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Subject: Configuring the Panasonic A4N over RTEX

APPLICATION NOTE

1. Introduction

The Panasonic A4N servodrive, when connected to the MC464 over RealTime Express (RTEX) can be set up using the Motion Perfect v3 Intelligent Drives window. This document is a short guide to using MPv3 to set up the A4N position loop servo gains.

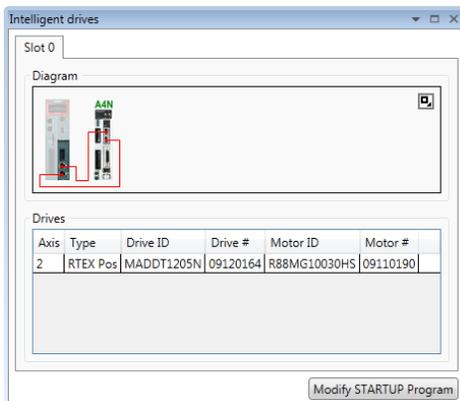
2. RTEX mode

On power up, the MC464 connects to all A4N drives in the network. Each drive is allocated an axis number according to the switch setting on the front of the drive. The servo drives are in Position mode which means the drive controls both the velocity loop and the position loop. The MC464 axis gains; P_GAIN, I_GAIN, D_GAIN, OV_GAIN and VFF_GAIN have no function when the drive is in position mode.

Motion is controlled by the MC464. Each servo period (1 msec) a new target position is sent to the drives. The drives use the target position as their demanded position and the closed loop servo in the drive forces the actual position to follow this demand.

3. Intelligent Drive function

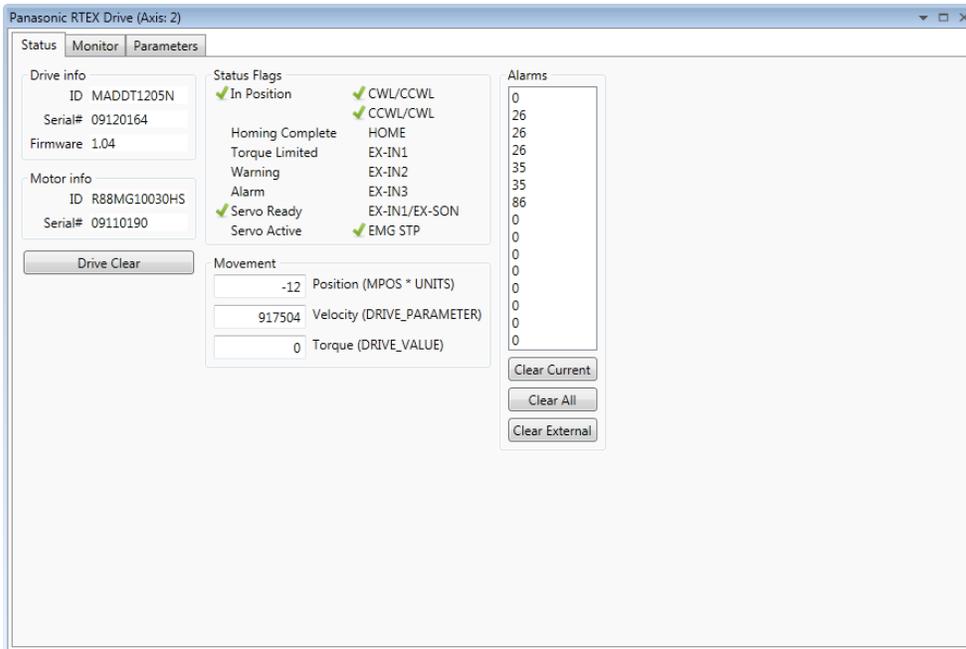
Before you can manually change the position loop setting, you must first open the Intelligent Drives window in Motion Perfect v3.



Click the Intelligent Drives button in the main tool bar to open this window.

Next, double-click the axis you want to set up. For example here; where it says 2 under the Axis column.

3.1.1. Drive Status page



The first page you will see is the status page.

Click the Parameters tab to see the list of drive parameters:

3.1.2. Drive Parameters

No.	Name	Range	Default	Value	Units
1	LED display	0, 1, 2	0	0	
2	Control mode	0, 6	0	0	
3	Torque limit selection	1..3	1	1	
4	Overtravel input inhibit	0..2	1	1	
6	Address indicated time at power up	0..1000	10	10	100ms
7	Speed monitor (SP) selection	0..11	3	3	
8	Torque monitor (IM) selection	0..14	0	0	
9	Unit of velocity	0..2	0	0	
10	Inhibit parameter change via network	0, 1	0	0	
11	Absolute encoder setup	0, 1, 2	1	1	
12	Baud rate of RS232	0, 1, 2	2	2	

Before you can change the drive parameters over the RTEX network you must set parameter number 10 to 0. If it is not 0 already, set it to 0, then click the Store in EEPROM button, close the intelligent drive pages and power cycle the drive.

4. Tuning the Position Loop

Disable the auto-tuning by setting parameter 33 to 0.

Now you can set parameters 16; 1st position loop gain and 21 velocity feedforward gain.

As an aid to tuning, it is a good idea to write a small program to step the motor through 45 or so degrees. The Motion Perfect oscilloscope can then be used to check the response of the motor. Do the test with the load applied to the motor shaft as the amount of load inertia will affect the response.

4.1.1. List of drive tuning parameters.

Panasonic RTEX Drive (Axis: 2)

Status Monitor Parameters

All Parameters

No.	Name	Range	Default	Value	Un
15	Update counter warning setup	0..32768	0	0	
16	1st position loop gain	0..3000	63	250	1/s
17	1st velocity loop gain	0..3500	35	35	Hz
18	1st velocity loop integration time constant	1..1000	16	16	ms
19	1st speed detection filter	0..5	0	0	
20	1st torque filter time constant	0..2500	65	65	10ms
21	Velocity feed forward	-2000..2000	300	1110	0.1%
22	Feed forward filter time constant	0..6400	50	50	10ms
24	2nd position loop gain	0..3000	73	73	1/s
25	2nd velocity loop gain	1..3500	35	35	Hz
26	2nd velocity loop integration time constant	1..1000	1000	1000	ms
27	2nd speed detection filter	0..5	0	0	
28	2nd torque filter time constant	0..2500	65	65	10ms
29	1st notch frequency	100..1500	1500	1500	Hz
30	1st notch width selection	0..4	2	2	
32	Inertia ratio	0..1000	0	160	%
33	Real time auto tuning setup	0..7	1	0	
34	Machine stiffness at auto tuning	0..15	4	4	

Store In EEPROM

Set Selected To Default

Set All To Default

Defines the speed feed forward value. The unit is [0.1%].

Use this function when particularly high speed response is required.

4.2. Step response program

```

' step the axis to see response

ax=2
cpr = 10000
stepsize=cpr/5

BASE (ax)
UNITS=1
SPEED=3000*cpr / 60
ACCEL=SPEED*1000
DECEL=SPEED*1000
SERVO=ON
WDOG=ON

DEFPOS (0)

WHILE MOTION_ERROR=0
  TRIGGER
  WA (20)
  MOVE (stepsize)
  WA (500)
  MOVE (-stepsize)
  WA (480)
WEND

```

4.2.1. Use Real time auto tuning

Panasonic RTE Drive (Axis: 2)

Status Monitor Parameters

All Parameters

No.	Name	Range	Default	Value	Un
16	1st position loop gain	0..3000	63	63	1/s
17	1st velocity loop gain	0..3500	35	35	Hz
18	1st velocity loop integration time constant	1..1000	16	16	ms
19	1st speed detection filter	0.5	0	0	
20	1st torque filter time constant	0..2500	65	65	10μs
21	Velocity feed forward	-2000..	300	300	0.1
22	Feed forward filter time constant	0..6400	50	50	10μs
24	2nd position loop gain	0..3000	73	73	1/s
25	2nd velocity loop gain	1..3500	35	35	Hz
26	2nd velocity loop integration time constant	1..1000	1000	1000	ms
27	2nd speed detection filter	0.5	0	0	
28	2nd torque filter time constant	0..2500	65	65	10μs
29	1st notch frequency	100..1500	1500	1500	Hz
30	1st notch width selection	0.4	2	2	
32	Inertia ratio	0..1000	0	100	%
33	Real time auto tuning setup	0..7	1	1	
34	Machine stiffness at auto tuning	0..15	4	7	
35	Adaptive filter mode	0..2	1	1	

Store In EEPROM

Set Selected To Default

Set All To Default

Defines the operation mode of real-time auto tuning.

Increasing the set value (3, 6, ...) provides higher response to the inertia change during operation. However, operation may become unstable depending on the motion pattern.

Normally, set to "1" or "4".

When it is used in vertical axis, set to "4 - 6".

Alternatively, the drive can be set up using the Real-time auto tuning. (set parameter 33 to 1)

Use parameters 32; Inertia Ratio and 34; machine stiffness at auto tuning to affect the response to the step change in demanded position.

4.2.2. MPv3 scope trace showing the actual position response to a small step change in position.

