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# Release Notes

## ION Dx1x1x0-195/30-x version 1.4

**Document last updated:** 6/7/2012

**Product name:** ION (DC Brush, Brushless DC, Microstepping)  
**Source control archive name:** 991100014  
**Date of build:** 05/08/2012  
**Device Checksum:** 0xFDA40A98

### **Description:**

This document details bug fixes and changes for this release.

### **Known Issues:**

Home, Index, or HSC captures may not be repeatable exactly, an error of one in either direction may occur.
On power up in RS-485 mode there is glitch on the TX line of approximately 200 ms.
An unpowered ION drive in a multi-drop RS-485 network will pull the RS-485 select signal low.
GetTemperature will return an inaccurate value for approximately three seconds after power on. The error will be toward 0 °C, and so should not trigger an overtemperature event.
Home, Index or HSC captures cannot be triggered more frequently than every 52 microseconds.
Tracing PhaseCommand A/B always returns zero when CurrentControlMode is set to "FOC", even when Current Loop is disabled. This is an intended feature. Setting CurrentControlMode to "FOC", whether or not the current loop is enabled, causes space vector PWM to be used instead of triangular carrier PWM. The PhaseCommand A/B trace variables are not well-specified for SVPWM.
FOC Alpha and Beta (non-rotating frame) outputs may be traced when using FOC mode.
Sending a ClearPositionError command while the trajectory bit is enabled in the operating mode but the position loop bit is not may result in a sudden change in the output motor torque. This issue is a result of the decision to make commanded position identical to output torque when the position loop bit is off.
As a workaround, do not use ClearPositionError when using the trajectory generator to control torque.
When in multi-drop mode, if the SetSerialPort command is used to put the serial port in point-to-point mode the reply will be in the point-to-point format, not including the multi-drop address. Replies to subsequent commands will use the expected point-to-point format.

### **Incompatibilities with previous version:**

The FaultOut mask previously always included the overtemperature and disabled event bits when set. This is no longer true, see bug 234 below.
SetPhaseAngle now performs more argument checking, see bug 269 below.

### ***Incompatibilities with version 1.3:***

Previously  $i^2t$  foldback energy was set to zero immediately after motor output was disabled due to a foldback event with the current loop disabled. When the current loop was enabled the foldback energy was not zeroed, instead it decreased according to the difference between measured current and the continuous current limit.

The InitializePhase command, when algorithmic phase initialization is specified, will return an invalid instruction context error if one of these conditions holds:

- The buffered motor command is zero.
- Phase counts is less than two.
- The operating mode is not 0x3 (axis and motor output only enabled).
- The phase initialization time is zero.

Previously no error was signaled under these conditions, but phase initialization would not succeed.

Disabling the position loop while the trajectory generator is enabled causes the commanded position (used as commanded torque) to be set to zero. In previous versions the commanded position would be unchanged, possibly causing a large, sudden change in motor output.

The SetActualPosition command will only change the commanded position if profile generation is off, or if the position loop is closed. In previous versions commanded position (used as commanded torque) would be suddenly changed even if the position loop was not in use.

Enabling the trajectory generator with the position loop disabled now sets the commanded position (used as commanded torque) to be set to zero. Previous versions would set the commanded torque to the current actual position.

### ***Incompatibilities with version 1.1:***

Space vector PWM modulation has been increased, see issue 64 below. Current and position loop settings may have to be changed.

Maximum PWM on and off time has been increased, see unnumbered issue in Drive section below.

If the device is operated in dual encoder mode, the auxiliary axis encoder is now used for sinusoidal commutation. In previous releases, the main axis encoder was always used for sinusoidal commutation.

Dual encoder mode now works in the same way for ION 500 as it does for ION 3000.

The SetCurrentFoldback command now can set two different parameters, an energy limit and a continuous current limit. The behavior of this command is explained in the Magellan Motion Processor Programmer's Command Reference, Revision 2.5

The initial operating mode is now 0x1 instead of 0x31. See bug 20 below.

SignalStatus changes in dual encoder mode, see bug 27 below.

## Changes/Fixes:

### Command Changes

159	SetTraceVariable could erroneously signal a “trace already running” error when setting a trace for an auxiliary axis quantity. This command is now fixed.
227	InitializePhase now returns a BadRegisterState error (error 18) when called with phase counts equal to one, the default value, which is never valid.
248	The update command could return the “illegal move into limit switch” error even when the maximum velocity was zero, this is no longer true.
269	SetPhaseAngle previously allowed values less than or equal to PhaseCounts. Now a “bad parameter” error will be thrown if the SetPhaseAngle argument is greater than or equal to PhaseCounts, or if PhaseCounts is zero or one.

### Communication Changes

173	Half-duplex RS-485 communication did not work correctly, this bug affected only version 1.6. Half-duplex now works.
174	Sending a reset command over a serial link resulted in a checksum error, it now correctly signals a Reset error.

### Protection Mechanism Changes

170	The digital smoothing filter for temperature did not work properly below 0 °C, sometimes causing a bogus overtemperature fault. This problem is fixed.
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### Commutation Changes

	None
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### Servo Filter Changes

	None
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### Drive Operation Changes

	None
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### Registers and Signals Changes

152	When MotionCompleteMode was set to Actual, multiple MotionComplete events could be signaled for one move. Now at most one event will be signaled.
158	The AdjustActualPosition command could, rarely, corrupt the actual position value, this problem has been fixed.
208	With the profile generator disabled, limit switch events could be (incorrectly) signaled with motor output off or with the position loop on, this no longer happens.
209	Active motor command could be read as nonzero with motor output disabled, it now always reads zero in that state.

234	<p>The FaultOut mask was previously logically ORed with the value 0x300, meaning the disabled or overtemperature events, whenever it was set. The initial value of the FaultOut mask was, and remains, 0x600, meaning the overtemperature and bus voltage fault events.</p> <p>No event bits are automatically ORed into the mask when it is set.</p>
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#### Position Loop Changes

	None
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#### Current Loop Changes

240	<p>Large, bogus current readings immediately after enabling motor output could cause glitches in the recorded <math>i^2t</math> foldback energy. Current readings are now forced to zero for the first three current loop cycles after motor output is enabled.</p>
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#### Trajectory Generator Changes

180	<p>A false negative limit event could be raised when using the s curve profile generator, this problem has been fixed.</p>
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#### Miscellaneous Changes

	None
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## Changes/Fixes in version 1.3:

### Command Changes

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### Communication Changes

	None
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### Protection Mechanism Changes

133, 146	In some cases the SetOperatingMode and RestoreOperatingMode commands allowed motor output without the current loop to be enabled during current foldback; this was not appropriate because the current cannot be bounded by the continuous current limit without the current loop. It is no longer possible to enable motor output during current foldback without enabling the current loop.
143	Under some circumstances, particularly at higher temperatures, a spurious overtemperature event would be signaled immediately after power on. This problem is fixed.

### Commutation Changes

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### Servo Filter Changes

	None
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### Drive Operation Changes

	None
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### Registers and Signals Changes

122	Limit conditions were not properly detected when the trajectory generator was disabled. In this case the sign of the motor command is used to determine the safe direction to move while a limit switch is active; problems in computing that sign have been fixed
130	Breakpoints using the auxiliary axis did not trigger correctly and sometimes raised an "internal logic fault". They now work.
117	Breakpoints based on position with large breakpoint values (greater than approximately 2,000,000,000) would sometimes trigger prematurely, they now work correctly.
123	The auxiliary axis actual position was sometimes set to -1 after a reset. It is now always set to zero.

### Position Loop Changes

120	Disabling the position loop while the trajectory generator is enabled could cause a large bump in motor output, so could enabling the trajectory generator without enabling the trajectory generator, or setting actual position with the position loop disabled.
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	These mode changes have been made bumpless, please see the “incompatibilities” section for details.
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### Trajectory Generator Changes

110	Under certain worst-case conditions, when running trace at the maximum sampling rate in rolling buffer mode (causing a trace buffer overrun), s-curve or trapezoidal trajectories would sometimes glitch. This is fixed.
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### Miscellaneous Changes

132	When running in current foldback tracing the active motor command (trace variable 7) sometimes showed the command before limiting to the continuous current limit, and sometimes the limited value. The limited value is now always shown.  This fix applies to the value returned by <code>GetActiveMotorCommand</code> .
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## Changes/Fixes in version 1.1:

### Command Changes

	None
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### Communication Changes

	None
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### Protection Mechanism Changes

11212	When using Hall commutation the maximum current when in current foldback was too high. It is now correct.
11211	The default over temperature limit was 70°C, it has been changed to 80°C.
	I <sup>2</sup> t foldback defaults and limits for total energy have been reduced. For BLDC, the new default is 68 A <sub>rms</sub> <sup>2</sup> sec, the limit is 101 A <sub>rms</sub> <sup>2</sup> sec. For DC, the new default is 150 A <sub>rms</sub> <sup>2</sup> sec, the limit is 203 A <sub>rms</sub> <sup>2</sup> sec. For microstep, the new default is 101 A <sub>rms</sub> <sup>2</sup> sec, the limit is 125 A <sub>rms</sub> <sup>2</sup> sec.  These values are summarized in table 3.3.4.2 in the ION Digital Drive User's Manual revision 1.5, November 2008, for values.

### Commutation Changes

22	Issuing an InitializePhase command if Hall commutation was specified would change the commutation mode to sinusoidal. InitializePhase is now a no-op if Hall commutation is specified.
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### Servo Filter Changes

11210	ClearPositionError could cause derivative kick. Clearing the position error no longer causes a spike in the derivative control term.
90172	Tracing actual position now traces values with units of counts if the ActualPositionUnits flag is set. Previously it always used units of steps.

### Drive Operation Changes

	None
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### Registers and Signals Changes

27	In dual encoder mode the state of the auxiliary index input (HSC input) was reflected in the primary axis SignalStatus register, and not the auxiliary axis SignalStatus register. In this release, in dual encoder mode, the Index bit of the primary axis SignalStatus register is always clear, and the auxiliary encoder index status is indicated by the Index bit of the auxiliary axis SignalStatus register.
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### Position Loop Changes

26	Phase correction was not applied until a SetPhaseCorrectionMode 1 command was
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	issued, although it was documented as default. In dual encoder mode auxiliary axis capture did not work unless a SetPhaseCorrectionMode 1 command had been issued. Phase correction now works by default, and auxiliary axis capture is independent of phase correction mode.
90180	The commanded position was sometimes incorrectly rounded for non-unity step-to-count ratios. It is now correctly rounded.

#### Miscellaneous Changes

3	The previous version of this unit sometimes reported "External Logic Fault" after power cycle, incorrectly indicating a problem with an internal 5 Volt supply. This has been fixed.
21	The delay following a commanded reset was long enough that host communication was often lost. Reset is now fast enough that communication should not be lost.
34	I2C is used internally for communication with temperature sensors, EEPROM, and the LED controller. In version 5.0 there were some I2C protocol violations, which are fixed.