Copley Amplifier Parameter Dictionary

Part Number 95-00716-000
Revision 2
March 2008

TABLE OF CONTENTS

About This Manual

Overview and Scope

This manual provides cross-referenced definitions of the parameters used to program and operate Copley Controls amplifiers.

Related Documentation

CANopen-related documents:

- *CANopen Programmer's Manual*
- *CML Reference Manual*
- *Copley Motion Objects Programmer's Guide*

DeviceNet-related:

- *Copley DeviceNet Programmer's Guide*

Also of related interest:

- *CME 2 User Guide*
- *Copley Indexer 2 Program User Guide* (describes use of Indexer 2 Program to create motion control sequences)
- *Copley ASCII Interface Programmer's Guide* (describes how to send ASCII format commands over an RS232 serial bus to control one or more amplifiers)
- *Copley Camming User Guide* (describes the use of the Copley Controls Camming feature, and its setup through CME 2)

Links to these publications, along with hardware manuals and data sheets, can be found under the *Documents* heading of http://www.copleycontrols.com/motion/downloads.

Copley Controls software and related information can be found on:
http://www.copleycontrols.com/motion/software

Comments

Copley Controls Corporation welcomes your comments on this manual. See http://www.copleycontrols.com for contact information.

Copyrights

Document Validity

We reserve the right to modify our products. The information in this document is subject to change without notice and does not represent a commitment by Copley Controls Corporation. Copley Controls Corporation assumes no responsibility for any errors that may appear in this document.

1.1.1: Product Warnings

Observe all relevant state, regional, and local safety regulations when installing and using Copley Controls amplifiers. For safety and to assure compliance with documented system data, only Copley Controls Corporation should perform repairs to amplifiers.

DANGER

Hazardous voltages.

Exercise caution when installing and adjusting Copley amplifiers.

Risk of electric shock.

On some Copley Controls amplifiers, high-voltage circuits are connected to mains power. Refer to hardware documentation.

Risk of unexpected motion with non-latched faults.

After the cause of a non-latched fault is corrected, the amplifier re-enables the PWM output stage without operator intervention. In this case, motion may re-start unexpectedly. Configure faults as latched unless a specific situation calls for non-latched behavior. When using non-latched faults, be sure to safeguard against unexpected motion.

Latching an output does not eliminate the risk of unexpected motion with non-latched faults.

Associating a fault with a latched, custom-configured output does not latch the fault itself. After the cause of a non-latched fault is corrected, the amplifier re-enables without operator intervention. In this case, motion may re-start unexpectedly.

For more information, see Fault Mask (p. 29).

When operating the amplifier as a CAN or DeviceNet node, the use of CME 2 or ASCII serial commands may affect operations in progress. Using such commands to initiate motion may cause network operations to suspend.

Operation may restart unexpectedly when the commanded motion is stopped.

Use equipment as described.

Operate amplifiers within the specifications provided in the relevant hardware manual or data sheet.

FAILURE TO HEED THESE WARNINGS CAN CAUSE EQUIPMENT DAMAGE, INJURY, OR DEATH.

1.1.2: Revision History

Revision	Date	DECO #	Applies to	Comments
1	October 2007	15447	Latest released firmware.	Initial publication.
2	March 2008	16706		Various updates.

CHAPTER
1: INTRODUCTION

1.1: Scope and Purpose of this Book

This book provides a listing and definitions of the parameters used to program and operate Copley Controls amplifiers. These parameters can be accessed using any of several communication interfaces, each with its own protocol and set of IDs for the parameters.

This book lists the parameters in order of their Copley ASCII Interface variable ID. Cross references for each parameter include, where applicable, the equivalent DeviceNet variable ID, MACRO I-variable ID, and CANopen (and EtherCat) object index and sub-index.

There are many CANopen and EtherCat objects for which there are no direct correlations to Copley amplifier parameters. Refer to the *CANopen Programmer's Manual* for a complete list of supported objects.

1.2: Organization of the Parameter Listings

The parameters are listed in tables consisting of the following columns:

The **ASCII** column contains the parameter's Copley ASCII Interface parameter ID. This ID would also be used with Copley Controls Indexer 2 Program. The ID is listed in hex format.

The **DvcNet** column contains the parameter's DeviceNet ID. The ID is listed in hex format.

The **CAN ID:sub** column contains the CANopen (and EtherCat) object index of the of the CANopen object that represents the parameter. This index is in hex format. If the parameter is represented by a CANopen (or EtherCat) sub-index object, the hex object index value and decimal sub-index value are delimited by a colon. For instance, the Current Loop Proportional Gain (Cp) parameter is represented by CANopen (and EtherCat) object index 0x60F6, sub-index 1. This appears in the CAN ID:sub column as 0x60F6:1.

Note that the CANopen object dictionary and the EtherCat object dictionary are identical. Use the CAN ID:sub column to get a parameter's EtherCat object ID.

The **MACRO** column contains the parameter's MACRO I-variable ID. The MACRO I-variable ID of a parameter is offset from the ASCII Interface parameter ID by decimal 1024 (hex 0x400).

The **Bank** column indicates whether the parameter is stored in amplifier RAM (R), amplifier flash memory (F), or both (RF). An asterisk in this column indicates that the parameter is read-only. Parameters without an asterisk in the Bank column can be read and written.

The **Type** column indicates the parameter's data type. Types include String, Octet, and:
Integer (8, 16, 32, or 64-bit): INT8, INT16, INT32.
Unsigned (8, 16, 32, or 64-bit): U8, U16, U32, U64.

1.3: Important Notes

1.3.1: CME 2 Refresh Behavior

When parameters are changed using one of the interfaces described in this manual, the changes will not necessarily be recognized by an active CME 2 session.

1.3.2: Units

On Junus amplifiers, all velocities are in units of 0.01 RPM instead of the units listed in this document.
On stepper amplifiers in stepper mode all velocity units are in micro steps/s.

CHAPTER

2: AMPLIFIER VARIABLES

2.1: Amplifier Parameters Sorted by ASCII Interface Parameter ID

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x00	0x01	0x400	0x60F6:1	RF	INT16	Current Loop Proportional Gain (Cp).
0x01	0x02	0x401	0x60F6:2	RF	INT16	Current Loop Integral Gain (Ci).
0x02	0x03	0x402	0x2340	RF	INT16	Programmed Current Command. Used only in Programmed Current mode (Desired State [p. 12] = 1) and Diagnostic Microstepping Mode (Desired State = 42). Units: 0.01 A.
0x03	0x04	0x403	0x2203	R*	INT16	Winding A Current. Actual current measured at winding A. Units: 0.01 A.
0x04	0x05	0x404	0x2204	R*	INT16	Winding B Current. Actual current measured at winding B. Units: 0.01 A.
0x05	0x06	0x405	0x2210	R*	INT16	Current Offset A. A calibration offset value, calculated at start up, and applied to the winding A current reading. Units: 0.01 A.
0x0B	0x0C	0x40B	0x2214	R*	INT16	Actual Current, D axis. Part of the internal current loop calculation. Units: 0.01 A.
0x0C	0x0D	0x40C	0x2215	R*	INT16	Actual Current, Q axis. Part of the internal current loop calculation. Units: 0.01 A.
0x0D	0x0E	0x40D	0x2216	R*	INT16	Current Command, D axis. Part of the internal current loop calculation. Units: 0.01 A.
0x0E	0x0F	0x40E	0x2217	R*	INT16	Current Command, Q axis. Part of the internal current loop calculation. Units: 0.01 A.
0x13	0x14	0x413	0x2218	R*	INT16	Terminal Voltage Stepper (Current Loop Output, D axis). Part of the internal current loop calculation. Units: 0. 1 V.
0x14	0x15	0x414	0x2219	R*	INT16	Terminal Voltage Servo (Current Loop Output, Q axis). Part of the internal current loop calculation. Units: 0. 1 V.
0x15	0x16	0x415	0x221D	R*	INT16	Commanded Current. Instantaneous commanded current as applied to the current limiter. Units: 0.01 A.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x17	0x18	0x417	0x6063	R	INT32	Actual Position, as used by the position loop. For single encoder systems, this is the same as Actual Motor Position (p. 13). For dual encoder systems, it is the same as Position Encoder Position (p. 48). Units: Counts.
			0x6064	R	INT32	Position Actual Value. CANopen objects 0x6064 and 0x6063 hold the same value.
0x18	0x19	0x418	0x6069	R*	INT32	Actual Motor Velocity. Units: 0.1 counts/s.
			0x606C			Actual Velocity. CANopen objects 0x606C and 0x6069 hold the same value.
0x19	0x1A	0x419	0x2310	RF	INT32	Analog Command Input Scaling Factor. This value is used to scale the analog command input voltage. When in current mode (Desired State [p. 12] = 2), the value programmed specifies the commanded current when 10 V is applied to the analog input. Units: 0.01 A. When in velocity mode (Desired State = 12), the value programmed specifies the commanded velocity when 10 V is applied to the analog input. Units: 0.1 encoder counts/s. When in position mode (Desired State = 22 or 32), the value programmed specifies the relative position command when 10 V is applied to the analog input. Units: counts.
0x1A	0x1B	0x41A	0x2311	RF	INT16	Analog Command Input Offset. Offset value applied to analog command input. Units: mV.
0x1B	0x1C	0x41B	0x2205	R*	INT16	Analog Sine Input Voltage. Also known as Sine Feedback Voltage. Units: 0.1 mV.
0x1C	0x1D	0x41C	0x2206	R*	INT16	Analog Cosine Input Voltage. Also known as Cosine Feedback Voltage. Units: 0.1 mV.
0x1D	0x1E	0x41D	0x2200	R*	INT16	Analog Command Input Voltage. Also known as A/D Reference Input Voltage. The analog command voltage after offset and deadband have been applied. Units: mV.
0x1E	0x1F	0x41E	0x2201	R*	INT16	Bus Voltage. Also known as High Voltage reference. The voltage present on the high-voltage bus. Units: 0.1 V.
0x1F	0x20	0x41F	0x2207	R*	INT16	A/D Offset Value. A calibration offset value applied to the internal A/D unit. It is part of a continuous calibration routine that the amplifier performs on itself while running. Units: mV.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x20	0x21	0x420	0x2202	R*	INT16	Amplifier Temperature. Units: degrees C.
0x21	0x22	0x421	0x2110	RF	INT16	User Peak Current Limit. Also known as Boost current on stepper amplifiers. This value cannot exceed the peak current rating of the amplifier. Units: 0.01 A.
0x22	0x23	0x422	0x2111	RF	INT16	User Continuous Current Limit. Also known as Run Current on stepper amplifiers. This value should be less then the User Peak Current Limit. Units: 0.01 A.
0x23	0x24	0x423	0x2112	RF	INT16	User I^2T Time Limit. (User Peak Current Limit Time.) Also known as Time at Boost Current on stepper amplifiers. Units: mS.
0x24	0x25	0x424	0x2300	RF	INT16	Desired State: (see value table below)
0x25	0x26	0x425	0x221E	R*	INT16	Limited Current. Output of current limiter (input to the current loop). Units: 0.01 A.

Desired State (0x24) values:

Value	Description
0	Disabled.
1	The current loop is driven by the programmed current value.
2	The current loop is driven by the analog command input.
3	The current loop is driven by the PWM & direction input pins.
4	The current loop is driven by the internal function generator.
5	The current loop is driven by UV commands via PWM inputs.
11	The velocity loop is driven by the programmed velocity value.
12	The velocity loop is driven by the analog command input.
13	The velocity loop is driven by the PWM & direction input pins.
14	The velocity loop is driven by the internal function generator.
21	In servo mode, the position loop is driven by the trajectory generator.
22	In servo mode, the position loop is driven by the analog command input.
23	In servo mode, the position loop is driven by the digital inputs (pulse & direction, master encoder, etc).
24	In servo mode, the position loop is driven by the internal function generator.
25	In servo mode, the position loop is driven by the camming function.
30	In servo mode, the position loop is driven by the CANopen interface.
31	In microstepping mode, the position loop is driven by the trajectory generator.
33	In microstepping mode, the position loop is driven by the digital inputs (pulse & direction, master encoder, etc).
34	In microstepping mode, the position loop is driven by the internal function generator.
35	In microstepping mode, the position loop is driven by the camming function.
40	In microstepping mode, the amplifier is driven by the CANopen interface.
42	Micro-stepping diagnostic mode. The current loop is driven by the programmed current value, and the phase angle is micro-stepped.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x26	0x27	0x426	0x2313	RF	INT16	Analog Command Input Dead Band. Deadband window value applied to the analog command input. Units: mV.
0x27	0x28	0x427	0x60F9:1	RF	INT16	Velocity Loop Proportional Gain (Vp).
0x28	0x29	0x428	0x60F9:2	RF	INT16	Velocity Loop Integral Gain (Vi).
0x29	0x2A	0x429	0x2230	R*	INT32	Limited Velocity. This is the commanded velocity after is passes through the velocity loop limiter and the velocity command filter. Units: 0.1 counts/s.
0x2A	0x2B	0x42A		R*	INT32	Velocity Loop Error. The difference between Limited Velocity (p. 13) and Unfiltered Motor Encoder Velocity (p. 18).
0x2C	0x2D	0x42C	0x606B	R*	INT32	Commanded Velocity. Velocity command, from the position loop or external source, that is the input to the velocity loop limiter. Units: 0.1 counts/s.
			0x60FA			Position Loop Control Effort. CANopen objects 0x60FA and 0x606B hold the same value.
0x2D	0x2E	0x42D	0x60FC	R*	INT32	Limited Position. Also known as Position Commanded. This value is a trajectory generator output that represents the commanded position input to the position control loop. Units: counts.
			0x6062			Position Command. CANopen object 6062 holds the same value as 0x60FC.
0x2E	0x2F	0x42E	0x60F9:3	RF	INT16	Velocity Loop Acceleration Feed Forward. This value is multiplied by the Trajectory Profile Acceleration (p. 14) generated by the trajectory generator and the result is added to the velocity loop output.
0x2F	0x30	0x42F	0x2341	RF	INT32	Programmed Velocity Command. Only used in Programmed Velocity Mode (Desired State [p. 12] = 11) Units: 0.1 counts/s.
0x30	0x31	0x430	0x60FB:1	RF	INT16	Position Loop Proportional Gain (Pp).
0x31	0x32	0x431	0x60F9:4	RF	INT16	Velocity Loop Gain Scaler. Velocity loop output is shifted this many times to arrive at the commanded current value. Positive values result in a right shift while negative values result in a left shift. The shift allows the velocity loop gains to have reasonable values for very high or low resolution encoders. Recommended values for this parameter are 8, 0 or -1.
0x32	0x33	0x432	0x2240	R*	INT32	Actual Motor Position. Also known as Motor Encoder Position. For dual encoder systems this parameter gives the motor encoder position. For single encoder systems, this parameter is a synonym for Actual Position (p. 11). Units: counts.
0x33	0x34	0x433	0x60FB:2	RF	INT16	Position Loop Velocity Feed Forward (Vff). The Vff value is multiplied by the

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
						Trajectory Profile Velocity (p. 14) generated by the trajectory generator. The product is added to the output of the position loop. This gain is scaled by 1/16384. Therefore, setting this gain to 0x4000 (16384) would cause the input velocity to be multiplied by 1.0, and the result added to the output of the position loop.
0x34	0x35	0x434	0x60FB:3	RF	INT16	Position Loop Acceleration Feed Forward (Aff). The Aff value is multiplied by the Trajectory Profile Acceleration (p. 14) generated by the trajectory generator. The product is added to the output of the position loop.
0x35	0x36	0x435	0x60F4	R*	INT32	Following Error. Also known as Position Error. The difference between Actual Position (p. 11) and Limited Position (p. 13). Units: counts.
0x36	0x37	0x436	0x2100	RF	INT32	Velocity Loop Acceleration Limit. Also known as Velocity Loop Maximum Acceleration. Used by the velocity loop limiter. Not used when velocity loop is controlled by the position loop. Units: 1000 counts/s^2.
0x37	0x38	0x437	0x2101	RF	INT32	Velocity Loop Deceleration Limit. Also known as Velocity Loop Maximum Deceleration. Used by the velocity loop limiter. Not used when velocity loop is controlled by the position loop. Units: 1000 counts/s^2.
0x38	0x39	0x438	0x221C	R*	INT16	Actual Motor Current. Units: 0.01 A.
0x39	0x3A	0x439	0x2102	RF	INT32	Velocity Loop Fast Stop Ramp. Also known as Velocity Loop Emergency Stop Deceleration. This value is used during the time that the amplifier is trying to actively stop a motor before applying the brake output. Note that this parameter is not used when the position loop is driving the velocity loop. Units: 1000 counts/s^2.
0x3A	0x3B	0x43A	0x2103	RF	INT32	Velocity Loop Velocity Limit. Also known as Velocity Loop Maximum Velocity. This value is a limit on the commanded velocity used by the velocity loop. Note that this limit is always in effect. Units 0.1 counts/s.
0x3B	0x3C	0x43B	0x2250	R*	INT32	Trajectory Profile Velocity. (Instantaneous Commanded Velocity.) This is a trajectory generator output by which the Position Loop Velocity Feed Forward (p. 13) is multiplied. Units: 0.1 counts/s.
0x3C	0x3D	0x43C	0x2251	R*	INT32	Trajectory Profile Acceleration. Also known as Instantaneous Commanded Acceleration. This is a trajectory generator output by which the Position Loop Acceleration Feed Forward (p. 14) is multiplied. Units: counts/s^2.
0x3D	0x3E	0x43D	0x2122	R*	INT32	Commanded Position. Also known as Trajectory Generator Destination Position.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
						This is the position that the trajectory generator uses as its destination. Units: counts.
0x3E	0x3F	0x43E	0x2104	RF	INT32	Velocity Tracking Window. Also known as Velocity Error Window. If the absolute value of the velocity loop error exceeds this value, then the Velocity Window bit (bit 28) in the Amplifier Event Status Register (p. 26) is set. The Velocity Window bit is cleared only when the velocity error has been within the Velocity Tracking Window for the Velocity Tracking Time (p. 15). Units: 0.1 counts/s.
			0x606D	RF	U16	Velocity Loop Error Window. CANopen Object 0x606D holds the same value as 0x2104. In the Copley Controls implementation, 0x606D and 0x2104 differ only in the data type. Object 0x606D is Unsigned 16 and 0x2104 is Integer 32. Changes made to either CANopen object affect both.
0x3F	0x40	0x43F	0x2105	RF	U16	Velocity Tracking Time. Also known as Velocity Error Window Time. When the absolute velocity error remains below the Velocity Tracking Window for this amount of time, the Velocity Window bit (bit 28) in the Amplifier Event Status Register (p. 26) is cleared. Units: ms.
			0x606E			Velocity Error Window Time. CANopen 0x606E holds the same value as 0x2105.
0x40	0x41	0x440	0x6410:1	F	INT16	Motor Type. The type of motor connected to the amplifier: Value – Description 0 – Rotary motor. 1 – Linear motor.
0x41	0x42	0x441	0x6404	F	S	Motor Manufacturer.
0x42	0x43	0x442	0x6403	F	S	Motor Model.
0x44	0x45	0x444	0x6410:9	F	INT32	Motor Inertia (Mass). Units: Rotary = 0.000001 Kg/cm^2; Linear = 0.0001 Kg.
0x45	0x46	0x445	0x6410:2	F	INT16	Motor Poll Pairs (used only for rotary motors). Number of motor pole pairs (electrical phases) per rotation. For stepper motors, Poll Pairs = (360 deg / Motor deg/step) / 4.
0x46	0x47	0x446	0x6410:16	F	INT16	Motor Brake Type. 0=present, 1=none.
0x47	0x48	0x447	0x6410:15	F	INT16	Motor Temperature Sensor Type. 0=present, 1=none.
0x48	0x49	0x448	0x6410:12	F	INT32	Motor Torque (Force) Constant. Units: Rotary = 0.001 Nm/A; Linear = 0.00001 N.
0x49	0x4A	0x449	0x6410:7	F	INT16	Motor Resistance. Units: 10 mΩ.
0x4A	0x4B	0x44A	0x6410:8	F	INT16	Motor Inductance. Units: 10 μH.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0x4B</td><td>0x4C</td><td>0x44B</td><td>0x6410:13</td><td>F</td><td>INT32</td><td>Motor Peak Torque (Force). Units: Rotary = 0.001 Nm; Linear = 0.00001 N.</td></tr>
<tr><td>0x4C</td><td>0x4D</td><td>0x44C</td><td>0x6410:14</td><td>F</td><td>INT32</td><td>Motor Continuous Torque (Force). Units: Rotary = 0.001 Nm; Linear = 0.00001 N.</td></tr>
<tr><td>0x4D</td><td>0x4E</td><td>0x44D</td><td>0x6410:11</td><td>F</td><td>INT32</td><td>Motor Max Velocity. Units: 0.1 counts/s.</td></tr>
<tr><td>0x4E</td><td>0x4F</td><td>0x44E</td><td>0x6410:3</td><td>F</td><td>INT16</td><td>Motor Wiring. 0=standard, 1= amplifier’s U and V outputs are swapped.</td></tr>
<tr><td>0x4F</td><td>0x50</td><td>0x44F</td><td>0x6410:6</td><td>RF</td><td>INT16</td><td>Motor Hall Offset. Offset angle to be applied to the Hall sensors. Units: degrees.</td></tr>
<tr><td>0x50</td><td>0x51</td><td>0x450</td><td>0x6410:4</td><td>F</td><td>INT16</td><td>Motor Hall Type. The type of Hall effect sensors attached to the motor:
<table>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>No Hall sensors available.</td></tr>
<tr><td>1</td><td>Digital Hall sensors.</td></tr>
<tr><td>2</td><td>Analog Hall sensors.</td></tr>
</table></td></tr>
<tr><td>0x52</td><td>0x53</td><td>0x452</td><td>0x6410:5</td><td>F</td><td>INT16</td><td>Hall Sensor Wiring. Bit-mapped as follows.
NOTE: When analog Halls are used, only bit 8 is relevant.
<table>
<tr><td>Bits</td><td>Description</td></tr>
<tr><td>0-2</td><td>The Hall wiring code (see below).
<table>
<tr><td>Value</td><td>Hall Ordering</td></tr>
<tr><td>0</td><td>U V W</td></tr>
<tr><td>1</td><td>U W V</td></tr>
<tr><td>2</td><td>V U W</td></tr>
<tr><td>3</td><td>V W U</td></tr>
<tr><td>4</td><td>W V U</td></tr>
<tr><td>5</td><td>W U V</td></tr>
<tr><td>6, 7</td><td>Reserved</td></tr>
</table></td></tr>
<tr><td>3</td><td>Reserved.</td></tr>
<tr><td>4</td><td>Invert W Hall input if set. Inversion occurs after Halls wiring is changed by bits 0-2.</td></tr>
<tr><td>5</td><td>Invert V Hall input if set. Inversion occurs after Halls wiring is changed by bits 0-2.</td></tr>
<tr><td>6</td><td>Invert U Hall input if set. Inversion occurs after Halls wiring is changed by bits 0-2.</td></tr>
<tr><td>7</td><td>Reserved.</td></tr>
<tr><td>8</td><td>Swap analog Halls if set.</td></tr>
<tr><td>9-15</td><td>Reserved.</td></tr>
</table></td></tr>
<tr><td>0x53</td><td>0x54</td><td>0x453</td><td>0x6410:17</td><td>F</td><td>INT16</td><td>Brake/Stop Delay Time (CME 2). Also known as Motor Stopping Time (CANopen). When the amplifier is disabled, it will actively decelerate the motor</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
						for this amount of time before activating the brake output. Units: ms.
0x54	0x55	0x454	0x6410:18	F	INT16	Motor Brake Delay Time. After the brake output is activated, the amplifier will stay enabled for this amount of time to allow the brake to engage. Units: ms.
0x55	0x56	0x455	0x6410:19	F	INT32	Brake/Stop Activation Velocity (CME 2). Also known as Motor Brake Velocity (CANopen). During the Brake/Stop Delay Time (p. 16), if the motor's actual velocity falls below this value the brake output is activated immediately. Units: 0.1 counts/s.
0x56	0x57	0x456	0x6410:10	F	INT32	Motor Back EMF Constant. Units: rotary motor: 0.01 V/KRPM; linear motor: 0.01 V/mps.
0x57	0x58	0x457	0x6410:29	F	INT32	Microsteps/Motor Rev. Units: microsteps.
0x59	0x5A	0x459	0x2107	RF	U16	Hall Velocity Mode Shift Value. This parameter is only used in Hall velocity mode. It specifies a left shift value for the position and velocity information calculated in that mode.
0x5A	0x5B	0x45A	0x2241	RF	U16	Multi-mode Port Configuration. The available settings are: Value: Description 0: Output buffered primary encoder (hardware buffering). 1: Configure pins as inputs. 2: Output simulated encoder outputs tracking motor encoder. 3: Output simulated encoder outputs tracking position encoder.
0x5B	0x5C	0x45B	0x6410:32	F	INT32	Position Encoder Resolution. Number of Motor Encoder Units (p. 18) per encoder count. Linear motors only. Units: encoder units/count.
0x5C	0x5D	0x45C	0x6410:31	F	U16	Position Encoder Direction. 0=normal, 1=reverse.
0x5D	0x5E	0x45D	0x6410:30	F	U16	Position Encoder Type. Bit-mapped as follows: Bits: Description 0-2: Encoder type: Value: Encoder Source/Type 0: No position encoder present. 1: Primary incremental quadrature encoder. 2: Analog encoder. 3: Multi-mode port incremental quadrature encoder. 4: Low frequency analog encoder.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
							5 Resolver.
						3	Reserved.
						4	Linear encoder if set, rotary encoder if clear.
						5	Passive load encoder if set, active if clear.
0x5E	0x5F	0x45E	0x2231	R*	INT32	Position Encoder Velocity. In dual encoder systems, this parameter reports the velocity of the position encoder. In single encoder systems, this parameter reports the same value as Actual Motor Velocity parameter. Units: 0.1 counts/s.	
0x5F	0x60	0x45F	0x2106	RF	Octet	Velocity Loop Output Filter Co-Efficients. A bi-quad filter which acts on the output of the velocity loop. See *Velocity Loop Filters* in the *CME 2 User Guide.*	
0x60	0x61	0x460	0x6410:20	F	INT16	Motor Encoder Type:	
						Value	Description
						0	Primary incremental quadrature encoder.
						1	No encoder.
						2	Analog encoder.
						3	Multi-mode port incremental quadrature encoder.
						4	LF analog encoder.
						5	Resolver.
						6	Digital Halls.
						7	Analog encoder, special.
						8	Yaskawa Sigma-Mini SGMM.
						9	Panasonic Minas-A.
0x61	0x62	0x461	0x6410:21	F	INT16	Motor Encoder Units. This value defines the units used to describe linear motor encoders. It is not used with rotary motors.	
						Value	Description
						0	Microns.
						1	Nanometers.
						2	Millimeters.
0x62	0x63	0x462	0x6410:23	F	INT32	Motor Encoder Counts/Rev. Rotary motor only. When a resolver is used as the motor feedback, this parameter sets the resolution of the interpolated position. Units: counts/rev.	
0x63	0x64	0x463	0x6410:24	F	INT16	Motor Encoder Resolution. Linear motor only. Units: encoder units/count.	
0x64	0x65	0x464	0x6410:25	F	INT32	Motor Encoder Electrical Distance. Linear motor only.	

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
						Units: encoder units/electrical cycle.
0x65	0x66	0x465	0x6410:22	F	INT16	Motor Encoder Direction. 0=normal, 1=reverse.
0x66	0x67	0x466	0x6410:26	F	INT32	Reserved.
0x67	0x68	0x467	0x6410:28	F	U16	Analog Encoder Shift Amount. This value gives the number of bits of interpolation to be applied to an analog encoder. The fundamental encoder resolution will be increased by a multiplier of 2^n where n is the value programmed in this parameter. The range of this value is 0 to 8 giving possible multipliers of 1 to 256.
0x68	0x69	0x468	0x2402	R*	INT32	Captured Index Position. Provides the position that the axis was in when an index pulse was captured. Configured by setting bits in the Position Capture Control Register (p. 18), and the status of the captured data can be checked in the Position Capture Status Register (p. 20). Reading this variable resets bits 0 & 3 of the Position Capture Status Register (p. 20). Units: counts.
0x69	0x6A	0x469	0x2232	R*	INT32	Unfiltered Motor Encoder Velocity. Units 0.1 counts/s.
0x6A	0x6B	0x46A	0x2113	RF	INT32	Commanded Current Ramp Rate. Setting this to zero disables slope limiting. Units: mA/s.
0x6B	0x6C	0x46B	0x2108	RF	Octet	Velocity Loop Command Filter Co-Efficients. A bi-quad filter structure that acts on the command input of the velocity loop just after velocity & acceleration limiting. See *Velocity Loop Filters* in the *CME 2 User Guide.*
0x6C	0x6D	0x46C	0x2400	RF	U16	Position Capture Control Register. Sets up position capture features for the encoder index home switch input and high speed position capture input. Bit-mapped as follows:

Bit	Description
0	If set, the Captured Index Position (p. 18) is captured on the falling edge of the index.
1	If set, the Captured Index Position is captured on the rising edge of the index.
2	If set, a Captured Index Position value will not be overwritten by a new position until it has been read. If clear, new positions will overwrite old positions.
3,4	Reserved.
5	If set, Captured Home Position (p. 47) captures falling edges of the home switch input transition; if clear, it captures rising edges.
6	If set, Captured Home Position will not be overwritten by a new position until it has been read. If clear, new positions will overwrite old positions.
8	If set, enable high speed input position capture. The position value is written to Captured

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
							Position for High Speed Position Capture (p. 48).
						9	If set, don't overwrite high speed input capture positions.
						10	If set, a Captured Position for High Speed Position Capture value will not be overwritten by a new position until it has been read. If clear, new positions will overwrite old positions.
						12	Clear actual position on every encoder index pulse.
0x6D	0x6E	0x46D	0x2401	R*	U16	Position Capture Status Register. Shows the current status of the encoder index, home switch, and high speed input capture mechanism. Bit-mapped as follows:	
						Bit	Description
						0	If set, an index position has been captured. Cleared when the captured position is read.
						1,2	Reserved.
						3	If set, a new index transition occurred when a captured position was already stored. The existing Captured Index Position (p. 18) will be overwritten or preserved as programmed in bit 2 of the Position Capture Control Register (p. 18)..
						4	If set, new home switch transition data has been captured.
						5,6	Reserved.
						7	If set, a new home switch input transition occurred when a captured position was already stored. The existing Captured Home Position (p. 47) will be overwritten or preserved as programmed in bit 6 of the Position Capture Control Register.
						8	If set, a new high speed input position has been captured. Cleared when the captured position is read.
						10	If set, high speed input position overflow.
						11	If set, a new high speed input transition occurred when a Captured Position for High Speed Position Capture (p. 48) was already stored. The existing Captured Position for High Speed Position Capture will be overwritten or preserved as programmed in bit 10 of the Position Capture Control Register.
0x6E	0x6F	0x46E	0x6410:34	F	U16	Number of Resolver Cycles/Motor Rev. This parameter is only used with resolver feedback devices.	
0x6F	0x70	0x46F	0x2140	RF	U16	PWM Mode and Status. This bit-mapped register allows some details of the PWM output to be controlled and monitored.	
						Bit	Description
						0	Force bus clamping if set, disable bus clamping if clear. If bit 1 is set, then this bit is ignored.
						1	Automatic bus clamping mode if set. Setting this bit causes bus clamping mode to be automatically selected based on the output voltage. Bit 0 is ignored if this bit is set.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td><table>
<tr><td>3</td><td>Factory reserved. If set, DBrk mode is enabled.</td></tr>
<tr><td>4</td><td>Use hex voltage limiting if set, circular limiting if clear. This setting is only used with brushless motors.</td></tr>
<tr><td>8</td><td>Status bit, set when bus clamping is active</td></tr>
</table></td></tr>
<tr><td>0x70</td><td>0x71</td><td>0x470</td><td>0x2193:1</td><td>RF</td><td>see text</td><td>Output 1 Configuration.
Data type is dependent on configuration and uses 1 to 5 words.
The first word is a bit-mapped configuration value. The remaining words give additional parameter data used by the output pin. Typically the second and third words are used as a 32-bit bit mask to identify which bit(s) in the status register the output should follow. If any of the selected bits in the status register are set, then the output will go active. If none of the selected bits are set then the output will be inactive.
Output pin 0 (OUT1) may be programmed as a sync output for use in synchronizing multiple amplifiers. In this configuration, the first word of this variable should be set to 0x0200 (i.e. only bit 9 is set), and the remaining words should be set to zero. Note that only output pin #0 has this feature. Attempting to program any other output pin as a sync output will have no effect.
Here is the bit mapping of the first word:<table>
<tr><td>Bits</td><td>Configuration</td></tr>
<tr><td>0-2</td><td>Define which internal register drives the output. The acceptable values for these bits are as follows:<table>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Words 2 and 3 are used as a mask of the Amplifier Event Status Register (p. 26). When any bit set in the mask is also set in the Amplifier Event Status Register, the output goes active.</td></tr>
<tr><td>1</td><td>Words 2 and 3 are used as a mask of the amplifier's Latched Event Status Register (p. 27). When any bit set in the mask is also set in the Latched Event Status Register, the output goes active and remains active until the necessary bit in the Latched Event Status Register is cleared.</td></tr>
<tr><td>2</td><td>Puts the output in manual mode. Additional words are not used in this mode, and the output's state follows the value programmed in the parameter Output States And Program Control (p. 32).</td></tr>
<tr><td>3</td><td>Words 2 and 3 are used as a mask of the Trajectory Status Register (p. 40). When any bit set in the mask is also set in the Trajectory Status Register the output goes active.</td></tr>
</table></td></tr>
</table></td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description		
							4	Output goes active if the axis position is between the low position specified in words 2 and 3 (bits 16-47) and the high position specified in words 4 and 5 (bits 48-80).
							5	Output goes active if the actual axis position crosses, with a low to high transition; the position specified in words 2 and 3 (bits 16-47). The output will stay active for number of ms specified in words 4 and 5 (bits 48-80).
							6	Same as 5 but for a high to low crossing.
							7	Same as 5 but for any crossing.
						3-7	Reserved for future use.	
						8	If set, the output is active low. If clear, the output is active high.	
						9-15	Reserved for future use.	
0x71	0x72	0x471	0x2193:2	RF	U48	Output 2 Configuration. See Output 1 Configuration (p. 21).		
0x72	0x73	0x472	0x 2193:3	RF	U48	Output 3 Configuration. See Output 1 Configuration (p. 21).		
0x73	0x74	0x473	0x 2193:4	RF	U48	Output 4 Configuration. See Output 1 Configuration (p. 21).		
0x74	0x75	0x474	0x 2193:5	RF	U48	Output 5 Configuration. See Output 1 Configuration (p. 21).		
0x75	0x76	0x475	0x 2193:6	RF	U48	Output 6 Configuration. See Output 1 Configuration (p. 21).		
0x76	0x77	0x476	0x 2193:7	RF	U48	Output 7 Configuration. See Output 1 Configuration (p. 21).		
0x77	0x78	0x477	0x 2193:8	RF	U48	Output 8 Configuration. See Output 1 Configuration (p. 21).		
0x78	0x79	0x478	0x 2192:1	RF	U16	Input 1 Configuration. Assigns a function to the input pin. All values not listed below are reserved for future use.		
						Value	Function	
						0	No function	
						1	Reserved for future use (no function)	
						2	Reset the amplifier on the rising edge of the input.	
						3	Reset the amplifier on the falling edge of the input.	
						4	Positive side limit switch. Active high.	
						5	Positive side limit switch. Active low.	
						6	Negative side limit switch. Active high.	
						7	Negative side limit switch. Active low.	
						8	Motor temperature sensor. Active high.	
						9	Motor temperature sensor. Active low.	

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
						10	Disable amplifier when high. Clear latched faults on any transition.
						11	Disable amplifier when low. Clear latched faults on any transition.
						12	Reset on rising edge. Disable amplifier when high.
						13	Reset on falling edge. Disable amplifier when low.
						14	Home switch. Active high.
						15	Home switch. Active low.
						16	Disable amplifier when high.
						17	Disable amplifier when low.
						19	PWM synchronization. Only for high speed inputs; see amplifier data sheet.
						20	Halt motor and prevent a new trajectory when high.
						21	Halt motor and prevent a new trajectory when low.
						22	High resolution analog divide when high.
						23	High resolution analog divide when low.
						24	High speed position capture on rising edge. Only for high speed inputs.
						25	High speed position capture on falling edge. Only for high speed inputs.
						26	Count pulses on rising edge. Note: Upper byte of this parameter designates which Indexer register to store the count in.
						27	Count pulses on falling edge. Note: Upper byte of this parameter designates which Indexer register to store the count in.
0x79	0x7A	0x479	0x 2192:2	RF	U16	Input 2 Configuration. See Input 1 Configuration (p. 22).	
0x7A	0x7B	0x47A	0x 2192:3	RF	U16	Input 3 Configuration. See Input 1 Configuration (p. 22).	
0x7B	0x7C	0x47B	0x 2192:4	RF	U16	Input 4 Configuration. See Input 1 Configuration (p. 22).	
0x7C	0x7D	0x47C	0x 2192:5	RF	U16	Input 5 Configuration. See Input 1 Configuration (p. 22).	
0x7D	0x7E	0x47D	0x 2192:6	RF	U16	Input 6 Configuration. See Input 1 Configuration (p. 22).	
0x7E	0x7F	0x47E	0x 2192:7	RF	U16	Input 7 Configuration. See Input 1 Configuration (p. 22).	
0x7F	0x80	0x47F	0x 2192:8	RF	U16	Input 8 Configuration. See Input 1 Configuration (p. 22).	
0x80	0x81	0x480	0x6503	F*	String	Amplifier Model Number.	
0x81	0x82	0x481	0x6510:1	F*	INT32	Amplifier Serial Number.	
			0x1018:4		U32	Amplifier Serial Number. CANopen 0x1018:4 holds the same value as 0x6510:1.	
0x82	0x83	0x482	0x6510:3	F*	INT16	Amplifier Peak Current. Units: 0.01 A.	

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x83	0x84	0x483	0x6510:4	F*	INT16	Amplifier Continuous Current. Units: 0.01 A.
0x84	0x85	0x484	0x6510:14	F*	INT16	Amplifier Current Corresponding to Max A/D Reading. Units: 0.01 A.
0x85	0x86	0x485	0x6510:11	F*	INT16	Amplifier PWM Period. Units: 10 ns.
0x86	0x87	0x486	0x6510:12	F*	INT16	Amplifier Servo Period (PWM periods). Servo loop update period as a multiple of the current loop period.
0x87	0x88	0x487		F*	INT16	Amplifier Product Family. Identifies the amplifier product family. For specific amplifier hardware type, see Amplifier Hardware Type (p. 33).
0x88	0x89	0x488	0x6510:5	F*	INT16	Amplifier Time At Peak Current. The maximum time for which the amplifier is rated to output peak current. Units: ms.
0x89	0x8A	0x489	0x6510:6	F*	INT16	Amplifier Maximum Voltage. Maximum bus voltage rating. Units: 0.1 V.
0x8A	0x8B	0x48A	0x6510:15	F*	INT16	Amplifier Voltage Corresponding To Max A/D Reading. Units: 0.1 V.
0x8B	0x8C	0x48B	0x6510:7	F*	INT16	Amplifier Minimum Voltage. Minimum bus voltage rating. Units: 0.1 V.
0x8C	0x8D	0x48C	0x6510:9	F*	INT16	Amplifier Maximum Temperature. Units: degrees C.
0x8D	0x8E	0x48D	0x6510:2	F*	String	Amplifier Date Code. The date of manufacture of the amplifier.
0x8E	0x8F	0x48E	0x6510:16	F*	INT16	Amplifier Analog Input Scaling Factor.
0x90	0x91	0x490		R	INT32	Serial Port Baud Rate. Units: bits/s. Defaults to 9600 at reset.
0x91	0x92	0x491		R*	INT16	Maximum Number Of Data Words/Command (MAX_DATA). The maximum number of data words allowed per command over the serial interface.
0x92	0x93	0x492	0x21A0	F	String	Amplifier Name. This object can assign an optional name to an amplifier. The data written here is stored to flash memory and is not used by the amplifier. Although this object is documented as holding a string (i.e. ASCII data), any values may be written here. Up to 40 bytes are stored.
0x94	0x95	0x494	0x6510:24	R*	U16	Firmware Version Number. The version number consists of a major and a minor version number. The minor number is passed in bits 0-7; the major number is in bits 8-15. For example, the version 1.12 would be encoded 0x010C.
0x95	0x96	0x495	0x2421	F		Host Configuration State. Reserved for use by CME 2 software.
0x96	0x97	0x496	0x2312	RF	U16	Calibration Offset For Analog Reference. This voltage is added to the analog command input. It is factory-calibrated to give a zero reading for zero input voltage.
0x97	0x98	0x497	0x6510:10	F*	INT16	Hysteresis Value For Amplifier Over Temperature Cut-Out. Units: degrees C.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0x98</td><td>0x99</td><td>0x498</td><td>0x2330</td><td>RF</td><td>U16</td><td>Function Generator Configuration. Configures the amplifier’s internal function generator, which can drive the current, velocity, or position loop. Bit-mapped:
<table>
<tr><td>Bits</td><td>Description</td></tr>
<tr><td>0-1</td><td>Function code (type of waveform to generate):
<table>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>None (disabled).</td></tr>
<tr><td>1</td><td>Square wave.</td></tr>
<tr><td>2</td><td>Sine wave.</td></tr>
</table></td></tr>
<tr><td>2-11</td><td>Reserved for future use.</td></tr>
<tr><td>12</td><td>One-shot mode. If bit 12 is set and bit 13 is clear, the function code is reset to zero (disabled) after one complete waveform. If bits 12 and 13 are both set, the function code is reset to zero after two waveforms.</td></tr>
<tr><td>13</td><td>Invert every other waveform if set.</td></tr>
<tr><td>14-15</td><td>Reserved for future use.</td></tr>
</table>
Note that the amplifier is placed under control of the function generator by setting Desired State (p. 12) to one of the following values:
4 (function generator drives current loop);
14 (function generator drives velocity loop);
24 (function generator drives position loop in servo mode);
34 (function generator drives position loop in stepper mode).</td></tr>
<tr><td>0x99</td><td>0x9A</td><td>0x499</td><td>0x2331</td><td>RF</td><td>INT16</td><td>Function Generator Frequency. Units: Hz.</td></tr>
<tr><td>0x9A</td><td>0x9B</td><td>0x49A</td><td>0x2332</td><td>RF</td><td>INT32</td><td>Function Generator Amplitude. The amplitude of the signal generated by the internal function generator. The units depend on the servo operating mode:
<table>
<tr><td>Mode</td><td>Units</td></tr>
<tr><td>Current</td><td>0.01 A.</td></tr>
<tr><td>Velocity</td><td>0.1 counts/s.</td></tr>
<tr><td>Position</td><td>Counts.</td></tr>
</table></td></tr>
<tr><td>0x9B</td><td>0x9C</td><td>0x49B</td><td>0x2333</td><td>RF</td><td>INT16</td><td>Function Generator Duty Cycle (square wave only).
Units: 0.1% (for instance, 1000 for 100%).</td></tr>
<tr><td>0x9C</td><td>0x9D</td><td>0x49C</td><td>0x6510:8</td><td>F*</td><td>INT16</td><td>Hysteresis For Maximum Bus Voltage Cut-Out. Units: 0.1 V.</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x9D	0x9E	0x49D	0x6510:18	F*	INT16	PWM Dead Time At Continuous Current Limit. This fixed amplifier parameter gives the PWM dead time used at or above the continuous current limit. The dead time below the continuous current limit is a linear function of this parameter and PWM Dead Time At Zero Current (p. 26). Units: CPU cycles.
0x9E	0x9F	0x49E	0x6510:17	F*	INT16	Amplifier Minimum PWM Off Time. This fixed amplifier parameter gives the minimum amount of time for which all PWM outputs must be disabled for each current loop cycle. Units: 10 ns.
0x9F	0xA0	0x49F	0x6510:19	F*	INT16	PWM Dead Time At Zero Current. This fixed amplifier parameter gives the PWM dead time at zero current. The dead time above zero current is defined by a linear function of this parameter and parameter PWM Dead Time At Continuous Current Limit (p. 26). Units: CPU cycles.
0xA0	0xA1	0x4A0	0x1002	R*	U32	Amplifier Event Status Register. Bit-mapped:

Bits	Description
0	Short circuit detected.
1	Amplifier over temperature.
2	Over voltage.
3	Under voltage.
4	Motor temperature sensor active.
5	Encoder feedback error.
6	Motor phasing error.
7	Current output limited.
8	Voltage output limited.
9	Positive limit switch active.
10	Negative limit switch active.
11	Enable input not active.
12	Amplifier is disabled by software.
13	Trying to stop motor.
14	Motor brake activated.
15	PWM outputs disabled.
16	Positive software limit condition.
17	Negative software limit condition.
18	Tracking error.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
						19	Tracking warning.
						20	Amplifier is currently in a reset condition.
						21	Position has wrapped. The Position variable cannot increase indefinitely. After reaching a certain value the variable rolls back. This type of counting is called position wrapping or modulo count.
						22	Amplifier fault. An amplifier fault that was configured as latching has occurred. For information on latching faults, see the CME 2 User Guide.
						23	Velocity limit has been reached.
						24	Acceleration limit has been reached.
						25	Tracking Window. Following Error (p. 14) is outside of Position Tracking Error Limit.
						26	Home switch is active.
						27	Set if trajectory is running or motor has not yet settled into position (within Position Tracking Error Limit) at the end of the move. Once the position has settled, the in motion bit won't be set until the next move starts.
						28	Velocity window. Set if the absolute velocity error exceeds the velocity window value.
						29	Phase not yet initialized. If the amplifier is phasing with no Halls, this bit is set until the amplifier has initialized its phase.
						30	Command fault.
						31	Not defined.
0xA1	0xA2	0x4A1	0x2181	R	U32	Latched Event Status Register. This is a latched version of the Amplifier Event Status Register (p. 26). Bits are set by the amplifier when events occur. Bits are only cleared by a set command. When writing to the Latched Event Status Register, any bit set in the written value will cause the corresponding bit in the register to be cleared. For example, to clear the short circuit detected bit, write a 1 to the register. To clear all bits, write 0xFFFFFFFF to the register.	
0xA2	0xA3	0x4A2	0x2261	R*	INT16	Hall Input State. The lower three bits of the returned value give the present state of the Hall input pins. The Hall state is the value of the Hall lines AFTER the ordering and inversions specified in the Hall wiring configuration have been applied.	

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0xA4</td><td>0xA5</td><td>0x4A4</td><td>0x2183</td><td>R</td><td>U32</td><td>Latching Fault Status Register. Bit-mapped to show which latching faults have occurred in the amplifier. When a latching fault has occurred, the fault bit (bit 22) of the Amplifier Event Status Register (p. 26) is set. The cause of the fault can be read from this register.
To clear a fault condition, write a 1 to the associated bit in this register. The events that cause the amplifier to latch a fault are programmable. See Fault Mask (p. 29) for details.
<table>
<tr><th colspan="2">Latched Faults</th></tr>
<tr><td>Bit</td><td>Fault Description</td></tr>
<tr><td>0</td><td>Data flash CRC failure. This fault is considered fatal and cannot be cleared.</td></tr>
<tr><td>1</td><td>Amplifier internal error. This fault is considered fatal and cannot be cleared.</td></tr>
<tr><td>2</td><td>Short circuit.</td></tr>
<tr><td>3</td><td>Amplifier over temperature.</td></tr>
<tr><td>4</td><td>Motor over temperature.</td></tr>
<tr><td>5</td><td>Over voltage.</td></tr>
<tr><td>6</td><td>Under voltage.</td></tr>
<tr><td>7</td><td>Feedback fault.</td></tr>
<tr><td>8</td><td>Phasing error.</td></tr>
<tr><td>9</td><td>Tracking error.</td></tr>
<tr><td>10</td><td>Over Current,</td></tr>
<tr><td>11</td><td>FPGA failure.</td></tr>
<tr><td>12</td><td>Command input lost.</td></tr>
<tr><td>13-31</td><td>Reserved.</td></tr>
</table></td></tr>
<tr><td>0xA5</td><td>0xA6</td><td>0x4A5</td><td>0x2191</td><td>RF</td><td>U16</td><td>Input Pin Configuration Register. Some amplifiers have one or more pull-up resistors associated with their general-purpose input pins. On these amplifiers, the state of the pull-ups can be controlled by writing to this register.
This register has one bit for each pull-up resistor available on the amplifier. Setting the bit causes the resistor to pull any inputs connected to it up to the high state when they are not connected. Bits 0 – 7 of this register are used to control pull-up resistor states. Each bit represents an input number. Bit 0 = IN1, bit 1 = IN2, etc.
On amplifiers that allow groups of inputs to be configured as either single ended or differential, bit 8 controls this feature. Set bit 8 to 0 for single ended, 1 for differential.</td></tr>
</table>

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0xA6</td><td>0xA7</td><td>0x4A6</td><td>0x2190</td><td>R*</td><td>U16</td><td>Input Pin States. The 16-bit value returned by this command gives the current state (high/low) of the amplifier’s input pins after debouncing. The inputs are returned one per bit as shown below.
<table>
<tr><th>Bits</th><th>Description</th></tr>
<tr><td>0</td><td>Input 1.</td></tr>
<tr><td>1</td><td>Input 2.</td></tr>
<tr><td>2</td><td>Input 3.</td></tr>
<tr><td>3</td><td>Input 4.</td></tr>
<tr><td>4</td><td>Input 5.</td></tr>
<tr><td>5</td><td>Input 6.</td></tr>
<tr><td>6</td><td>Input 7.</td></tr>
<tr><td>7</td><td>Input 8.</td></tr>
<tr><td>8</td><td>Input 9.</td></tr>
<tr><td>9</td><td>Input 10.</td></tr>
<tr><td>10</td><td>Input 11.</td></tr>
<tr><td>11</td><td>Input 12.</td></tr>
<tr><td>12</td><td>Input 13.</td></tr>
<tr><td>13</td><td>Input 14.</td></tr>
<tr><td>14</td><td>Input 15.</td></tr>
<tr><td>15</td><td>Input 16.</td></tr>
</table></td></tr>
<tr><td>0xA7</td><td>0xA8</td><td>0x4A7</td><td>0x2182</td><td>RF</td><td>U32</td><td>Fault Mask. This variable is used to configure which amplifier events cause latching faults.
Setting a fault mask bit to 1 causes the associated amplifier event to cause a latching fault when it occurs. Setting a fault mask bit to 0 disables fault latching on the associated event.
Latched faults may be cleared using the Latching Fault Status Register (p. 28).
<table>
<tr><th>Bit</th><th>Fault Description</th></tr>
<tr><td>0</td><td>Data flash CRC failure. This bit is read-only and will always be set.
If the amplifier detects corrupted flash data values on startup it will remain disabled and indicate a fault condition.</td></tr>
<tr><td>1</td><td>Amplifier internal error. This bit is read-only and will always be set.
If the amplifier fails its power-on self-test, it will remain disabled and indicate a fault condition.</td></tr>
</table></td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
						2	Short circuit. If set: programs the amplifier to latch a fault condition when a short circuit is detected on the motor outputs. If clear: programs the amplifier to disable its outputs for 100 ms after a short circuit and then re-enable.
						3	Amplifier over temperature. If set: programs the amplifier to latch a fault condition when an amplifier over temperature event happens. If clear: programs the amplifier to re-enable as soon as it cools sufficiently from an over temperature event.
						4	Motor over temperature. If set: programs the amplifier to latch a fault condition when a motor temperature sensor input activates. If Clear: programs the amplifier to re-enable as soon as the over temperature input becomes inactive.
						5	Over voltage. If set: programs the amplifier to latch a fault condition when excessive bus voltage is detected. If Clear: programs the amplifier to re-enable as soon as the bus voltage is within normal range.
						6	Under voltage. If set: programs the amplifier to latch a fault condition when inadequate bus voltage is detected. If Clear: programs the amplifier to re-enable as soon as the bus voltage is within normal range.
						7	Feedback fault. If set: programs the amplifier to latch a fault when feedback faults occur. Feedback faults occur if too much current is drawn from the 5 V source on the amplifier, a resolver or analog encoder is disconnected, or a resolver or analog encoder has levels out of tolerance.
						8	Phasing error. If set: programs the amplifier to latch a fault when phasing errors occur. If clear: programs the amplifier to re-enable when the phasing error is removed.
						9	Tracking error. If set: programs the amplifier to latch in the disabled state when a tracking error occurs. If clear: programs the amplifier to abort the current move and remain enabled when a tracking error occurs.
						10	If set: programs the amplifier to latch a fault when output current is limited by the I^2T algorithm.
						11	FPGA failure. This bit is read-only and will always be set.
						12	Command input lost fault. If set: programs the amplifier to latch in the disabled state when the command input is lost. This fault is currently only available on special amplifiers.
						13-31	Reserved

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xA8	0xA9	0x4A8	0x2320	RF	U16	Digital Input Command Configuration. Defines the configuration of the digital input commands when the amplifier is running in a mode that uses them as a control source. The lower 8 bits control the PWM input configuration for controlling current and velocity modes. The upper 8 bits configure the digital inputs when running in position mode.

Bits	Description	
0	If set, use PWM in signed/magnitude mode. If clear, use PWM in 50% duty cycle offset mode.	
1	Invert the PWM input if set.	
2	Invert the sign bit if set.	
3	Allow 100% duty cycle if set. If clear, treat 100% duty cycle as a zero command, providing a measure of safety in case of controller failure or cable break.	
4-7	Reserved for future use.	
8-9	Input pin interpretation for position mode (see below).	
	Value	Description
	0	Step & Direction mode.
	1	Separate up & down counters.
	2	Quadrature encoder input.
10-11	Reserved for future use.	
12	Count falling edges if set, rising edges if clear.	
13	Invert command signal.	
14-15	Selects source of digital position input command.	
	Value	Description
	0	Single ended high speed inputs.
	1	Multi-mode encoder port.
	2	Differential high speed inputs.
	3	Motor encoder port.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xA9	0xAA	0x4A9	0x2321	RF	INT32	Digital Command Input Scaling Factor. This value gives the amount of current to command at 100% PWM input. The scaling depends on what the PWM input is driving: Current mode: 0.01 A Velocity (Junus): 0.01 RPM Velocity (Accelus): 0.1 counts/s In position mode the scaling factor is a ratio of two 16-bit values. The first word passed gives the numerator and the second word gives the denominator. This ratio determines the number of encoder units moved for each pulse (or encoder count) input. For example, a ratio of 1/3 would cause the motor to move 1 encoder unit for every three input steps.
0xAA	0xAB	0x4AA	0x2196	R*	U16	Raw Input State. The 16-bit value returned by this command gives the current state (high/low) of the amplifier's input pins. Unlike Input Pin States (p. 29), no debounce is applied when reading the inputs using this variable. The bits are mapped in the same order as Input Pin States (p. 29).
0xAB	0xAC	0x4AB	0x2194	R	U16	Output States And Program Control. When read, this parameter gives the active/inactive state of the amplifier's general-purpose digital outputs. Each bit represents an input number. Bit 0 = digital output 1 (OUT1), bit 1 = OUT2, etc., up to OUT*n*, the number of digital outputs on the amplifier. Additional bits are ignored. Outputs that have been configured for program control can be set by writing to this parameter. Set a bit to activate the output. It will be activated high or low according to how it was programmed. Clear a bit to make the output inactive. If an output was not configured for program control it will not affected.
0xAC	0xAD	0x4AC	0x2180	R*	U32	Sticky Amplifier Event Status Register. This read-only parameter is bit-mapped in exactly the same way as the Amplifier Event Status Register (p. 26), but instead of giving the present status of the amplifier, the sticky version indicates any bits in the event status that have been set since the last reading of the sticky register. The sticky register is similar to the Latched Event Status Register (p. 27), but the latched register must be cleared explicitly, whereas the sticky register is cleared automatically each time it is read.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description	
0xAD	0xAE	0x4AD	0x1018:2	F*	U32	Amplifier Hardware Type. Also known as Product Code. Identifies the specific amplifier model. This is an augmented version of Amplifier Product Family (p. 24).	
						Value	Product
						0x0000	ASC: Accelus Card.
						0x0002	ASP: Accelus Panel.
						0x0100	JSP: Junus Panel.
						0x0200	ACM: Accelnet Module.
						0x0201	XSL: Xenus Panel (obsolete).
						0x0203	ACP: Accelnet Panel (obsolete).
						0x0206	XSL-R: Xenus Panel, resolver version.
						0x0207	XSL: Xenus Panel.
						0x0209	ACJ: Accelnet Micro Panel.
						0x020b	ACP: Accelnet Panel.
						0x020c	ACK: Accelnet Micro Module.
						0x020e	Special.
						0x020f	Special.
						0x0210	ACJ-S: Accelnet Micro Panel, analog encoder version.
						0x0240	STM: Stepnet Module.
						0x0242	STP: Stepnet Panel.
						0x0243	STL: Stepnet Micro Module.
						0x0300	ASP: Accelnet Panel, dual axis.
						0x0310	XSJ(S): Xenus Micro Panel.
						0x0320	XTL: Xenus Panel, resolver version.
						0x0330	XTL(S): Xenus Panel.
						0x0340	XSJ-R: Xenus Micro Panel, resolver version
						0x0380	AEP: Accelnet EtherCat Panel.
						0x0390	AMP: Accelnet Macro Panel.
						0x0350	STX: Stepnet AC Panel
						0x03a0	ADP: Accelnet Panel
			0x6510:13		INT16	Amplifier Hardware Type. CANopen 0x6510:13 and 0x1018:2 are identical.	

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xAE	0xAF	0x4AE	0x60F6:3	RF	INT16	Current Loop Offset. This value is added to the commanded motor current. It can compensate for a directional bias affecting the current loop. Units: 0.01 A.
0xAF	0xB0	0x4AF	0x2420	RF	U32	Miscellaneous Amplifier Options Register. Bit-mapped as follows: Bit: Option 0: If set, input pins 1, 2, and 3 are pulled high on the amplifier. If clear the pins are not pulled up. This option is only available on the Junus amplifier. 1: Reserved. 2: If set, limit switch inputs will only abort a trajectory in progress, but will not affect current output. If clear, limit switches limit current. 3-31: Reserved.
0xB0	0xB1	0x4B0	0x2260	R	INT16	Motor Phase Angle. Writes are only useful when running in diagnostic micro-stepping mode. Units: degrees.
0xB1	0xB2	0x4B1	0x21C1	RF	INT16	Increment Rate For Phase Angle When In Micro Stepping Mode. Only used in diagnostic micro-stepping mode. Desired State (p. 12) = 42 (microstepping mode). Units: degrees/s.
0xB2	0xB3	0x4B2	0x21C0	RF	U16	Commutation Mode. Also known as Phasing Mode. Controls the mechanism used by the amplifier to compute the motor phasing angle. Determines what inputs the amplifier uses to initialize and maintain the phase angle, as follows: Value: Mode 0: Standard mode. Encoder-based sinusoidal commutation for brushless motors. Use digital Hall inputs to initialize phase, then switch to an encoder to maintain phase. The encoder is the primary sensing device with the Hall effect sensors used to monitor and adjust the phase angle as necessary during operation. 1: Trapezoidal (Hall based) phasing. The Hall sensors are used for phasing all the time. This mode can be used if no encoder is available. 2: Like mode 0 except that the phase angle is not adjusted based on the Hall inputs. Hall sensors are still required to initialize the phase angle at startup. 3: Analog Halls (90 degrees). Only available on amplifiers with the necessary analog Hall inputs. 4: DC brush motor mode. 5: Algorithmic Phase Initialization mode (wake & wiggle, no Halls). See the *CME 2 User Guide* for more information on Algorithmic Phase Initialization. 6: Encoder based phasing. Use with resolver or Servo-Tube motors. 7: Trapezoidal commutation with phase angle interpolation.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xB3	0xB4	0x4B3	0x6510:23	F*	INT16	Analog Encoder Scaling Factor. This parameter selects the resolution of an analog encoder input. The parameter is not used for other encoder types.
0xB4	0xB5	0x4B4	0x2263	R*	INT16	Encoder Phase Angle. For feedback types, such as resolver, that can also calculate phase angle information. This parameter allows the phase information to be read directly.
0xB5	0xB6	0x4B5	0x2353	R*	INT32	Homing Adjustment. This parameter is updated after each successful homing operation. The value it contains is the size of the actual position adjustment made in the last home sequence. Units: counts.
0xB6	0xB7	0x4B6	0x2322	RF	U16	PWM Input Frequency. This is the frequency of the PWM for use in UV commutation mode only. Units: 10 Hz.
0xB7	0xB8	0x4B7	0x2141	R*	U32	System Time. Time since start up. Units: ms.
0xB8	0xB9	0x4B8	0x607D:2	RF	INT32	Positive Software Limit. This parameter is only available on amplifiers that support trajectory generation and homing. Software limits are only in effect after the amplifier has been referenced (i.e. homing has been successfully completed). Set to less than negative software limit to disable. Units: counts.
0xB9	0xBA	0x4B9	0x607D:1	RF	INT32	Negative Software Limit. Software limits are only in effect after the amplifier has been referenced (i.e. homing has been successfully completed). Set to greater than positive software limit to disable. Units: counts.
0xBA	0xBB	0x4BA	0x2120	RF	INT32	Position Tracking Error Limit. If the Following Error (p. 14) exceeds this value then the tracking error bit (bit 18) of the Amplifier Event Status Register (p. 26) is set and the motor is stopped. Using Fault Mask (p. 29), the tracking error event can be configured to either disable the amplifier immediately, or abort the present move and continue holding position.
0xBB	0xBC	0x4BB	0x6065	RF	U32	Position Tracking Warning Limit. If the Following Error (p. 14) exceeds this value then the tracking warning bit (bit 19) of the Amplifier Event Status Register (p. 26) is set. Units: counts.
0xBC	0xBD	0x4BC	0x6067	RF	U32	Position Tracking Window Limit. If the Following Error (p. 14) exceeds this value then the tracking window bit (bit 25) of the Amplifier Event Status Register (p. 26) is set. Units: counts.
0xBD	0xBE	0x4BD	0x6068	RF	U16	Time Delay For Position Tracking Error Limit. The tracking window bit (bit 25) of the Amplifier Event Status Register (p. 26) will not be cleared until the Following Error (p. 14) has been within the Position Tracking Error Limit for at least this long. Units: ms.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th colspan="3">Description</th></tr>
<tr><td>0xBE</td><td>0xBF</td><td>0x4BE</td><td>0x2253</td><td>RF</td><td>U32</td><td colspan="3">Software Limit Deceleration. The deceleration rate used stop a motor when approaching a software limit. Units: 10 counts/s^2.</td></tr>
<tr><td>0xBF</td><td>0xC0</td><td>0x4BF</td><td>0x2351</td><td>RF</td><td>U16</td><td colspan="3">Homing Current Delay Time (used with home to hard stop mode only).
Units: ms.</td></tr>
<tr><td>0xC0</td><td>0xC1</td><td>0x4C0</td><td></td><td>R*</td><td>U16</td><td colspan="3">Network Node ID. This is the amplifier's present ID as read at system startup. The node ID is only read at system startup, so this value will not change unless the amplifier is reset. See Network Node ID Configuration (p. 36).</td></tr>
<tr><td rowspan="10">0xC1</td><td rowspan="10">0xC2</td><td rowspan="10">0x4C1</td><td rowspan="10">0x21B0</td><td rowspan="10">RF</td><td rowspan="10">U16</td><td colspan="3">Network Node ID Configuration. Defines how an amplifier's node ID is calculated, and specifies the amplifier's network bit rate.
The ID is calculated at startup (and only at startup) using a combination of general-purpose input pins and a programmed offset value. On certain models, an address switch is also used. The resulting value is clipped to a 7-bit ID in the range 0 to 127. The configuration parameter is bit-mapped as follows:</td></tr>
<tr><td>0-6</td><td colspan="2">Give the node ID offset value that will be added to the value read from the input pins and address selector switch.</td></tr>
<tr><td>7</td><td colspan="2">Used only on DeviceNet firmware. If this bit is set, then the drive will be software disabled on startup and will remain disabled until it is enabled by a DeviceNet I/O message with the enable bit set.</td></tr>
<tr><td>8-10</td><td colspan="2">Number of input pins (0-7) to read on startup for the node ID value. If input pins are used (i.e., the value in bits 8-10 is not zero), the inputs can be mapped to node ID bits through the parameter Input Pin Mapping For Node ID Selection (p. 45).</td></tr>
<tr><td>11</td><td colspan="2">This bit is ignored on amplifiers that do not have an address switch.
On amplifiers with an address switch, setting this bit programs the amplifier to use the address selector switch as part of the address calculation. In this case, the node ID value is equal to the sum of:
▪ The value read from the designated input pins, shifted up 4 bits.
▪ The address switch value.
▪ The programmed offset value.
Note that since the node ID is always clipped to the lowest 7 bits, no more than 3 input pins will ever have an effect on the node address when the address switch is used.</td></tr>
<tr><td rowspan="4">12-15</td><td colspan="2">Network bit rate setting:</td></tr>
<tr><td>Value</td><td>Bit Rate (bits/s)</td></tr>
<tr><td>0</td><td>1,000,000.</td></tr>
<tr><td>1</td><td>800,000.</td></tr>
</table>

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th colspan="3">Description</th></tr>
<tr><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td>2</td><td>500,000.</td></tr>
<tr><td>3</td><td>250,000.</td></tr>
<tr><td>4</td><td>125,000.</td></tr>
<tr><td>5</td><td>50,000.</td></tr>
<tr><td>6</td><td>20,000.</td></tr>
<tr><td>7-15</td><td>Reserved for future use</td></tr>
<tr><td rowspan="13">0xC2</td><td rowspan="13">0xC3</td><td rowspan="13">0x4C2</td><td rowspan="13">0x2352</td><td rowspan="13">RF</td><td rowspan="13">U16</td><td colspan="3">Homing Method Configuration. This variable is bit-mapped as follows:</td></tr>
<tr><td>Bits</td><td colspan="2">Description</td></tr>
<tr><td rowspan="7">0-3</td><td colspan="2">Home function.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>If bit 5 is not set, then just set the current position as home. If bit 5 is set, then move in the direction specified by bit 4 and set the location of the first index pulse as home. Bit 6 is not used in this mode.</td></tr>
<tr><td>1</td><td>Move in the direction specified by bit 4 until a limit switch is encountered. Then move in the other direction out of limit. If bit 5 is clear, then the edge location is home. If bit 5 is set, then the next index pulse is home. Bit 6 not used in this mode.</td></tr>
<tr><td>2</td><td>Home on a constant home switch. The initial move is made in the direction specified by bit 4. When the home switch is encountered, the direction is reversed. The edge of the home switch is set as home if bit 5 is clear. If bit 5 is set, then an index pulse is used as the home position. Bit 6 is used to define which index pulse is used.</td></tr>
<tr><td>3</td><td>Home on an intermittent home switch. This mode works the same as mode 2 except that if a limit switch is encountered when initially searching for home, then the direction is reversed. In mode 2, hitting a limit switch before finding home would be considered an error. Bit 8 identifies which edge of the home to search for (positive or negative).</td></tr>
<tr><td>4</td><td>Home to a hard stop. This moves in the direction specified in bit 4 until the home current limit is reached. It then presses against the hard stop using that current value until the home delay time expires. If bit 5 (index) is set, drive away from the hard stop until an index is found.</td></tr>
<tr><td>4</td><td colspan="2">Initial move direction (0=positive, 1=negative).</td></tr>
<tr><td>5</td><td colspan="2">Home on index pulse if set.</td></tr>
<tr><td>6</td><td colspan="2">Selects which index pulse to use. If set, use the pulse on the DIR side of the sensor edge. DIR is the direction specified by bit 4 of this word.</td></tr>
<tr><td>7</td><td colspan="2">If set, capture falling edge of index. Capture rising edge if clear.</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
						8 — When using a momentary home switch, this bit identifies which edge of the home switch to reference on. If set, then the negative edge is used; if clear the positive edge is used. 9 — If set, make a move to the zero position when homing is finished. If clear, the zero position is found, but not moved to. 10 — If set, the homing sequence will run as normal, but the actual position will not be adjusted at the end. Note that even though the actual position is not adjusted, the parameter Homing Adjustment (p. 35) is updated with the size of the adjustment (in counts) that would have been made. Also, if bit 10 is set then no move to zero is made regardless of the setting of bit 9.
0xC3	0xC4	0x4C3	0x6099:1	RF	U32	Homing Velocity (fast moves). This velocity value is used during segments of the homing procedure that may be handled at high speed. Generally, this means move in which the home sensor is being located, but the edge of the sensor is not being found. Units: 0.1 counts/s.
0xC4	0xC5	0x4C4	0x6099:2	RF	U32	Homing Velocity (slow moves). This velocity value is used for homing segment that require low speed, such as cases where the edge of a homing sensor is being sought. Units: 0.1 counts/s.
0xC5	0xC6	0x4C5	0x609A	RF	U32	Homing Acceleration/Deceleration. This value defines the acceleration used for all homing moves. The same value is used at the beginning and ending of moves (i.e. there is no separate deceleration value). Units: 10 counts/s^2.
0xC6	0xC7	0x4C6	0X607C	RF	INT32	Home Offset. The home offset is the difference between the zero position for the application and the machine home position (found during homing). During homing the home position is found. Once the homing is completed the zero position is offset from the home position by adding the Home Offset to the home position. All subsequent absolute moves shall be taken relative to this new zero position. Units: counts.
0xC7	0xC8	0x4C7	0X2350	RF	U16	Homing Current Limit (home to hard stop mode only). Home current in hard stop mode, in which the amplifier drives the motor to the mechanical end of travel (hard stop). End of travel is recognized when the amplifier outputs the Hard Stop Mode Home Current for the Homing Current Delay Time (p. 36).Units: 0.01 A.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0xC8</td><td>0xC9</td><td>0x4C8</td><td></td><td>RF</td><td>U16</td><td>Trajectory Profile Mode. Bit-mapped as follows:
<table>
<tr><td>Bits</td><td>Description</td></tr>
<tr><td>0-2</td><td>Give the trajectory profile mode. The possible trajectory modes are described below.
<table>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Trapezoidal profile mode. Uses position/distance, velocity, acceleration and deceleration. Any of those parameters may be changed during the move. Jerk is not used in this mode.</td></tr>
<tr><td>1</td><td>S-curve profile mode. Uses position/distance, velocity, acceleration, and jerk. None of these parameters may be changed while a move is in progress (although the move may be aborted). The acceleration parameter will be used for deceleration.</td></tr>
<tr><td>2</td><td>Velocity mode. Uses velocity, acceleration, and deceleration. Jerk is not used in this mode, and position is only used to define the direction of move (zero or positive to move with a positive velocity, negative to move with a negative velocity). Any parameter may be changed during the move. Set velocity to zero to stop.</td></tr>
<tr><td>3</td><td>PVT profile mode. Use of this mode through the serial interface is not presently supported.</td></tr>
</table></td></tr>
<tr><td>8</td><td>If set, this is a relative move. If clear, this is an absolute move.</td></tr>
</table>
Valid settings for this parameter:
<table>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Absolute move, trapezoidal profile.</td></tr>
<tr><td>1</td><td>Absolute move, S-curve profile.</td></tr>
<tr><td>256</td><td>Relative move, trapezoidal profile.</td></tr>
<tr><td>257</td><td>Relative move, S-curve profile.</td></tr>
<tr><td>2</td><td>Velocity profile.</td></tr>
</table></td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xC9	0xCA	0x4C9	0x2252	R*	U16	Trajectory Status Register. This parameter gives status information about the trajectory generator. It is bit-mapped as follows: Bit – Description 0-10 – Reserved for future use. 11 – Homing error. If set, an error occurred in the last home attempt. Cleared by a home command. 12 – Referenced. Set when a homing command has been successfully executed. Cleared by a home command. 13 – Homing. If set, the amplifier is running a home command. 14 – Set when a move is aborted. Cleared at the start of the next move. 15 – In-Motion Bit. If set, the trajectory generator is presently generating a profile.
0xCA	0xCB	0x4CA	0x607A	RF	INT32	Trajectory Generator Position Command. Units: Counts. Meaning depends on move type as described below. Move Type – Meaning Relative – Move distance. Absolute – Target position. Velocity – Direction: 1 for positive, -1 for negative.
0xCB	0xCC	0x4CB	0x6081	RF	U32	Trajectory Maximum Velocity. The trajectory generator will attempt to reach this velocity during a move. Units: 0.1 counts/s.
0xCC	0xCD	0x4CC	0x6083	RF	U32	Trajectory Maximum Acceleration. The trajectory generator will attempt to reach this acceleration during a move. For s-curve profiles, this value is also used to decelerate at the end of a move. Units: 10 counts/s^2.
0xCD	0xCE	0x4CD	0x6084	RF	U32	Trajectory Maximum Deceleration. In trapezoidal trajectory mode, this value will be used to decelerate at the end of a move. Units: 10 counts/s^2.
0xCE	0xCF	0x4CE	0x2121	RF	INT32	Trajectory Maximum Jerk. The S-curve profile generator uses this value as the jerk (rate of change of acceleration/deceleration) during moves. Other profiles types do not use jerk limit. Units: 100 counts/s^3.
0xCF	0xD0	0x4CF	0x6085	RF	U32	Trajectory Abort Deceleration. If a move is aborted, this value will be used by the trajectory generator to decelerate to a stop. Units: 10 counts/s^2.
0xD0	0xD1	0x4D0	0x2192:9	RF	U16	Input 9 Configuration. See Input 1 Configuration (p. 22).
0xD1	0xD2	0x4D1	0x2192:10	RF	U16	Input 10 Configuration. See Input 1 Configuration (p. 22).
0xD2	0xD3	0x4D2	0x2192:11	RF	U16	Input 11 Configuration. See Input 1 Configuration (p. 22).

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xD3	0xD4	0x4D3	0x2192:12	RF	U16	Input 12 Configuration. See Input 1 Configuration (p. 22).
0xD4	0xD5	0x4D4	0x2192:13	RF	U16	Input 13 Configuration. See Input 1 Configuration (p. 22).
0xD5	0xD6	0x4D5	0x2192:14	RF	U16	Input 14 Configuration. See Input 1 Configuration (p. 22).
0xD6	0xD7	0x4D6	0x2192:15	RF	U16	Input 15 Configuration. See Input 1 Configuration (p. 22).
0xD7	0xD8	0x4D7	0x2192:16	RF	U16	Input 16 Configuration. See Input 1 Configuration (p. 22).
0xD8	0xD9	0x4D8	0x2150	RF	U16	Regen Resistor Resistance. Units: 0.1 Ω.
0xD9	0xDA	0x4D9	0x2151	RF	U16	Regen Resistor, Continuous Power. Units: W.
0xDA	0xDB	0x4DA	0x2152	RF	U16	Regen Resistor, Peak Power. Units: W.
0xDB	0xDC	0x4DB	0x2153	RF	U16	Regen Resistor, Time At Peak. Units: ms.
0xDC	0xDD	0x4DC	0x2154	RF	U16	Regen Turn On Voltage Units: 0.1 V.
0xDD	0xDE	0x4DD	0x2155	RF	U16	Regen Turn Off Voltage. Units: 0.1 V.
0xDE	0xDF	0x4DE	0x6510:20	F*	INT16	Amplifier’s Peak Current Rating For Its Internal Regen Transistor. Units: 0.01 A.
0xDF	0xE0	0x4DF	0x6510:21	F*	INT16	Amplifier's Continuous Current Rating For Its Internal Regen Transistor. Units: 0.01 A.
0xE0	0xE1	0x4E0	0x6510:22	F*	INT16	Amplifier's Time At Peak Current For Its Internal Regen Transistor. Units: ms.
0xE1	0xE2	0x4E1	0x2156	F	String	Regen Resistor Model Number String.
0xE2	0xE3	0x4E2	0x2157	R*	U16	Regen Resistor Status. Bit-mapped: Bit: Description 0: Set if the regen circuit is currently closed. 1: Set if regen is required based on bus voltage. 2: Set if the regen circuit is open due to an overload condition. The overload may be caused by either the resistor settings or the internal amplifier protections. 3-15: Reserved.
0xE3	0xE4	0x4E3	0x60FB:4	RF	INT16	Position Loop Output Gain Multiplier. The output of the position loop is multiplied by this value before being passed to the velocity loop. This scaling factor is calculated such that a value of 100 is a 1.0 scaling factor. This parameter is most useful in dual loop systems.
0xE4	0xE5	0x4E4	0x21C2	RF	U16	Maximum Current to use with algorithmic phase initialization. See code 5 of Commutation Mode (p. 34). Units: 0.01 A.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xE5	0xE6	0x4E5	0x21C3	RF	U16	Algorithmic Phase Initialization Timeout. See code 5 of Commutation Mode (p. 34). Units: ms.
0xE6	0xE7	0x4E6	0x21D8	RF	U32	Maximum Velocity Adjustment. This is the maximum velocity adjustment made by the stepper outer position loop when enabled. This parameter is only used when the stepper outer loop is engaged (when bit 1 of Stepper Configuration & Status [p. 42] is set). Units: 0.1 steps/s.
0xE7	0xE8	0x4E7	0x21D7	RF	U16	Proportional Gain For Stepper Outer Loop. This parameter gives the gain used for calculating a velocity adjustment based on Following Error (p. 14). This parameter is only used when the stepper outer loop is engaged (when bit 1 of Stepper Configuration & Status [p. 42] is set).
0xE8	0xE9	0x4E8	0x21D0	RF	U16	Holding Current For Microstepping Mode. Units: 0.01 A.
0xE9	0xEA	0x4E9	0x21D1	RF	U16	Run to Hold Time For Microstepping Mode. Units: ms.
0xEA	0xEB	0x4EA	0x21D2	RF	INT16	Detent Correction Gain Factor For Microstepping Mode.
0xEB	0xEC	0x4EB	0x21D3	RF	U16	Damping Correction Gain Factor For Microstepping Mode.
0xEC	0xED	0x4EC	0x21D4	RF	Octet	Damping Correction Bi-Quad Filter Structure For Microstepping Mode.
0xED	0xEE	0x4ED	0x21D5	RF	U16	Holding Current To Fixed Voltage Output Time for Microstepping Mode. Time delay from entering hold current before entering the special voltage control mode of operation. This mode trades the normal tight control of current for very low jitter on the motor position. Used in stepper mode only. Set to 0 to disable this feature. Units: ms.
0xEE	0xEF	0x4EE	0x21D6	RF	U16	Stepper Configuration & Status. This variable is bit-mapped as follows: Bit – Description 0 – Use the encoder input for phase compensation if enabled. Pure stepper mode if disabled. 1 – Use on outer position loop to adjust the stepper position based on Following Error (p. 14). When this bit is set, the gain value Maximum Velocity Adjustment (p. 42) is multiplied by the Following Error, and the result is a velocity that is added to the microstepping position. 2-15 – Reserved.
0xF0	0xF1	0x4F0	0x2195:1	RF	U16	Debounce Time For Input 1. Units: ms.
0xF1	0xF2	0x4F1	0x2195:2	RF	U16	Debounce Time For Input 2. Units: ms.
0xF2	0xF3	0x4F2	0x2195:3	RF	U16	Debounce Time For Input 3. Units: ms.
0xF3	0xF4	0x4F3	0x2195:4	RF	U16	Debounce Time For Input 4. Units: ms.

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0xF4	0xF5	0x4F4	0x2195:5	RF	U16	Debounce Time For Input 5. Units: ms.
0xF5	0xF6	0x4F5	0x2195:6	RF	U16	Debounce Time For Input 6. Units: ms.
0xF6	0xF7	0x4F6	0x2195:7	RF	U16	Debounce Time For Input 7. Units: ms.
0xF7	0xF8	0x4F7	0x2195:8	RF	U16	Debounce Time For Input 8. Units: ms.
0xF8	0xF9	0x4F8	0x2195:9	RF	U16	Debounce Time For Input 9. Units: ms.
0xF9	0xFA	0x4F9	0x2195:10	RF	U16	Debounce Time For Input 10. Units: ms.
0xFA	0xFB	0x4FA	0x2195:11	RF	U16	Debounce Time For Input 11. Units: ms.
0xFB	0xFC	0x4FB	0x2195:12	RF	U16	Debounce Time For Input 12. Units: ms.
0xFC	0xFD	0x4FC	0x2195:13	RF	U16	Debounce Time For Input 13. Units: ms.
0xFD	0xFE	0x4FD	0x2195:14	RF	U16	Debounce Time For Input 14. Units: ms.
0xFE	0xFF	0x4FE	0x2195:15	RF	U16	Debounce Time For Input 15. Units: ms.
0xFF	0x100	0x4FF	0x2195:16	RF	U16	Debounce Time For Input 16. Units: ms.
0x100	0x101	0x500	0x2184	RF	U32	CANopen Status Word Limit Mask. This parameter defines which bits in the Amplifier Event Status Register (p. 26) can set the limit bit (bit 11) of the CANopen Status Word (CANopen index 0x6041 as described in the *CANopen Programmer's Manual*). If an Amplifier Event Status Register bit and its corresponding Limit Mask bit are both set, then the CANopen Status Word limit bit is set. If all selected Amplifier Event Status Register bits are clear, then the limit bit is clear.
0x101	0x102	0x501	0x2197	R*	U16	Network Address Switch Value. This gives the current state of the CAN address switch. For amplifiers without a switch, the value returned is undefined.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th colspan="3">Description</th></tr>
<tr><td rowspan="14">0x102</td><td rowspan="14">0x103</td><td rowspan="14">0x502</td><td rowspan="14"></td><td rowspan="14">R*</td><td rowspan="14"></td><td colspan="3">CAN Network Status Word. Bit-mapped:</td></tr>
<tr><td>Bit</td><td colspan="2">Meaning</td></tr>
<tr><td rowspan="6">0-1</td><td colspan="2">CANopen node status. This field will take one of the following values:</td></tr>
<tr><td>Value</td><td>Status</td></tr>
<tr><td>0</td><td>The CANopen interface is disabled.</td></tr>
<tr><td>1</td><td>Stopped mode.</td></tr>
<tr><td>2</td><td>Preoperational mode.</td></tr>
<tr><td>3</td><td>Operational mode.</td></tr>
<tr><td>4</td><td colspan="2">Set if the CANopen SYNC message is missing.</td></tr>
<tr><td>5</td><td colspan="2">Set on a CANopen guard error.</td></tr>
<tr><td>8</td><td colspan="2">Set if the CAN port is in 'bus off' state.</td></tr>
<tr><td>9</td><td colspan="2">Set if the CAN port is in 'transmit error passive' state.</td></tr>
<tr><td>10</td><td colspan="2">Set if the CAN port is in 'receive error passive' state.</td></tr>
<tr><td>11</td><td colspan="2">Set if the CAN port is in 'transmit warning' state.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>12</td><td colspan="2">Set if the CAN port is in 'receive warning' state.</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x103	0x104	0x503	0x21B1	F	U32	Input Pin Mapping For Node ID Selection. When Network Node ID Configuration (p. 36) indicates that 1 or more input pins will be used to select the node ID, this parameter is used to map input pins to ID bits.

Bits	Meaning
0-3	Identify the general-purpose input pin associated with ID bit 0.
4-7	Identify the general-purpose input pin associated with ID bit 1.
8-11	Identify the general-purpose input pin associated with ID bit 2.
12-15	Identify the general-purpose input pin associated with ID bit 3.
16-19	Identify the general-purpose input pin associated with ID bit 4.
20-23	Identify the general-purpose input pin associated with ID bit 5.
24-27	Identify the general-purpose input pin associated with ID bit 6.
28-30	Reserved.
31	Set to enable this register. Clear to use default mapping.

If bit 31 is zero, then a default bit mapping is used and the rest of this register is ignored. The default bit mapping uses the top N input pins and maps them such that the high numbered pins are used for higher numbered bits in the ID. For example; the Accelnet panel amplifier has 12 general-purpose input pins (0 to 11). If 3 of these pins are used for ID configuration and the default mapping is used, then the highest 3 pins (9, 10 and 11) will be used for the ID. In this case, pin 9 will be bit 0, pin 10 will be bit 1 and pin 11 will be bit 2.

If bit 31 is set, then the rest of this register will be used to define which input pin will be assigned to which bit of the ID. The input pins are numbered from 0 to 15 and each nibble of the register gives the input pin number associated with one bit of the ID.

For example, if three input pins are configured for address selection and the mapping register is set to 0x80000012, then input pin 2 will be used for ID bit 0, input pin 1 will be used for ID bit 1, and input pin 0 will be used for ID bit 2.

Note that the CAN node ID is calculated at startup only. The input pins assigned to the node ID will be sampled once during power up and used to calculate the ID. These pins may be assigned other uses after power up if necessary.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th>Description</th></tr>
<tr><td>0x104</td><td>0x105</td><td>0x504</td><td>0x21C4</td><td>RF</td><td>U16</td><td>Algorithmic Phase Initialization Config. See code 5 of Commutation Mode (p. 34). This parameter is bit-mapped as follows:
<table>
<tr><td>Bits</td><td>Meaning</td></tr>
<tr><td>0</td><td>If clear, use algorithmic phase initialization. If set force the phase angle to zero degrees.</td></tr>
<tr><td>1-15</td><td>Reserved.</td></tr>
</table></td></tr>
<tr><td>0x105</td><td>0x106</td><td>0x505</td><td>0x2360</td><td>RF</td><td>U16</td><td>Camming Configuration. Configures camming feature. Bit-mapped as follows. For more information, see the Copley Camming User Guide.
<table>
<tr><th>Bits</th><th>Description</th></tr>
<tr><td>0-3</td><td>ID Number of the Cam Table to use (0-9).</td></tr>
<tr><td>4</td><td>Reserved.</td></tr>
<tr><td>5</td><td>If set, exit table in forward direction.</td></tr>
<tr><td>6</td><td>If set, use the Camming Internal Generator. The internal generator runs at the constant velocity programmed in Camming Master Velocity (p. 47).
If clear, use digital command input as configured in using Copley’s CME 2 software camming controls or Input Pin States (p. 29).</td></tr>
<tr><td>7</td><td>If set, run tables stored in RAM. If clear, use tables stored in the flash file system.</td></tr>
<tr><td>8-11</td><td>Input number to use as Cam Trigger. Note: a value of 0 selects IN1, 1 selects IN2, etc.</td></tr>
<tr><td>12-13</td><td>Cam Trigger type:
<table>
<tr><td>Value</td><td>Type</td></tr>
<tr><td>0</td><td>None (Continuous): The active Cam Table is repeated continuously.</td></tr>
<tr><td>1</td><td>Use Input, Edge: The active Cam Table begins executing on the rising edge of the input pin selected by bits 8-11.</td></tr>
<tr><td>2</td><td>Use Input, Level: The active Cam Table will run as long as the input selected by bits 8-11 is high.</td></tr>
<tr><td>3</td><td>Use Master (Secondary) Encoder Index: The active Cam Table is executed when the amplifier receives an index pulse from the Master encoder. Index pulses received during execution are ignored.</td></tr>
</table></td></tr>
</table></td></tr>
<tr><td>0x106</td><td>0x107</td><td>0x506</td><td>0x2361</td><td>RF</td><td>U16</td><td>Camming Delay Forward. Units: master command counts.</td></tr>
<tr><td>0x107</td><td>0x108</td><td>0x507</td><td>0x2362</td><td>RF</td><td>U16</td><td>Camming Delay Reverse. Units: master command counts.</td></tr>
<tr><td>0x108</td><td>0x109</td><td>0x508</td><td></td><td>R</td><td>U16</td><td>Writing any value to this parameter will cause any CANopen PDO objects configured with type code 254 to be sent. This parameter is primarily useful for triggering a PDO from within a CVM program.
Reading this parameter does not return any useful information.</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x109	0x10A	0x509	0x2363	RF	INT 32	Camming Master Velocity. Constant velocity of the Camming Internal Generator. Units: 0.1 counts/s.
0x10A	0x10B	0x50A	0x2403	R*	INT 32	Captured Home Position. Provides the position that the axis was in when an input pin configured as a home switch input became active. Configured by setting bits in the Position Capture Control Register (p. 18). Status of the captured data can be checked in the Position Capture Status Register (p. 20). Reading this variable resets bits 4 & 7 of the Position Capture Status Register. Units: counts.
0x10B	0x10C	0x50B		R*	INT 32	Firmware Version Number (extended). The upper 16 bits give the same major/minor version number as Firmware Version Number (p. 24). The lower 16 bits hold a release number (upper byte) and a reserved byte (lower).
0x10C	0x10D	0x50C	0x1017	R	U16	CANopen Heartbeat Time. The frequency at which the amplifier will produce heartbeat messages. This parameter may be set to zero to disable heartbeat production. Note that only one of the two node-guarding methods may be used at once. If the Heartbeat Time is non-zero, then the heartbeat protocol is used regardless of the settings of the CANopen Node Guarding Time (p. 47) and CANopen Node Guarding Life Time Factor (p. 47). Units: ms.
0x10D	0x10E	0x50D	0x100C	R	U16	CANopen Node Guarding Time. This parameter gives the time between node-guarding requests that are sent from the CANopen master to this amplifier. The amplifier will respond to each request with a node-guarding message indicating the internal state of the amplifier. If the amplifier has not received a node-guarding request within the time period defined by the product of the Node Guarding Time and the CANopen Node Guarding Life Time Factor (p. 47), the amplifier will treat this lack of requests as a fault condition. Units: ms.
0x10E	0x10F	0x50E	0x100D	R	U8	CANopen Node Guarding Life Time Factor. This object gives a multiple of the CANopen Node Guarding Time (p. 47). The amplifier expects to receive a node-guarding request within the time period defined by the product of the Guarding Time and the Lifetime Factor. If the amplifier has not received a node-guarding request within this time period, it treats the lack of requests as a fault.
0x10F	0x110	0x50F		R	INT 32	Registration Offset For Pulse & Direction Mode. When running in pulse & direction mode (Desired State = 23), this parameter may be used to inject an offset into the master position. The offset will immediately be cleared once it has been applied to the master position, so this parameter will normally be read back as zero when running in pulse and direction mode 23.

<table>
<tr><th>ASCII</th><th>DvcNet</th><th>Macro</th><th>CAN ID:sub</th><th>Bank</th><th>Type</th><th colspan="2">Description</th></tr>
<tr><td>0x110</td><td>0x111</td><td>0x510</td><td>0x2404</td><td>R</td><td>INT 32</td><td colspan="2">Time Stamp of Last High Speed Position Capture. Units: microseconds.</td></tr>
<tr><td>0x111</td><td>0x112</td><td>0x511</td><td>0x2405</td><td>R*</td><td>INT 32</td><td colspan="2">Captured Position for High Speed Position Capture. Units: counts.</td></tr>
<tr><td>0x112</td><td>0x113</td><td>0x512</td><td>0x2242</td><td>R</td><td>INT 32</td><td colspan="2">Position Encoder Position.Units: counts.</td></tr>
<tr><td>0x113</td><td>0x114</td><td>0x513</td><td>0x1015</td><td>RF</td><td>U16</td><td colspan="2">CANopen emergency inhibit time. Units: milliseconds</td></tr>
<tr><td>0x114</td><td>0x115</td><td>0x514</td><td>0x60F9:5</td><td>RF</td><td>U16</td><td colspan="2">Vi Drain (integral bleed). Modifies the effect of velocity loop integral gain. The higher the Vi Drain value, the faster the integral sum is lowered. Range: 0 to 32,000. Default: 0.</td></tr>
<tr><td>0x120</td><td>0x121</td><td>0x520</td><td></td><td>R*</td><td>U16</td><td colspan="2">Returns the number of axis implemented by this amplifier.</td></tr>
<tr><td rowspan="13">0x121</td><td rowspan="13">0x122</td><td rowspan="13">0x521</td><td rowspan="13"></td><td rowspan="13">RF</td><td rowspan="13">U16</td><td colspan="2">Network options. This bit mapped parameter is used to configure the amplifier's network. The details of its meaning are dependent on the type of network implemented in the amplifier.</td></tr>
<tr><td colspan="2">CANopen</td></tr>
<tr><td>Bits</td><td>Meaning</td></tr>
<tr><td>0</td><td>Must be clear to select CANopen networking.</td></tr>
<tr><td>1-15</td><td>Reserved</td></tr>
<tr><td colspan="2">DeviceNet</td></tr>
<tr><td>Bits</td><td>Meaning</td></tr>
<tr><td>0</td><td>Must be set to select DeviceNet networking.</td></tr>
<tr><td>1-15</td><td>Reserved</td></tr>
<tr><td colspan="2">MACRO</td></tr>
<tr><td>Bits</td><td>Meaning</td></tr>
<tr><td>0</td><td>If set, position data sent over the MACRO network is shifted up 5 bits to be more compatible with Delta-Tao controllers.</td></tr>
<tr><td>1-15</td><td>Reserved.</td></tr>
<tr><td>0x122</td><td>0x123</td><td>0x522</td><td></td><td>F*</td><td>U16</td><td colspan="2">Amplifier internal maximum regen current. Units: mA.</td></tr>
<tr><td>0x123</td><td>0x124</td><td>0x523</td><td></td><td>RF</td><td>INT32</td><td colspan="2">Motor position wrap value. Actual motor position will wrap back to zero when this value is reached. Setting this value to zero disables this feature. Units: counts</td></tr>
<tr><td>0x124</td><td>0x125</td><td>0x524</td><td></td><td>RF</td><td>INT32</td><td colspan="2">Load position wrap value. Actual load position will wrap back to zero when this value is reached. Setting this value to zero disables this feature. Units: counts.</td></tr>
</table>

ASCII	DvcNet	Macro	CAN ID:sub	Bank	Type	Description
0x125	0x126	0x525		RF	U16	Configures the MACRO amplifier's encoder capture circuit as follows: Bits / Meaning 0-3: Type of capture to use. Value / Description 0: Capture on edge of encoder index. 1: Capture using a general purpose input pin. 2-15: Reserved. 4-7: Input pin number to use if using capture type 1. 8: Active level; high if clear, low if set. 9-15: Reserved.
0x126	0x127	0x526		R*	U16	FPGA firmware version number.
0x127	0x128	0x527		RF	U16	Gain scheduling configuration: Bits / Meaning 0-2: Key parameter for gain scheduling. Value / Description 0: None. Setting the key parameter to zero disables gain scheduling. 1: Use value written to Gain scheduling key parameter value (p. 49) as the key. 2: Use Trajectory Profile Velocity (p. 14). 3: Use Position Encoder Velocity (p. 18). 4: Use Limited Position (p. 13). 5: Use Actual Position (p. 11). 6-7: Reserved. 3-7: Reserved. 8: If set, use the absolute value of key parameter for gain lookup. 9: If set, disable gain scheduling until the position encoder is referenced.
0x128	0x129	0x528		R	INT32	Gain scheduling key parameter value. When gain scheduling is enabled, the current value of the key parameter is stored here. When this parameter is selected as the key parameter for gain scheduling, then it may be written to manually move through entries in the gain scheduling table.

Copley Amplifier Parameter Dictionary

P/N 95-00716-000

Revision 2

March, 2008