CD SynqNet

Firmware Revision History

Table Of Contents

Base Version: 1.1.9

Release Date: xxx

Known Issues

- Position rollover bug with resolver feedback. If RDRES is less that 16, the 32-bit signed rollover has a jump.

Driving AKM Motors with Encoder Feedback

- Set MOTORTYPE=0

- Connect phases U-V-W on motor to C-B-A on drive

- Connect halls U-V-W on motor to H3-H2-H1 on drive

- Set MPHASE=180

Version 1.1.9d

Release Date: December 24,2003

Additions and Changes

Support added for 32-bit EnDat absolute position (previously, abs pos length was limited to 25 bits).

Bug Fixes

In Sine Encoder the position was "drifting" due to incorrect digital counter offset.

Version 1.2.0

Release Date: January 22,2004

Additions and Changes

Version number changed to 1.2.0 for ECO.

Version 1.2.1

Release Date: February 16, 2004

Additions and Changes

1. Automatic sine calibration on power up was canceled.

2. Added fault "Sine quad mismatch", this fault toggled in case that digital counter quad and analog quad mismatch at least 2 consecutive sample times and motor moving more than 3 counts in digital counter. This fault has mask in 0x0080 in Feedback_Not_Ok word. In the SynqNet direct command 8 (read faults), it has mask 0x00800000.

Bug Fixes

1. PFB drifting problem was not solved yet. It occurred again.

> Address of variables that related to sine encoder was sent to Axcelis.

> From accepted data it looks like the initialization of Digital_Counter_offset was

> incorrect in case when 2 bit difference between analog and digital quad.

> This problem was fixed and hopefully the drift issue.

2. When Sine or Cosine offset cause the Sine or Cosine to change sign, it caused incorrect arc-tan calculation.

3. In Sine Encoder sometimes error "SPI in use" occurred if MENCTYPE 9 was change in middle of ENDAT initialization process.

4. In Feedback_Not_Ok the ENDAT fault bit was set but SysNotOk was equal to 0.

5. In DUMP space was replaced by "=" to be compatible to ML.

6. Ember command was changed to support baud rate 56000 in Software ember.

Version 1.2.2

Release Date: June 22,2004

Bug Fixes

1. MPHASE for EnDat Sine/Cosine feedback wasn't reported correctly

2. PFB changed to 48 bits due to resolver RDRES. This solves the position rollover problem.

Version 1.2.3

Release Date: July 1,2004

Bug Fixes

1. Sine encoder bug fix: A-Quad-B mismatch detection was modified to work the same as PicoDad

Version 1.2.4

Release Date: July 10,2004

Bug Fixes

1. WNS Bug Fix

Version 1.2.5

Release Date: August 25,2004

Additions and Changes

1. AKM support added for zero

Bug Fixes

1. RDRES after CLREEPROM bug fix

2. In MOTORTYPE 3 with Resolver feedback, 180 is added to PRD, so it will match UCB. If MOTORTYPE is not equal to 3, we are left with a PRD that is 180 degrees off. Due to the fact we already have user for resolver MOTORTYPE 0 we leave it at that, remembering that the SSV file from M-L will need 180 MPHASE if motor poles pair is an odd number

Version 1.2.6

Release Date: August 29,2004

Additions and Changes

1. ICMD command added (same as query of T)

2. A query of I returns Ieq_625 and not Eq_Crrnt

3. Current limit bit in SynqNet removed (bit 13)

Version 1.2.7

Release Date: September 2,2004

Additions and Changes

1. WD timer in background was increased due to possibility that slow EEPROM can cause a WD.

Version 1.2.8

Release Date: September 29,2004

Additions and Changes

1. Added the MENCFRAC parameter (SynqNet index 0x59) to accommodate non-integer MENCRES values. This value will hold the Numerator of the following fraction:

$$MENCFRAC/2^{16}.$$

Version 1.2.9

Release Date: Oct 13,2004

Bug Fixes

1. Bug fix regarding the calculation of commutation fraction in case of a rollover (when MENCFRAC<>0).

Version 1.3.0

Release Date: November 8,2004

Bug Fixes

1. OR sat_flag bug fix

2. Foldback current calculation bug fix

3. Current scaling changed for SynqNet current monitor

Additions and Changes

1. Sine calibration enabled on power up for resolver and sine encoder.

Version 1.3.1

January 19,2005

Additions and Changes

- HALLSYNC added

    This function is used to enable a commutation correction to be performed at every hall transition, instead of only at the first hall transition.

- UV warning added to SynqNet warnings word

- MSININT limited to 256

    The sine encoder interpolation has a practical limit of 256, so there is no point I sallowing the parameter to be set to higher values.

Bug Fixes

None

Version 1.3.2

Release Date: January 20,2005

Additions and Changes

None

Bug Fixes

- Firmware Version number mismatch between the value reported over SynqNet and the value reported over the serial port.

Known Issues and Limitations

None

Version 1.3.3

Release Date: January 20,2005

Additions and Changes

None

Bug Fixes

- Bug Fix: During ZERO, PRD did not show real motor position.

Known Issues and Limitations

None

Version 1.3.4

Release Date: January 24,2005

Additions and Changes

None

Bug Fixes

- EnDat: Incorrect commutation initialization with MENCTYPE 9 was fixed.
- Fix the reading of OEM parameters (MPHASE) from the EnDat memory. For EnDat model #EQA1329.

Known Issues and Limitations

None

Version 1.3.5

Release Date: January 24,2005

Additions and Changes

None

Bug Fixes

- AKM support - remove 180 degrees offset from encoder

Known Issues and Limitations

None

Version 1.3.6

Release Date: May 30,2005

Additions and Changes

- Low pass filters implemented on IA, IC and IB current samples. The frequency of the filters is defined by the user. For this purpose 2 parameters were added:

  IACLPFHZ (index 0x5b in SynqNet)
  IBLPFHZ   (index 0x5c in SynqNet)

- ADC noise on IA, IC current samples reduced by over sampling technique. IA, IC sampled 8 times and averaged.

Bug Fixes

- Bug in current loop adaptive gain was fixed. This bug affected negative current only. Re-tuning of motion controller PID loops is not necessary.

Known Issues and Limitations

None

Version 1.3.7

Release Date: May 31,2005

Additions and Changes

None

Bug Fixes

- Bug in IBLPFHZ was fixed

Known Issues and Limitations

None

Version 1.3.8

Release Date: August 1,2005

Additions and Changes

None

Bug Fixes

- Bug in EnDat sine encoder initialization was fixed.

  Customer complaint:

  The axis has a single-turn absolute encoder, with resolution of 2,097,152 counts/rev. The encoder reading should be between 0 and 2,097,152 at the start-up. However, using the "PFB" command, we received a read back that was much higher than the range: 5,215,743.

  Observation:

  Reading HWPOS, PFB and internal variables in the drive, it was found that bit 15 of PFB was set to 1 even though bit 15 of HWPOS was 0. On power up PFB/MSININT must be equal to HWPOS.

  Fix:

  The bug was in sine encoder initialization. The accumulator register in DSP was not initialized to 0 during PFB initialization. In sometimes cases it was actually equal to 0x8000 (bit 15 =1). This explains the bug. The fix is to set accumulator to 0 during PFB initialization.

- Bug in calculation of encoder counter offset was fixed. This bug caused an R14 fault if ATAN and A/B state disagree.

- Discrepancy between PFB and HWPOS on power up fixed. There was 180 degrees offset between ATAN and HWPOS.

  Customer complaint:
  PFB/MSININT was not equal to HWPOS; usually difference was 1, but sometimes 2.

  Observation:
  The problem is that drive inverts internally the counting direction of sine encoder, but HWPOS still counts in original direction, this cause 180 degrees offset between HWPOS and ATAN (analog word for interpolation).

  Fix:
  The fix is adding 180 degrees to ATAN during sine encoder initialization.

Known Issues and Limitations

None

Version 1.3.9

Release Date: August 11,2005

Additions and Changes

- Support for Phase Finding coordination with the Controller added.
- Support for 5MHZ encoder input frequency
- Added quad encoder filter (qualifier) at the DSP.

  The firmware will set the qualifier automatically, based on MENCRES and VLIM. The firmware can calculate the maximum frequency. If less then or equal to 3 MHz, the firmware will set the qualifier to 1. If greater then 3 MHz, the firmware will set the qualifier to 0.

  A qualifier of 1 is equivalent to a filter of 80nsec. I.e. the signal has to be stable for more than 80nsec for an encoder signal state to be recognized as a valid state.

- Support for WNS duration added. Parameter INITTIME (SynqNet index 0x5D) defines WNS duration.
- Added support for RMTMODE (SynqNet index 0x5E).
  - RMTMODE = 0: remote enable input is required (pins 7, 8 on C3 connector) to enable the drive.
  - RMTMODE = 1: remote enable input is ignored by drive.
- Added support for sine/cosine Real-Time Monitoring with sine encoder and resolver feedback. Index 40 for sine, and index 41 for cosine.
- New command EMEMW defined for EnDat memory reading (serial port access only).

  This command was added for purposes of debugging the EnDat alarm word. The command is used only to read the EnDat memory. The syntax is

      EMEMW

  0 reads the EnDat alarm information.

Bug Fixes

- Default value for MENCTYPE is 0 when position feedback Resolver. This is done to avoid the following problem:

  If the drive is RESOLVER and MENCTYPE is set to 9 (default), the resolver internal MPHASE is calculated with the 60 degrees EnDat offset. The bug is that this correction doesn't consider the feedback type

- Bug Fix: Sometimes the drive reads resolver in increments of 4096 and only CLREEPROM helps clear this situation.

  Root cause: The problem happens if SINPARAM values are invalid (related to sine/cosine calibration). SINPARAM can be invalid if the sine calibration process runs when feedback not connected.

  Solution:

    a) Do not enable sine/cosine calibration when there is a feedback loss fault

    b) After power up, if the SINPARAM values are invalid, clear these parameters and enable the calibration process.

  Although sine/cosine calibration starts automatically on power up, the firmware needs to detect 128 sine/cosine peaks to accomplish the calibration. If SINPARAM values are invalid, the PFB/PRD reading during calibration will increment by 4096 counts and drive will not be able to rotate motor. The only option is rotate motor by hand till calibration completed. In firmware 1.3.9 if SINPARAM values are invalid, the firmware initializes them to default values, and PFB/PRD will count correctly.

- Bug fix: With UVMODE=2: After UVTIME, the UV fault is set, as expected. However, the fault indication can be cleared even though the fault still exists. The fault indication returns when the drive is enabled.

- Bug fix: The SynqNet WARNING bit is not set when an under-voltage event occurs with UVMODE=1.

- EnDat alarm cleared on power up.

  Sometimes the EnDat Alarm bit is set at power-up. Based on recommendations from Heidenhain, the alarm bit is cleared at power up.

Known Issues and Limitations

None

Version 1.4.0

Release Date September 26, 2005

Additions and Changes

- WD disabled before main, this done to eliminate WD while "C" initializes variables before main function.

- New fault for ENDAT encoder added: on power up drive resets alarm at ENDAT if after reset alarm word is not zero drive latches fault.

- ConsiderFrac function updated according fix that was found in STARC.

- segment display updated for phase finding: for MENCTYPE=3 if drive was attempted to enable before issue phase find procedure,"-3" displayed on 7 segment, if phase finding fails "-4" will be displayed, for MENCTYPE=4 if phase finding fails "-4" will be displayed .

- Control and warnings bits behavior was updated according last spec.

- REMOTE command changed to show real status of remote input.

- Support for Sine Encoder with HALLS added (MENCTYPE=6)

- Support in SynqNet for resolver calibration parameters added (SINPARAM index 5 and 6) index in SynqNet 0x5F and 0x60 accordingly.

- The current monior needs \scaled by 1.25, so that the DAC command and the monitored curretn will be on the same scale.

Bug Fixes

- Bug fix: When bit 0 of MFBDIR is set to 1, the actual direction of PRD does not change.

- Bug fix: Direct command 0xB did not set high 16 bit of returned data, this caused that high 16 bit contained "junk" value.

Known Issues and Limitations

None

Version 1.4.1

Release Date November 21, 2005

Additions and Changes

- When in SynqNet mode - don't clear faults when K, EN cycle is done from the serial port

Bug Fixes

- Handle saturation in software resolver to digital at all stages of the SININIT (sine/cosine calibration) gain and offsets signal corrections.

Known Issues and Limitations

None

Version 1.4.2

Release Date November 22, 2005

Additions and Changes

None

Bug Fixes

- Bug fix: Drive tried to execute encoder initialization procedure with resolver feedback

Known Issues and Limitations

None

Version 1.4.3   Official firmware release: ECO 767

Release Date December 5, 2005

Additions and Changes

- EnDat alarm fault (R15) was disabled.

Bug Fixes

None

Known Issues and Limitations

None