name
1	Electrical Cycle Position
2	Commutation Position
5	Hall State
12	Phase A Current
14	Phase B Current
16	Phase C Current
25	Phase A Voltage
26	Phase B Voltage
27	Phase C Voltage
35	Current Offset
36	Current Target
37	Current Demand
38	Current Measured
39	Current Error
47	Velocity Offset
48	Velocity Target
49	Velocity Demand
50	Velocity Measured
51	Velocity Measured Post Filtering
52	Velocity Error
54	Position Offset
55	Position Target
56	Position Demand
58	Position Measured
59	Position Error
104	Bus Voltage
111	Incremental Encoder 1 Position
113	Incremental Encoder 2 Position
115	Absolute Encoder 1 Position
168	Drive Temperature
190	Drive Bridge Status
191	Drive Protection Status
192	System Protection Status
193	Drive/System Status 1
194	Drive/System Status 2
195	Drive/System Status 3

A.3 Appendix B - Current Limiting Algorithm

In order to understand the current limiting algorithm used by *ADVANCED* Motion Controls DP Series drives, it is necessary to first understand the different current limiting regions. The graph in Figure A.1 breaks the available current into three different regions.

FIGURE A.1 Current Limiting Regions



- **Continuous Region:** The commanded current is less than or equal to the continuous current limit. The available current is equal to the commanded current.
- **Peak Region:** The commanded current is between the continuous and peak current limits. The available current is equal to the commanded current for a limited time (Peak Time).
- **Foldback Region:** Commanded current is between the continuous and peak current limits of the drive. The available current is less than the commanded current. The available current decreases over time until it equals the continuous current limit. The rate of this decrease is equal to:

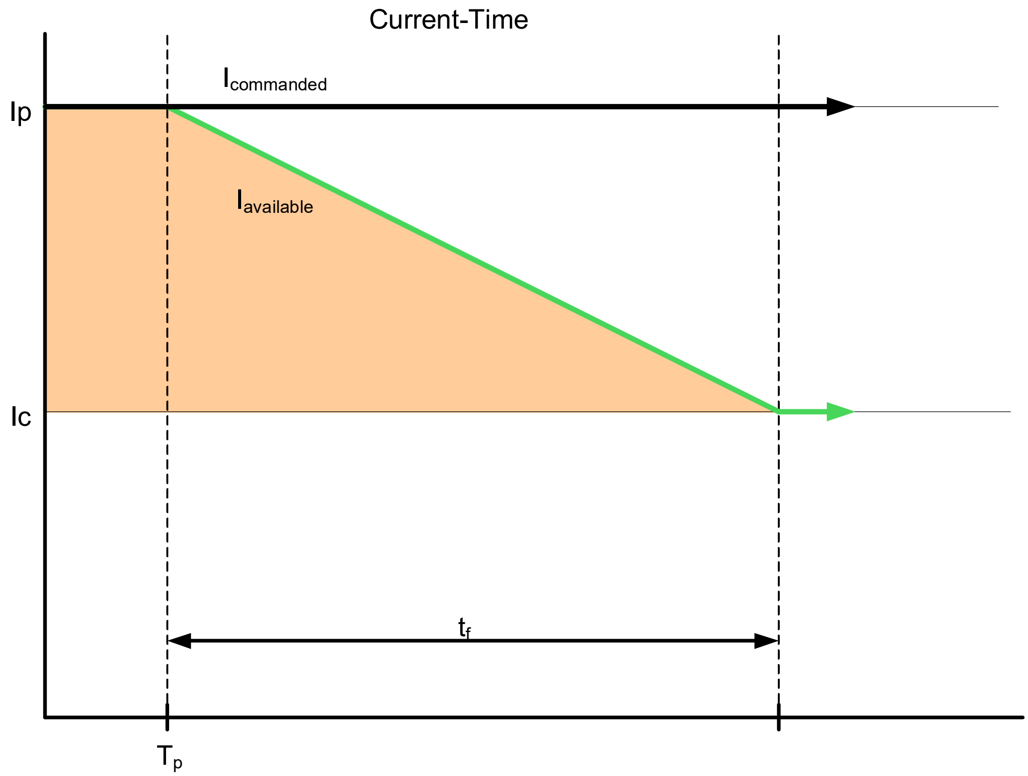
$$Slope = \frac{Ip - Ic}{tf}$$

Ip	Peak current limit
Ic	Continuous current limit
tf	Foldback time

A.3.1 Time-Based Peak Current Limiting

The full peak value of current is available to begin with. When a current command is equal to the peak current limit, the current begins to foldback to the continuous limit after T_p, following the same slope as given in Figure A.1. Once the available current has reached the continuous current limit after t_f, the available current will be limited to the continuous current limit until the commanded current is dropped below the continuous level.

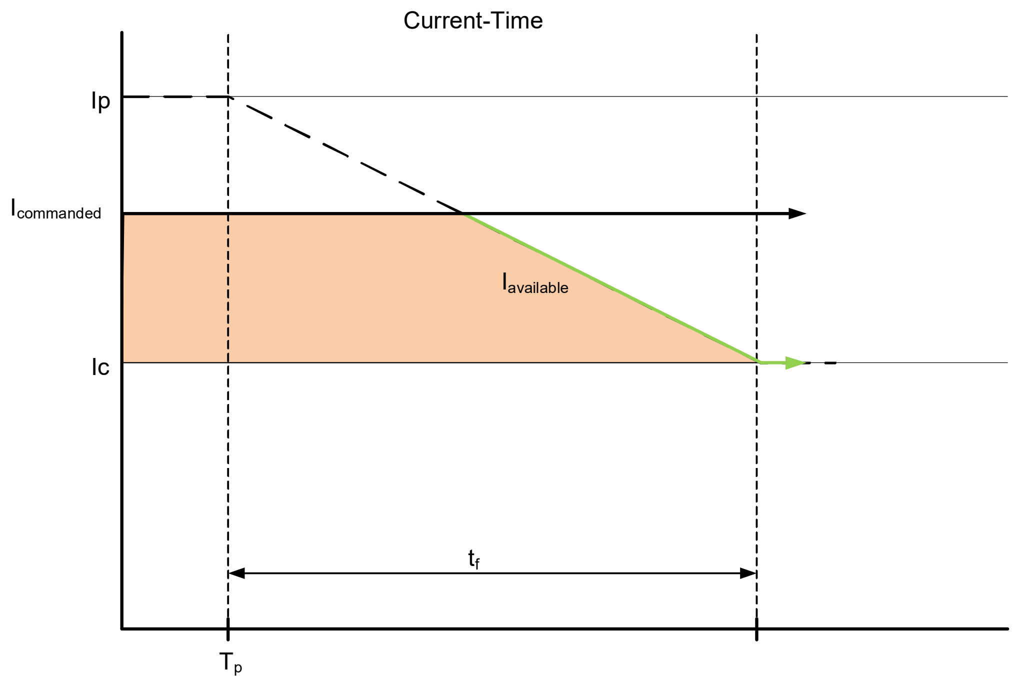
FIGURE A.2 Time-Based Peak Current Limiting



A.3.2 Time-Based Non-Peak Current Limiting

When the commanded current is between the peak and continuous current limits, the available current will begin to foldback at the intersection with the slope from "Time-Based Peak Current Limiting". The larger the commanded current, the sooner the available current will begin to foldback.

FIGURE A.3 Time-Based Non-Peak Current Limiting



A.3.3 Time-Based Current Recovery

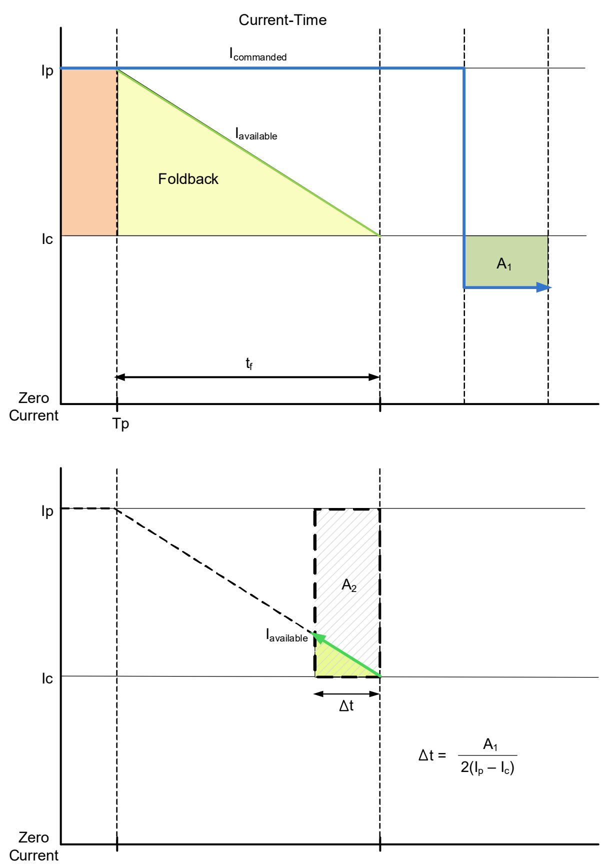
Initially, the full peak value of current is available. A commanded current above the continuous level causes the available current to foldback to the continuous level as shown in the first graph of Figure A.4. When the commanded current drops below the continuous current limit value ($\mathbf{A_1}$ in the first graph), the available current will then begin to recover along the slope of the foldback line towards the peak current level, as shown in the second graph of Figure A.4. The relationship between the commanded current and the recovered current is given as:

$$A_2 = \frac{1}{2}A_1$$

Using this relationship, you can calculate the amount of time recovered, Δt, by using the following equation:

$$\Delta t = \frac{A_1}{2(I_p - I_c)}$$

FIGURE A.4 Time-Based Current Recovery - Foldback and Commanded Current

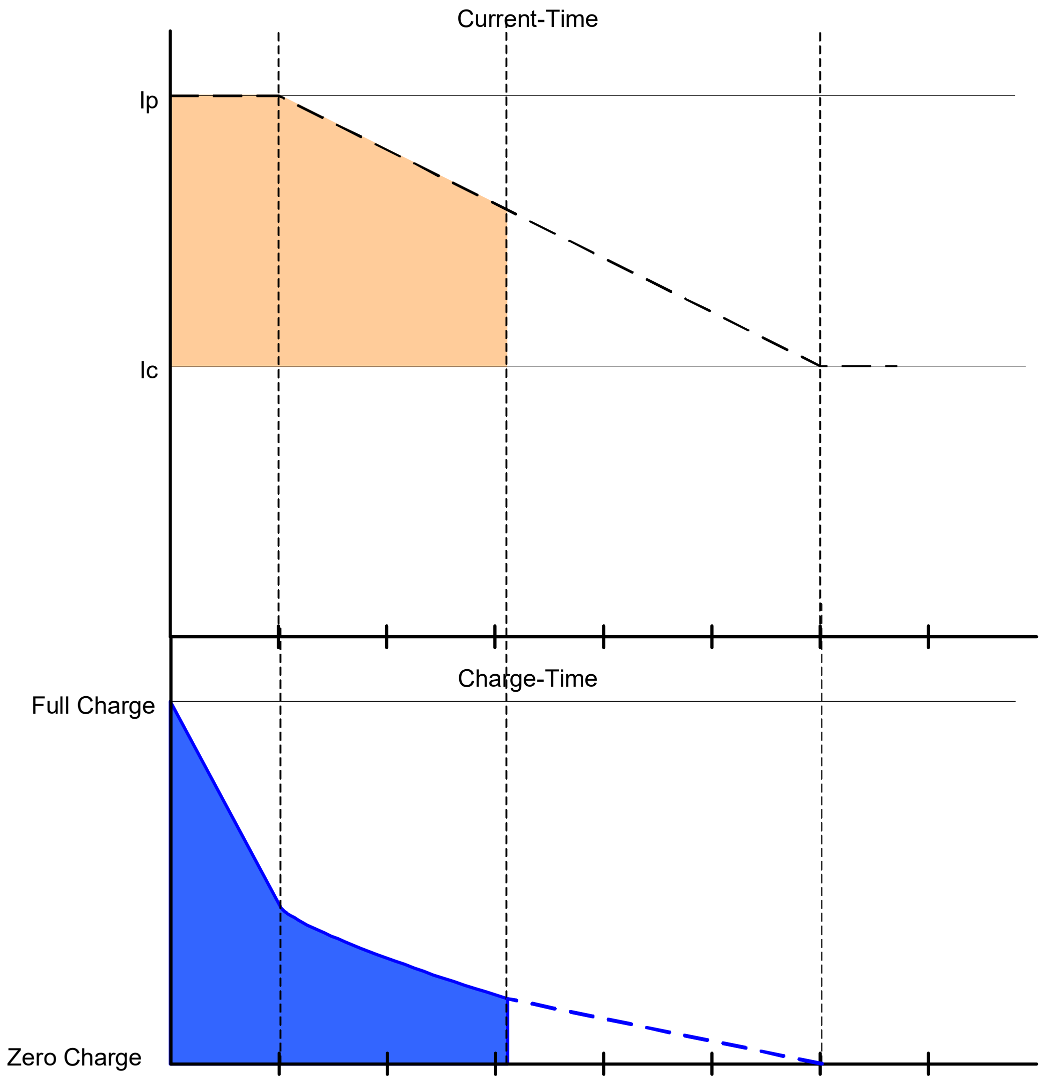


Note that current must be commanded below the specified continuous value to start recovering from a foldback condition.

A.3.4 Charge-Based Peak Current Limiting

The charge is full to begin with. When a current greater than the continuous current limit is commanded, the charge begins to decay. The loss of charge is determined by the area under the curve as shown in Figure A.5. The larger the command, the faster the charge will decay. When the charge decreases to zero, the available current will be limited to the continuous current limit until the charge is restored.

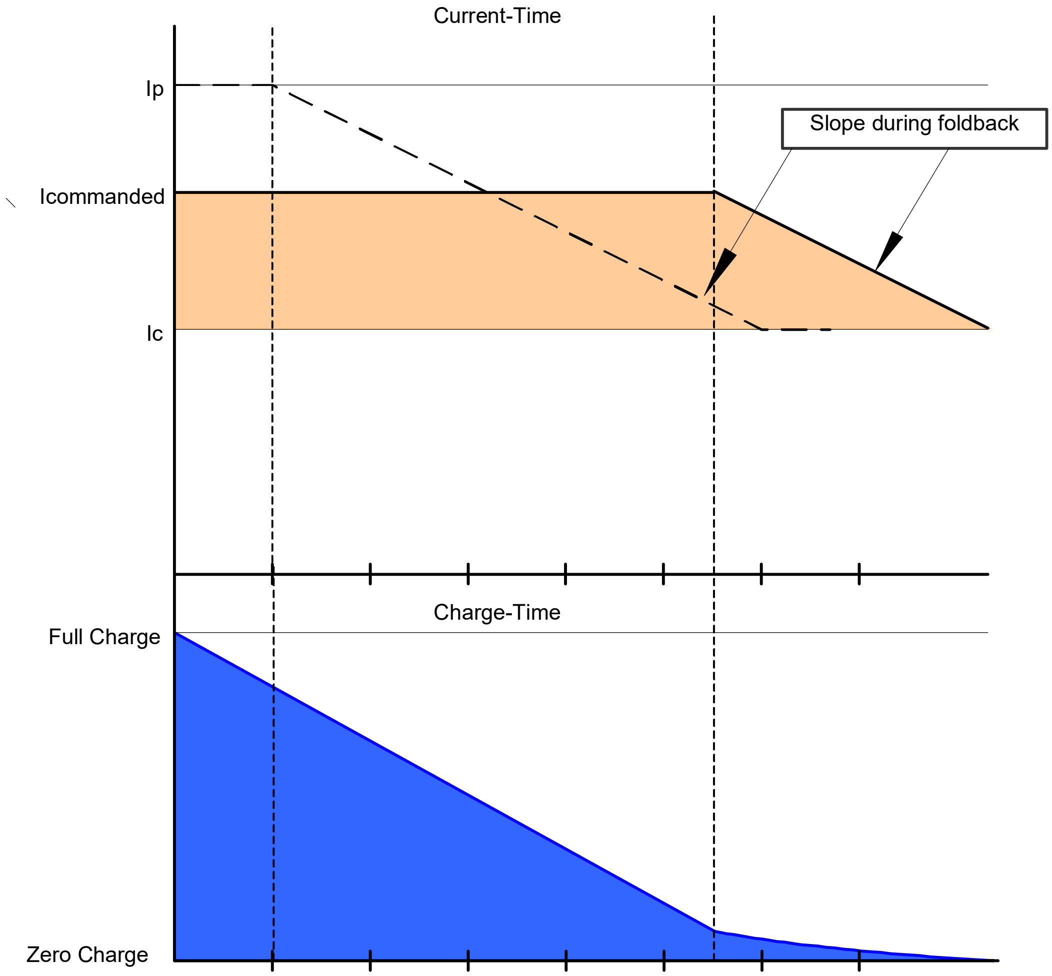
FIGURE A.5 Charge-Based Peak Current Limiting



A.3.5 Charge-Based Non-Peak Current Limiting

When the commanded current is between the peak and continuous current limits, the commanded current will be available for a longer period when compared to limiting at peak command. Note that the slope of the line during foldback is the same for both cases.

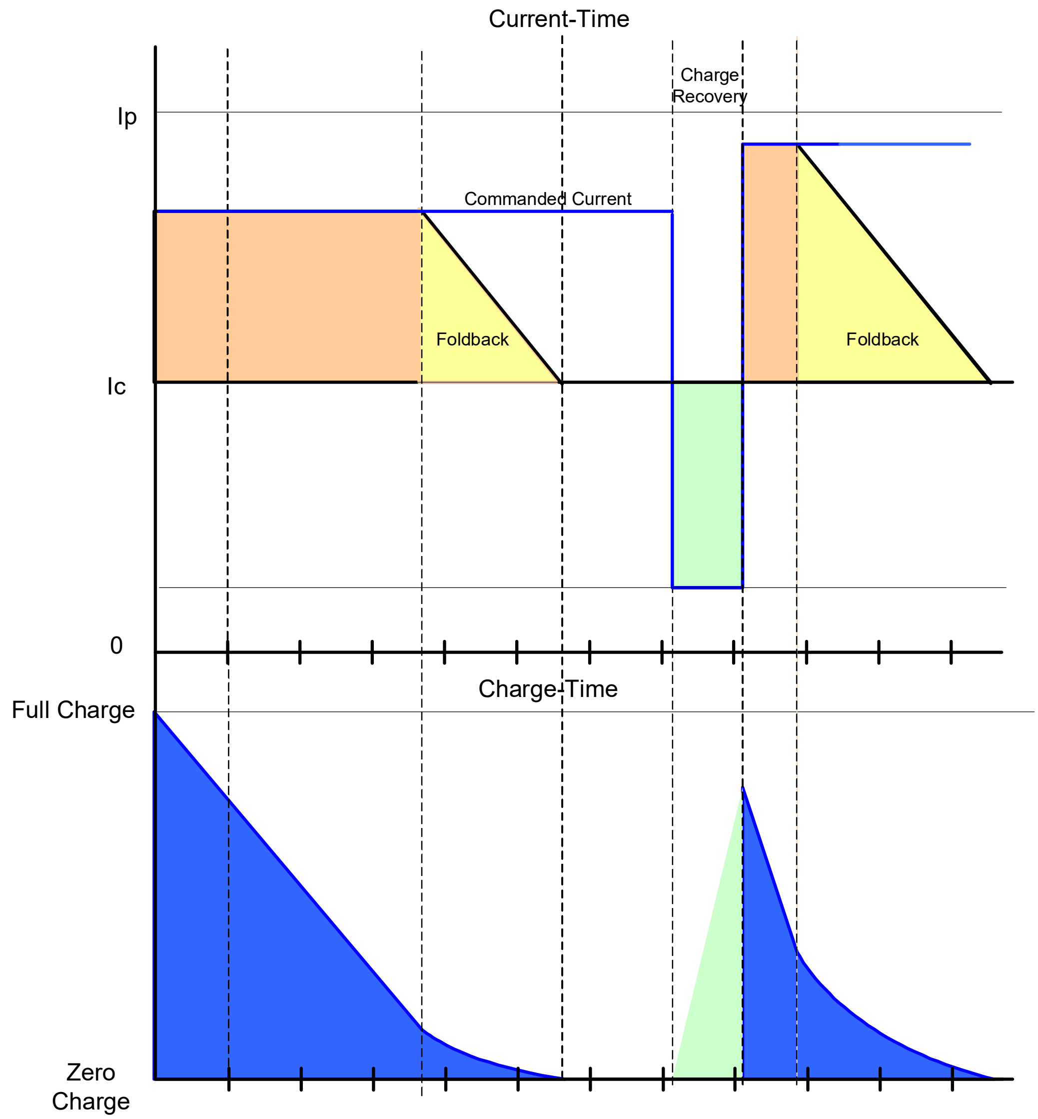
FIGURE A.6 Charge-Based Non-Peak Current Limiting



A.3.6 Charge-Based Current Recovery

After losing some value of charge, the charge may be recovered when the commanded value is dropped less than the continuous current limit. The amount of charge recovered depends on the magnitude of the commanded current and the amount of time in which it is commanded. The amount of charge recovered can be calculated by measuring the area within the curve as shown during the charge recovery phase in Figure A.7.

FIGURE A.7 Charge Recovery



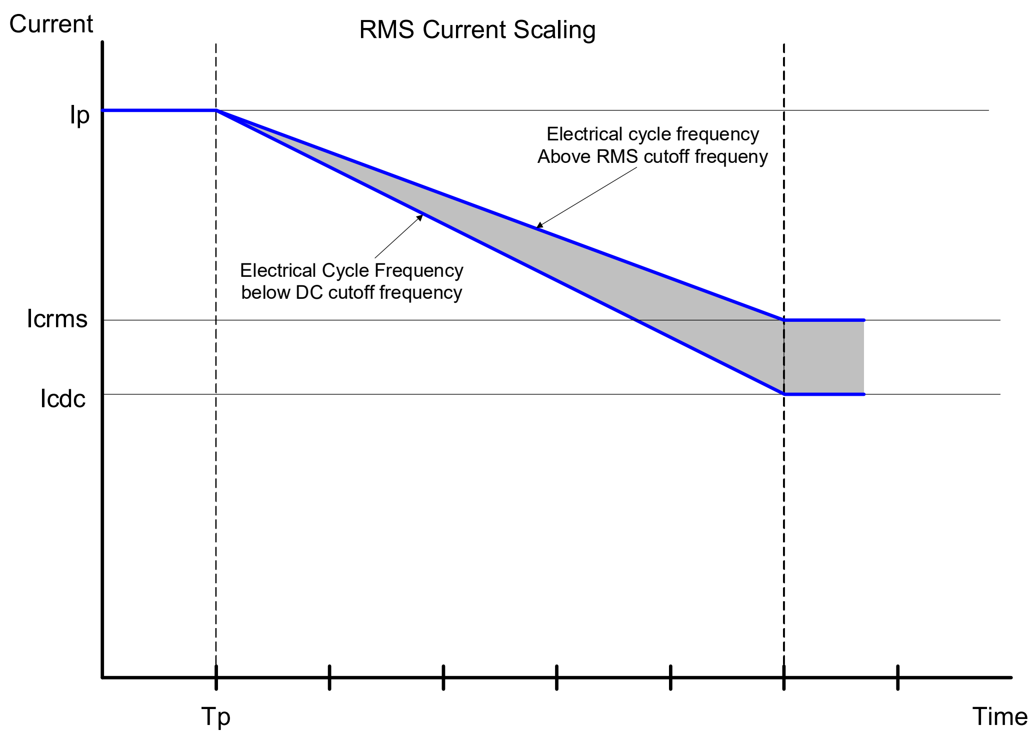
A.3.7 RMS Current Scaling

RMS Current Scaling uses the charge-based algorithm described above. The only difference is the value of the continuous current the drive is capable of outputting. The continuous RMS limit can be used when the motor is moving so that the electrical cycle frequency is greater than the upper frequency assigned to that drive. The upper frequency is typically around 5Hz or 150 RPM for a 4-pole motor. The continuous RMS value is the continuous DC value multiplied by the square root of two.

$$Icrms \equiv \sqrt{2} \cdot Icdc$$

When the electrical cycle frequency drops below the upper frequency, the continuous current drops below the RMS value. When the motor is moving at slow speeds, the continuous current is equal to the DC value of the current.

FIGURE A.8 RMS Current Limiting



Index

Numerics

***ADVANCED* Motion Controls® CANopen Communication**

Reference Manual

MNCMCNFP-08

3805 Calle Tecate • Camarillo, CA 93012-5068

Tel: (805) 389-1935 Fax: (805) 384-2315 www.a-m-c.com