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T E C H N I C A L   N O T E

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Subject:	**Sigma II Drive Controlled Homing using Trio controllers**

The Trio BASIC program listed below is used to setup and execute drive controlled homing in the Yaskawa Sigma II drive, using a Trio SERCOS master controller. Note that all configuration is setup using the program constants at the top of the program. The drive must be in position control mode, the SERCOS ring in control phase 4 (CP4), and the drive enabled. The program below uses an encoder of resolution 8192.

```
' Program: Homing Test Program
' Date   : 6th Dec 2006
'
' Description :
'
' Drive controlled homing, to be used with the P730 v0.0.14 firmware
' and above.
'
' Standard Homing IDNs :
'
' S41  - homing velocity - 256th encoder edge per msec
'      - hence if home speed is in revs per sec, use algorithm
'      - S41 = home_speed*(enc_resolution/1000)*256
' S42  - home accel = 256th encoder edge per msec*msec
' S147 - Homing Parameter
'      - 0x00 : clockwise homing direction
'      - 0x01 : ccw homing direction
'      - 0x20 : do not evaluate the home switch
'      - 0x40 : do not evaluate the z mark
' S52  - Ref Dist 1
' S150 - Ref Offset 1
' S403 - homing status
'      - 0 : homing
'      - 1 : homed
' S148 - drive controlled homing procedure command
'
' Propietary Homing IDNs :
'
' S0xC100 - Homing Mode
'         - 0 : standard
'         - 1 : special profile 1
' S0xC101 - Homing input
'         - Options 0:SI0,1:SI2, ... ,6:SI6
' S0xC102 - Homing Creep velocity (units as above)
' S0xC103 - Time constant
```

```
'
'
' Homing modes :
'
' Standard
' Drive moves until hits switch, and then slows to creep velocity and
' continues to move in the same direction until it hits the z-mark.
' Note that whether the z-mark and/or switch are evaluated is defined by
' the homing parameter (S147).
'
' Special 1:
' Drive moves until hits switch at homing velocity. It then changes direction
' and reverses off at creep velocity, and then changes direction and moves
' forward until it sees the z-mark.
'
' Drive Notes
'
' CN1
' Connector  Input       Default
' Terminal   Terminal    symbol        Name
' Numbers    Name
'   40       SI0         /S-ON         Servo on
'   41       SI1         /P-ON         Proportional control ref
'   42       SI2         P-OT          forward run limit
'   43       SI3         N-OT          reverse run limit
'   44       SI4         /ALM-RST      alarm reset
'   45       SI5         /P-CL         foward current limit
'   46       SI6         /N-CL         reverse current limit


'Program Constants
'homing speed in revs per sec - was 10
'(algorithm below enables us to use this multiplier in revs per sec)
home_speed = 1
'homing creep speed in revs per sec - was 0.1
'(algorithm below enables us to use this multiplier in revs per sec)
'home_creep=0.1
home_creep=0.2

'Homing Parameters
'Motion direction
clockwise = 0
cclockwise = 1 '+ve enc count direction on my motor
no_home_switch = $20
no_z_mark = $40

'Homing Mode
default = 0
profile1 = 1 'special profile 1, switch and z_mark

'Program and Drive Parameters
slt =0 'sercos daughterboard slot number
drv =1 'drive address
drv_axis = 0
enc_resolution = 8192
```

```
parameter = clockwise' OR no_z_mark 'OR no_z_mark 'OR no_home_switch
homing_mode = default 'profile1


' SERCOS Homing Parameter
ref_dist_1 = 000
ref_offset_1 = 000


' Begin

' Units are 256th enc edge per msec.
' homing velocity
home_vel = home_speed*(enc_resolution/1000)*256
home_accel = home_vel*100
' creep velosity = 1 rev per sec
creep_vel = home_creep*(enc_resolution/1000)*256


BASE(drv_axis)

'Check drive in correct control mode.
VR(0) = SERCOS(4,slt,drv,32768,2)
IF VR(0)<>$10 THEN
    PRINT "Error - drive not in correct mode - set Pn0000 to $10"
    PRINT "& cycle power to drive. "
    STOP
ENDIF


'Ensure servo off on drive axis (otherwise generates FE)
SERVO AXIS(drv_axis)=0

'Standard SERCOS Homing IDNs
'homing velocity
SERCOS(5,slt,drv,41,4,home_vel)
'homing accel
SERCOS(5,slt,drv,42,4,home_accel)
'Homing Parameter
SERCOS(5,slt,drv,147,2,parameter)
'Ref Dist 1
SERCOS(5,slt,drv,52,4,ref_dist_1)
'Ref Offset 1
SERCOS(5,slt,drv,150,4,ref_offset_1)


' Propietary Homing IDNs
'Homing Mode
SERCOS(5,slt,drv,$c100,2,homing_mode)
'Homing Input
' ( NB Options 0:SI0,1:SI2, ... ,6:SI6 )
SERCOS(5,slt,drv,$c101,2,6)
'Homing Creep velocity
SERCOS(5,slt,drv,$c102,4,creep_vel)


'Inform user
PRINT#5,"Starting homing routine"

PRINT #5, "IDNs 400",SERCOS(4,slt,drv,400),"403",SERCOS(4,slt,drv,403);
PRINT #5, "","drive status",HEX(SERCOS(4,slt,drv,135))
```

```
'Run homing command
SERCOS(6,slt,drv,148,6000,1)

nstatus = SERCOS(4,slt,drv,403)
WHILE nstatus<>1
    nstatus = SERCOS(4,slt,drv,403)
    WA(10)
    IF nstatus<>0 AND nstatus<>1 THEN
        PRINT#5,"Eh, status is ",nstatus
    ENDIF
WEND

'Read setpoint (currently updated by drive)
PRINT#5,SERCOS(4,slt,drv,47,4)

PRINT #5, "IDNs 400",SERCOS(4,slt,drv,400),"403",SERCOS(4,slt,drv,403);
PRINT #5, "","drive status",HEX(SERCOS(4,slt,drv,135))

'Before Cancel homing command
PRINT #5, "before : enc",ENCODER,"dac",DAC_OUT,"mpos",MPOS,"dpos",DPOS

WDOG=OFF
WA(100)

'Toggle servo so dac_out reflects encoder feedback
SERVO AXIS(drv_axis) = 0
WA(1)
SERVO AXIS(drv_axis) = 1
WA(2)

PRINT #5, "debug word", SERCOS(4,slt,drv,52992)
PRINT #5, "debug long", SERCOS(4,slt,drv,52996,4)

'Cancel homing command
PRINT #5, "enc",ENCODER,"dac",DAC_OUT,"mpos",MPOS,"dpos",DPOS
SERCOS(6,slt,drv,148,6000,0)

WA(100)
WDOG=ON

PRINT #5, "AFTER: ENC", ENCODER AXIS(6), "DAC",DAC_OUT AXIS(6)

nstatus = SERCOS(4,slt,drv,403)
PRINT#5,"Drive homed, pos fb status is ",nstatus

'DEFPOS(0)
```