

TB264 (Rev4) - Delta ASDA-A2-U Precision Mode Setup

Purpose:

This tech bulletin explains the steps that are needed in order to properly configure the Delta ASDA-A2-U servo drives as well as CNC11 software for Precision Mode

Requirements:

ASDA-A2 Drive Manual

Windows PC with Delta A2 Software

USB cable – may need an additional USB extension cable

CNC11 system with Optic Direct or OAK installed running CNC11 v3.09r15 or higher and having the correct PLC program loaded

Download links

[CNC11](#)

<http://www.ajaxcnc.com/ajax-cnc-software-downloads/> for latest revision of software

[Delta Software](#)

http://www.delta.com.tw/product/em/motion/motion_servo/download/software/ASDA_Soft_V4.08.05_Install_Edition.zip

[Delta A2 Manual](#)

http://www.delta.com.tw/product/em/motion/motion_servo/download/manual/DELTA_ASDA-A2_M_EN_20130315.pdf

Installing and Configuring of Delta Software:

1. Copy the ASDA_Soft_V4.08.05_Install.zip file to the PC which will be used to connect to the Delta drive.
2. Double-click the ASDA_Soft_V4.08.05_Install.zip file to open it and then double-click the ASDA_Soft V4.0805.msi file to install making sure to install everything to the default locations selected by the software.



Once the software has completed the installation, there will be a shortcut on the desktop.

3. Double-click the ASDA shortcut to start the Delta software. The first time the software is run, you will be prompted to install USB drivers. Install the USB drivers, shut the PC off, and then power the PC back up with USB cable disconnected.
4. Plug the USB cable into the Delta drive as well as the PC. Windows may indicate that it is installing drivers when you reboot. Let it complete before starting the ASDA software.

5. Start ASDA software
 - a- Select a language.
 - b- Click on the "COM Port Setting" tab.
 - c- Click on the down arrow of the drop-down box.
 - d- Scroll down and select ASDA-A2.
 - e- Click OK.

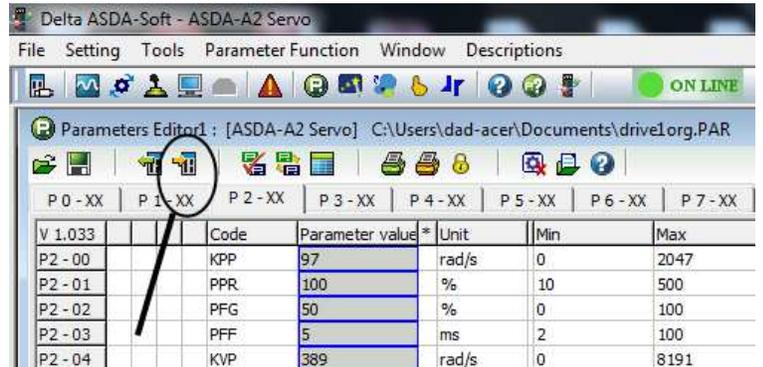
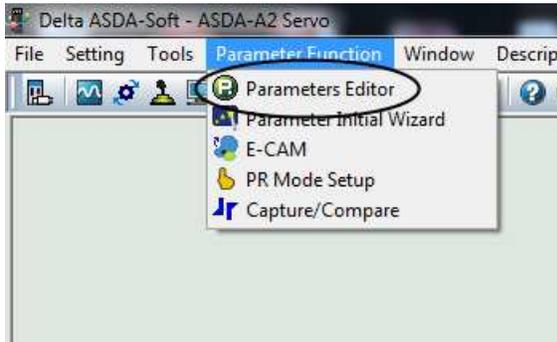


6. Click autodetect to configure your com port settings. If it's not successful, try powering off and back up again. After it has autodetected, click OK. Notice that the drive has now come online.

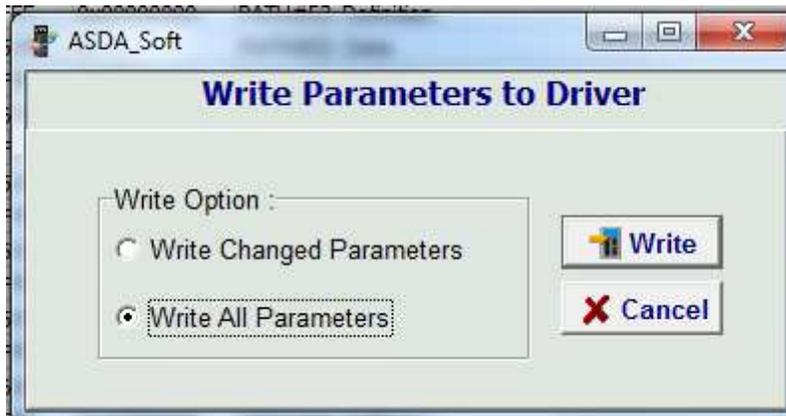


Configuring and Tuning Delta ASDA-A2 Drives:

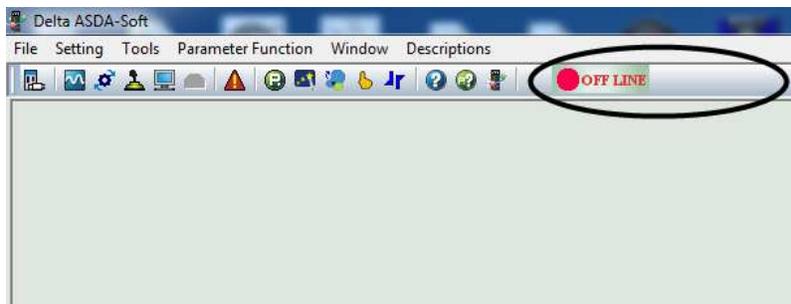
1. **ALWAYS** begin by setting the drive back to the factory default configuration.
 - a- Select "Parameter Function" from the menu bar at the top of the screen.
 - b- Select "Parameters Editor" from the drop-down.
 - c- When the editor screen fills, it fills with the default settings for the drive. Click the icon with the arrow pointing at the drive to send the default parameters to the drive.



- d- Select "Write All Parameters" when prompted. There may be a few errors about being unable to write certain parameters but it's safe to ignore those errors.



2. Since some parameters require the drive to be rebooted before they take effect, remove power from the drive, wait 10 seconds, and then power the drive back up. If the menu bar at the top of the screen indicates "Off Line", click on it to toggle the drive to "On Line".



3. As in step 1, open the "Parameters Editor" from the "Parameter Function" tab and set the following parameters to configure the Delta drive for precision mode operation.

Note – Use the tabs at the top of the Parameters Editor screen to select the Parameter Group (01-, 02- etc.) for editing

P00-03	0x10	Analog output monitor represents motor torque
P01-00	0x1000	Encoder is AB pulse output
P01-01	0x0100	Precision mode control
P01-40	3000*	Motor max commanded RPM. Depends on motor
P01-41	200	Max analog torque command
P01-44	320000	Encoder output pulses**Delta encoder line count
P01-45	8192	Centroid pulse input ratio
P01-46	8192	Encoder output pulses**
P01-55	3000*	Max allowed RPM of motor. Depends on motor
P02-10	0x0101	DIO1 - Drive Enable
P02-11	0x0000	DIO2 - not used
P02-12	0x0000	DIO2 - not used
P02-13	0x0000	DIO3 - not used
P02-14	0x0102	DIO5 - Reset Servo Drive
P02-15	0x0000	Disable + limit switch
P02-16	0x0000	Disable - limit switch
P02-17	0x0000	Disable EMGS function
P02-21	0x0108	DO4-Motor Brake Output
P02-22	0x0007	DO5-Motor Alarm Output
P02-32	0x0000	Continuous tuning mode
P02-33	0x0000	Semi-auto mode inertia adjustment
P02-47	0x0000	Auto resonance suppression
P02-66	0x0004	Auto-reset undervolt error

After all the parameters above have been set, click the icon with the arrow pointing at the drive to send the parameters to the drive. Select "Write All Parameters". There may be a few errors about being unable to write certain parameters but it's safe to ignore those errors.

4. Unplug the power from the drive and plug it back in to reboot the drive.

5. When the drive is back up, restart the ASDA software. If the menu bar at the top of the screen indicates "OFF Line", click it to toggle the drive online.

6. Tune the Delta drives.

a- Select "Tools" from the menu bar.

b- Click "Auto Gain Tuning" from the drop down.

c- Check the box for "Enable Gain Control Panel".

d- Click "Servo On".

e- Use the arrow button(s) to jog to the first position you wish to move to while tuning.

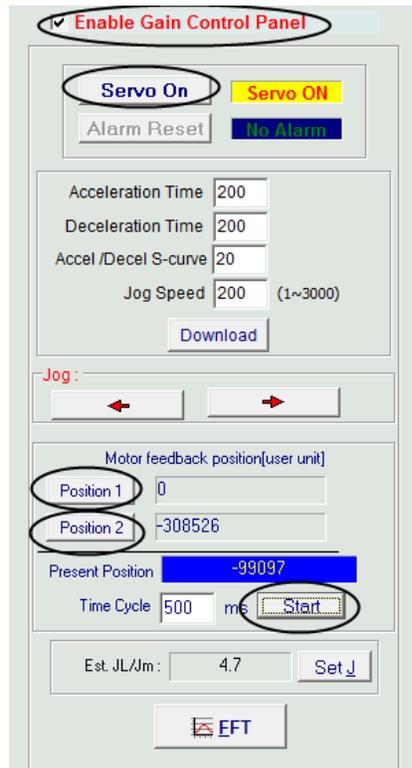
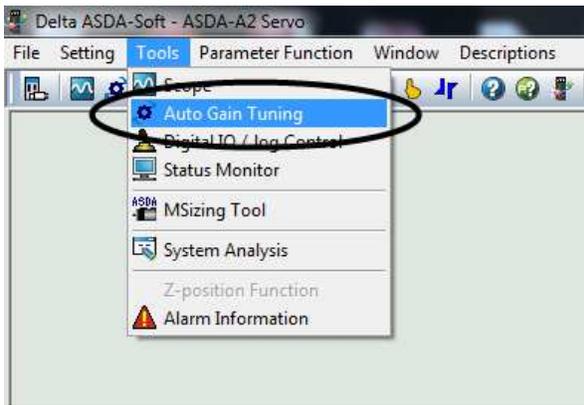
f- Click the "Position 1" button.

g- Use the arrow button(s) to jog to the second position you wish to use for tuning.

Note – It should be a couple of inches from the first position

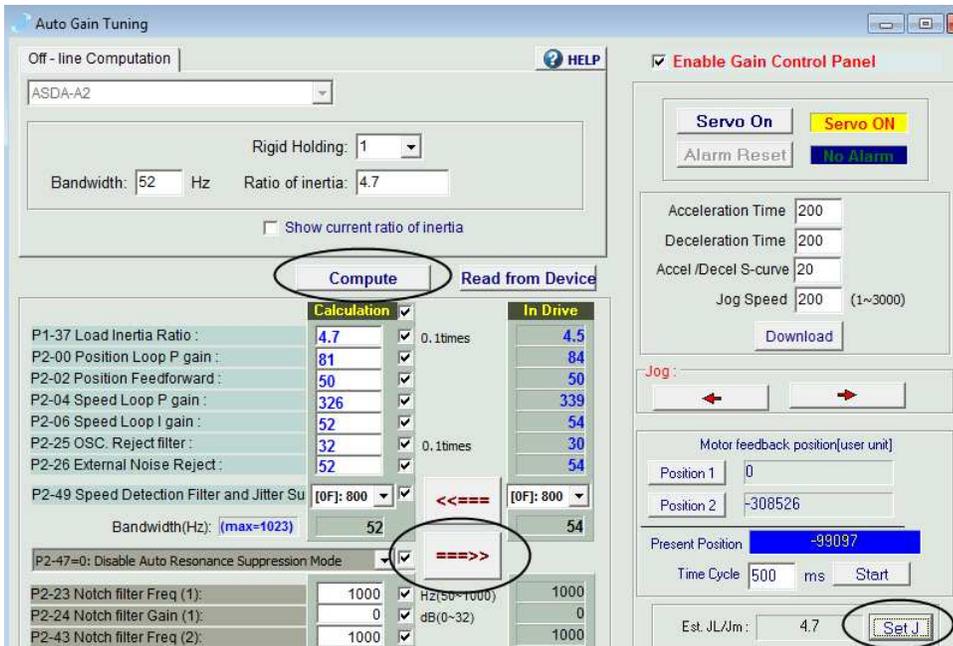
h- Click "Position 2" button.

i- Click "Start" to begin tuning.



7. Watch the value in Est. JI/Jm box at the bottom of the screen. When it stops changing (less than a minute) you can stop the auto tune.

- a- Click "Set J".
- b- Click "Compute".
- c- Click the "====>>" button in the bottom section of the screen to send the data to the drive.



Note – You can generally use the auto-calculated values for Bandwidth (52hz) and Ratio of Inertia (4.7) without trouble. It may be necessary, particularly on bigger machines, to manually adjust the Bandwidth closer to 100Hz and the Ratio of Inertia to 1 or 2 but try using the autocalculated values first.

8. Turn off "Servo On" and close the Auto Gain Tuning window. Close the Delta software, unplug power from the drive, and plug it back in to reboot the drive.

CNC11 Control Configuration

1. When all the Delta drives have been tuned and the parameters have been SAVED to the drives in the Delta software, start the CNC11 software.

a- From the main screen press F1(Setup)→F3(Config)→default password is 137→F2(Mach)→F2(Motor).

b- Set the “Encoder Counts/Rev” to 32768 for all axes and then press F10(Save).

c- Press ESC once→ F3(Params) → F8(Next Table) until it's at P200-P299 page.

d- Set parameter 256 to 2 to enable precision mode and press F10(Save).

e- Press F4(PID)→ F1(PID Config).

f- Set K_p , K_i , and K_d to 0 for all axes. Note – Do NOT set the Accels to 0 or you will not be able to move the machine. Leave these set to 0.5.

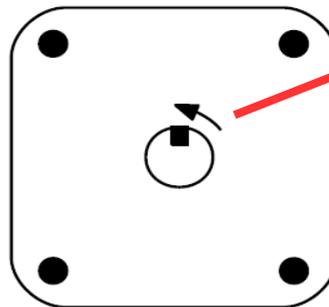
2. Use the ASDA software to jog the motors (as in step 6 above). In the PID menu, confirm that the Abs Pos field is increasing when the shaft is moving counter clockwise.

Axis	Error	Sum	Delta	PID Out	Abs Pos	Max Error	Min Error
X*	0	0	0	OFF	-1	0	0
Y*	0	0	0	OFF	-1	0	0
Z	0	0	0	OFF	0	0	0
N*	0	0	0	OFF	-1	0	0
N*	0	0	0	OFF	-1	0	0
N*	0	0	0	OFF	2	0	0
N	0	0	0	OFF	0	0	0
N	0	0	0	OFF	0	0	0

PID Menu

PID Config F1

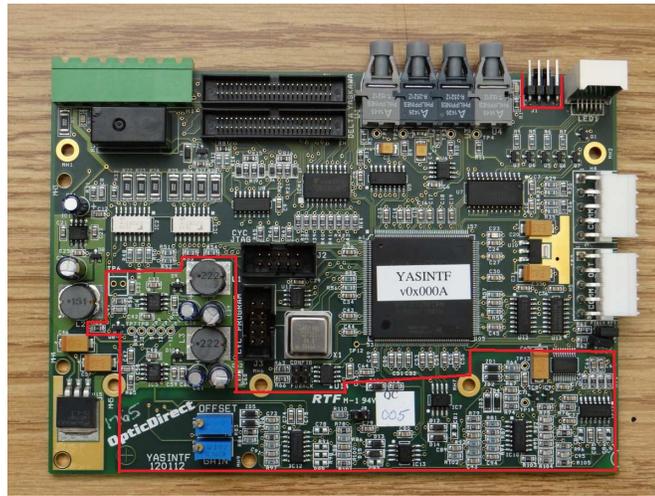
Tune F5 Drag F6 Laser F7 Drive F8 Plot F9



3. In the PID menu, press F5(Tune) and then press Cycle Start.

Load Meter Setup

1. If using the OAK board, all that is needed is the Delta interface cable for the OAK board, Centroid part number 13131. If using the OpticDirect boards, please verify that the OpticDirect board has the analog section populated as shown in the photo below.



2. Verify that the following is defined in the PLC program. **Note** – The input and word definitions may vary depending on the component that is being used to read the analog torque voltage from the Delta drive as well as what is already being defined in the PLC program

Input Definitions

AnalogInput1	IS INP241
AnalogInput2	IS INP257
AnalogInput3	IS INP273
AnalogInput4	IS INP289
AnalogInput5	IS INP305

Word Definitions

XMeterADC_W	IS W14
YMeterADC_W	IS W15
ZMeterADC_W	IS W16
AMeterADC_W	IS W17
SpindleMeterADC_W	IS W20

Main Stage

```
IF true THEN BTW XMeterADC_W AnalogInput1 16,
              BTW YMeterADC_W AnalogInput2 16,
              BTW ZMeterADC_W AnalogInput3 16,
              BTW AMeterADC_W AnalogInput4 16,
              BTW SpindleMeterADC_W AnalogInput5 16
```

```
IF XMeterADC_W > 32767 THEN XMeterADC_W = XMeterADC_W - 65536
IF YMeterADC_W > 32767 THEN YMeterADC_W = YMeterADC_W - 65536
IF ZMeterADC_W > 32767 THEN ZMeterADC_W = ZMeterADC_W - 65536
IF AMeterADC_W > 32767 THEN AMeterADC_W = AMeterADC_W - 65536
IF SpindleMeterADC_W > 32767 THEN SpindleMeterADC_W = SpindleMeterADC_W - 65536
```

```
; TODO: Pre-compute constants in initial stage
; The Delta drives put out +/-8V at max torque
; The spindle is +/-10V
```

```
IF true THEN XMeterADC_W = (100 * XMeterADC_W) / 1638,
              YMeterADC_W = (100 * YMeterADC_W) / 1638,
              ZMeterADC_W = (100 * ZMeterADC_W) / 1638,
              AMeterADC_W = (100 * AMeterADC_W) / 1638,
              SpindleMeterADC_W = (100 * SpindleMeterADC_W) / 2048
```

```

IF true THEN SV_METER_1 = abs(XMeterADC_W),
SV_METER_2 = abs(YMeterADC_W),
SV_METER_3 = abs(ZMeterADC_W),
SV_METER_4 = abs(AMeterADC_W),
SV_METER_6 = abs(SpindleMeterADC_W)

```

3. Verify that parameters 35, 57, 137, 143, and 313 are set correctly.

Parameter 35

This is the axis that is assigned as your spindle axis. By default, it should be set to 6.

Parameter 57

This is bit based parameter that tells the CNC11 software which axes to turn the load meters on for.

Axis	1	2	3	4	5	6	7	8
Bit	0	1	2	3	4	5	6	7
Value	1	2	4	8	16	32	64	128

For example, we have a 3-axis system with a spindle in which it is desired to see the load meters of all the axes as well as the spindle. Therefore, bits 0, 1, 2, and 5 would be set. That means that parameter 57 would be a value of $1+2+4+32 = 39$.

Parameter 137

This parameter tells the CNC11 software how many samples to use when calculating the average output for the load meter display. By default it should be set to 0 but if the load meter jumps around a lot with it set to 0, this parameter can be adjusted to minimize the amount of “jumpiness” of the load meter display.

Parameter 143

This is another bit based parameter that controls the display of the axis load meters. By default it should be set to 0 which enables the load meters as well as the Distance to Go DRO and provides an outline for the load meters.

Parameter 313

This parameter tells the CNC11 software which encoder input to look at for the 6th axis, which is the spindle axis that was set by parameter 35. By default it should be 6.

Document History

Rev4 Created on 2016-01-04 by #270

Rev3 Created on 2015-02-12 by #397

[Rev2](#) Created on 2013-04-03 by #277

[Rev1](#) Created on 2013-02-08 by #000