Novanta PHOTONICS

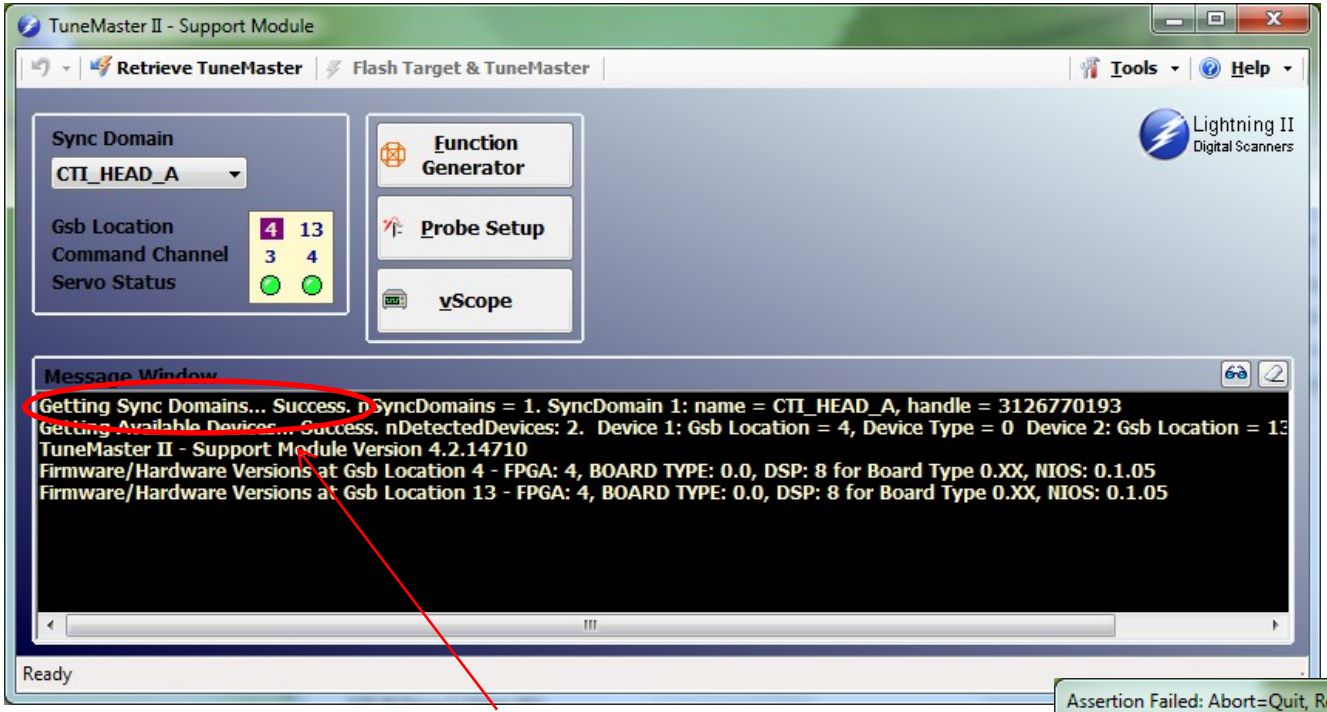
TUNEMASTERII

VIRTUAL SCOPE

Cambridge Technology, a Novanta product brand

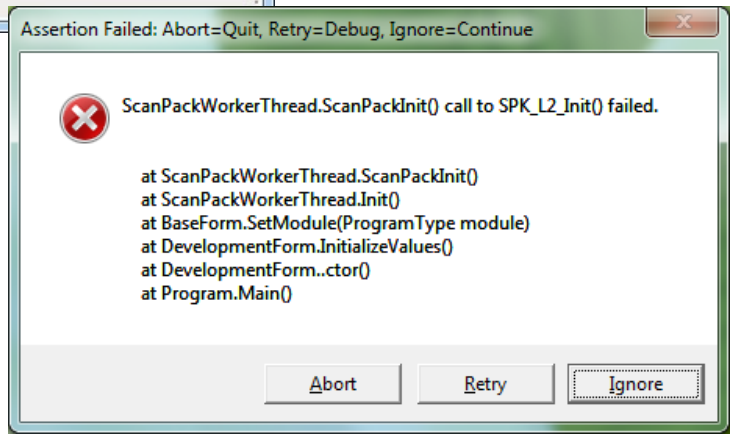
Start TuneMaster II

Turn on Lightning II control board **FIRST**, then start TuneMasterII

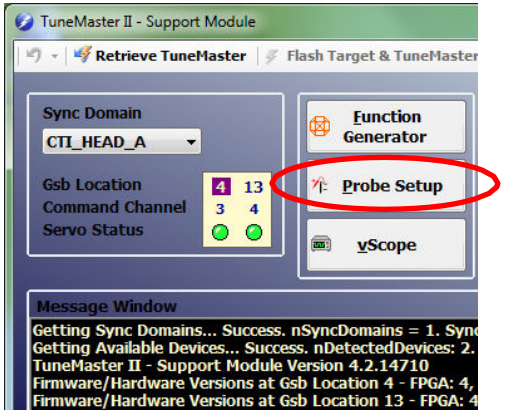


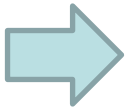
If connection is successful,
will show this message

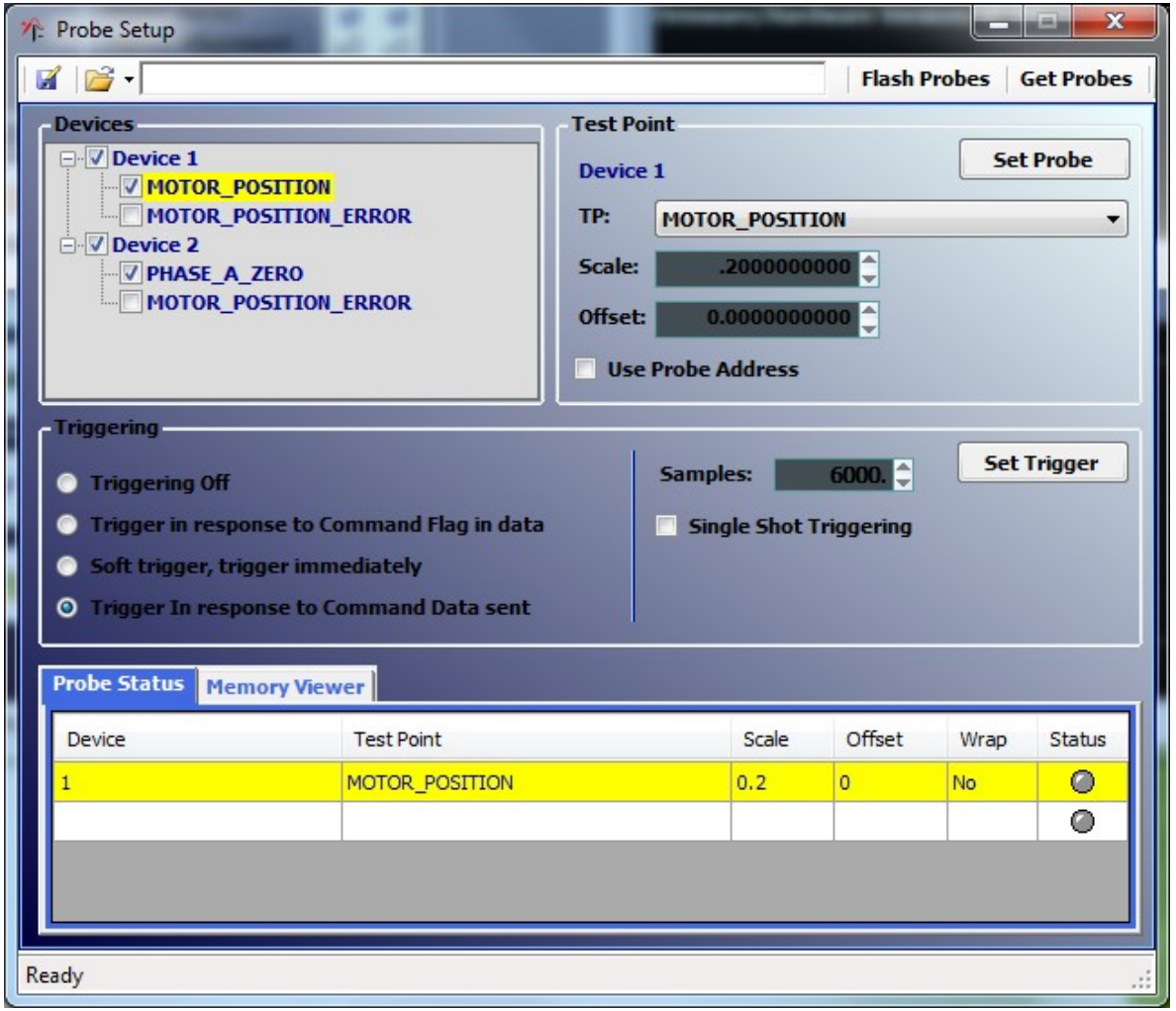
Otherwise, it will show error message
Click “Abort” to exit this window, and
power on Lightning II board first



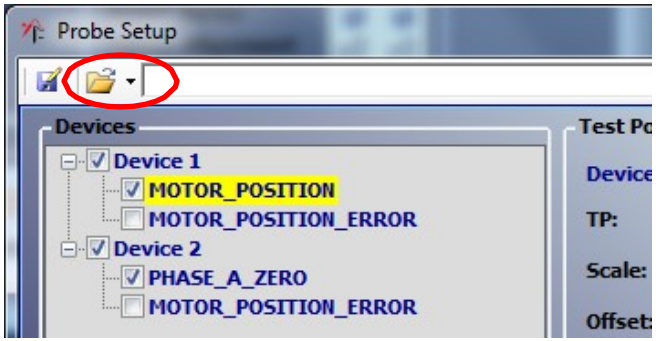
Setup Probe

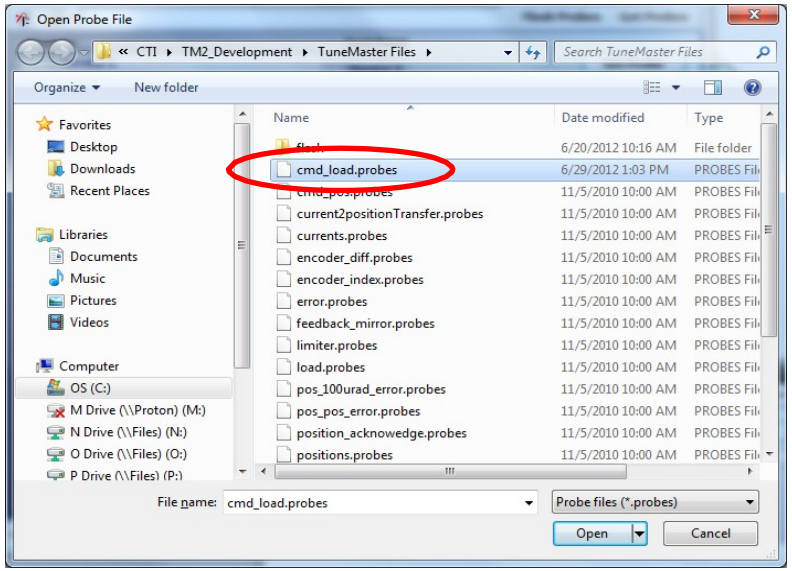

TuneMaster II - Support Module
Retrieve TuneMaster
Flash Target & TuneMaster
Sync Domain
CTI_HEAD_A
Gsb Location
Command Channel
Servo Status
4
13
3
4
Function Generator
Probe Setup
vScope
Message Window
Getting Sync Domains... Success. nSyncDomains = 1. Sync
Getting Available Devices... Success. nDetectedDevices: 2.
TuneMaster II - Support Module Version 4.2.14710
Firmware/Hardware Versions at Gsb Location 4 - FPGA: 4,
Firmware/Hardware Versions at Gsb Location 13 - FPGA: 4



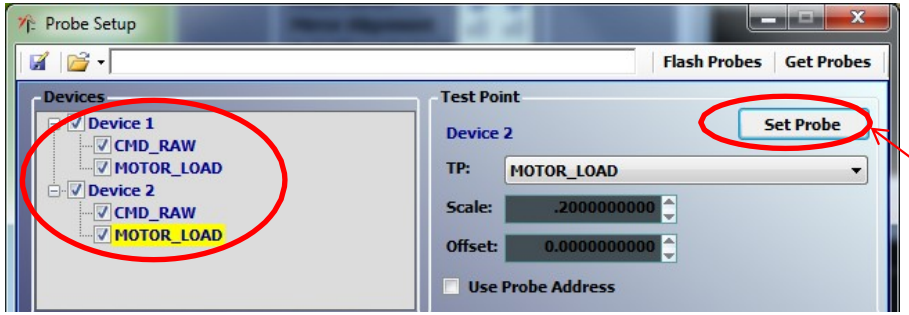

Probe Setup
Flash Probes
Get Probes
Devices
Device 1
MOTOR_POSITION
MOTOR_POSITION_ERROR
Device 2
PHASE_A_ZERO
MOTOR_POSITION_ERROR
Test Point
Device 1
Set Probe
TP:
MOTOR_POSITION
Scale:
.2000000000
Offset:
0.0000000000
Use Probe Address
Triggering
Triggering Off
Trigger in response to Command Flag in data
Soft trigger, trigger immediately
Trigger In response to Command Data sent
Samples:
6000.
Set Trigger
Single Shot Triggering
Probe Status
Memory Viewer
Device
Test Point
Scale
Offset
Wrap
Status
1
MOTOR_POSITION
0.2
0
No
Ready

1. Setup Probe with preset probe file (easiest way)



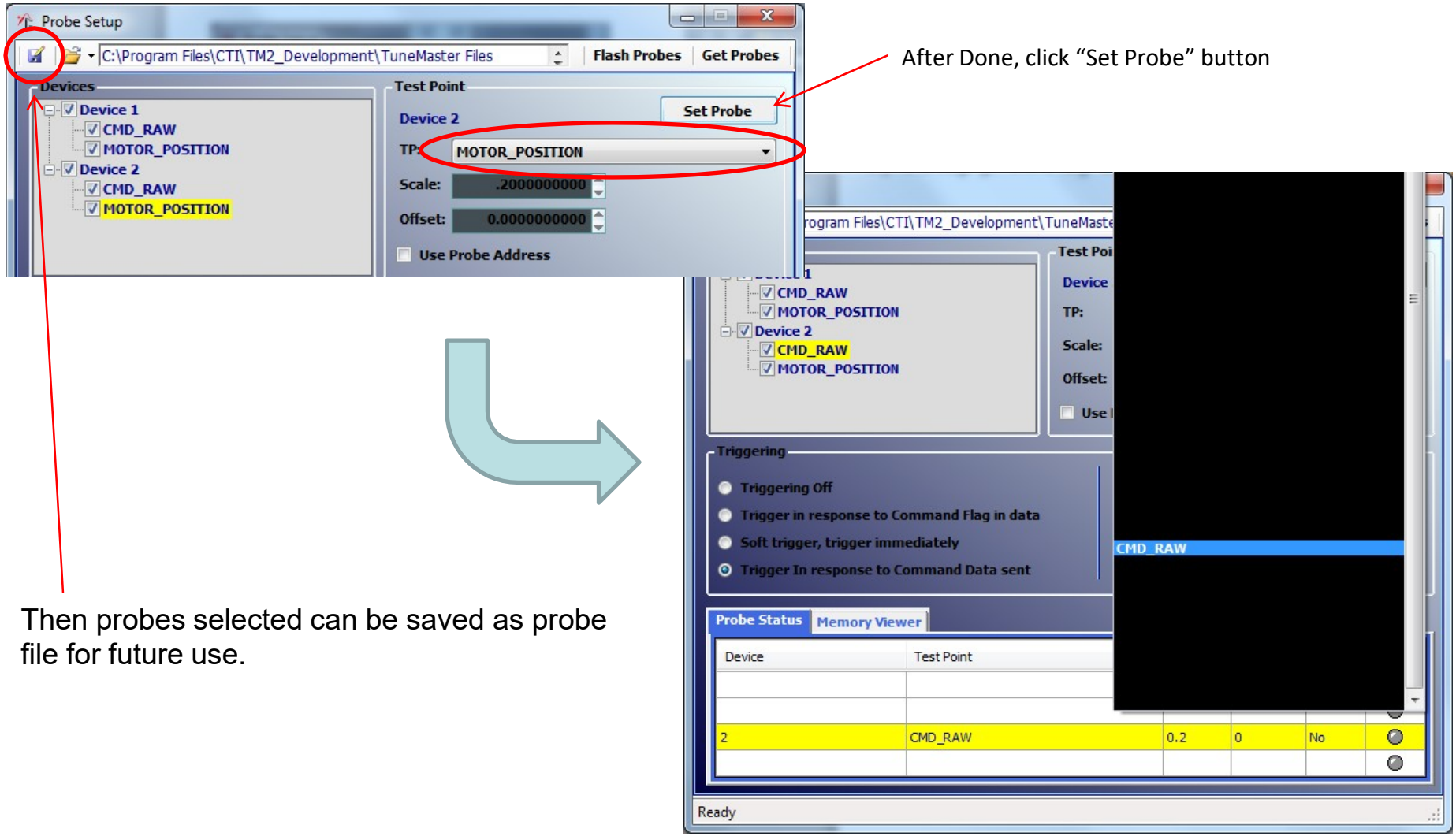


CMD_RAW
(command signal)
MOTOR_LOAD
(mirror position)
are one set of
most used probes



After Done, click
“Set Probe” button

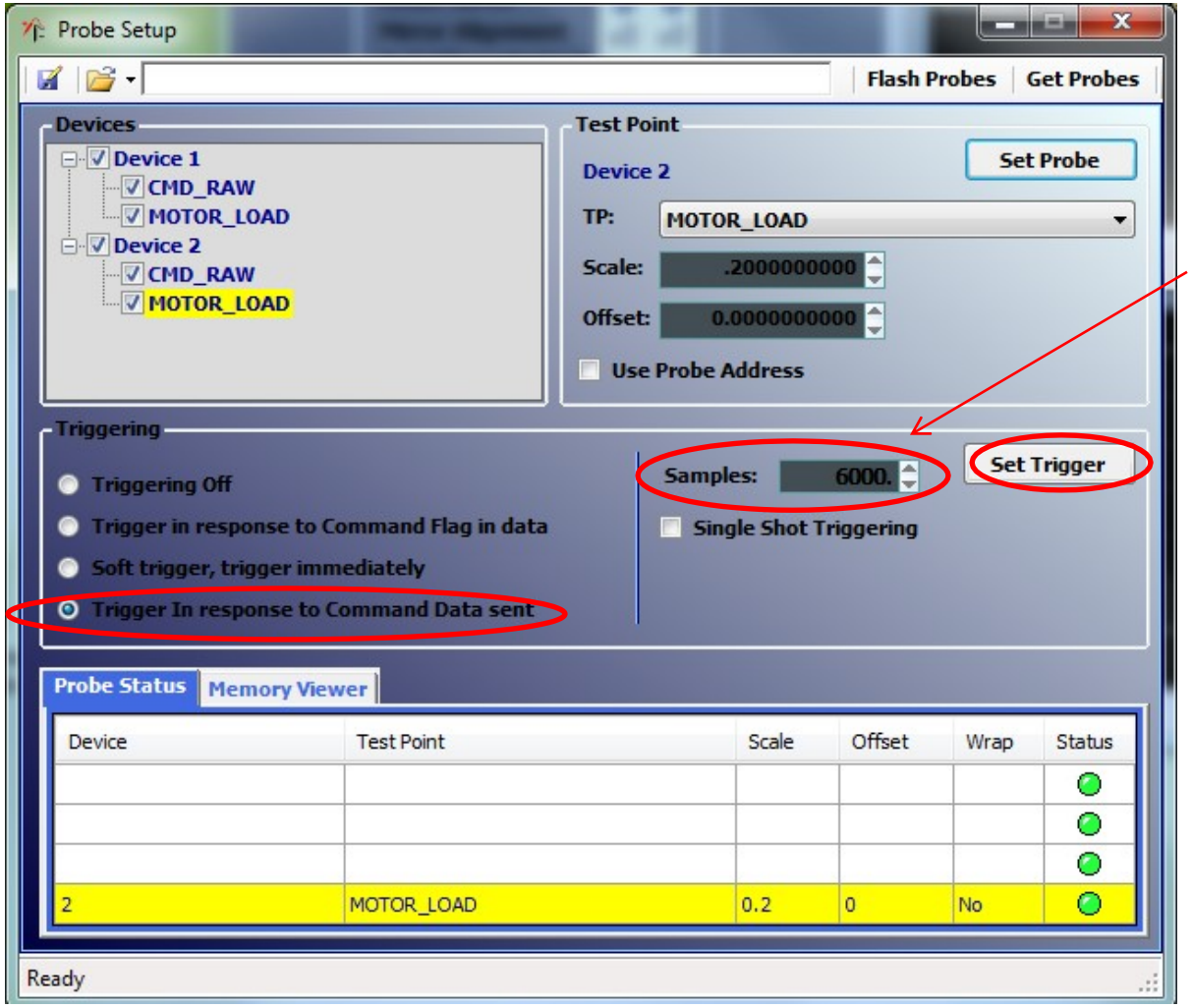
1) Setup probe by selecting individual probe type in the drop list



Then probes selected can be saved as probe file for future use.

Setup Trigger

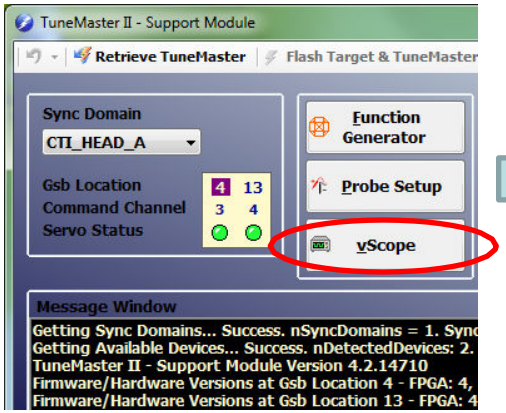
Trigger mode → Sample size → Click “Set Trigger”

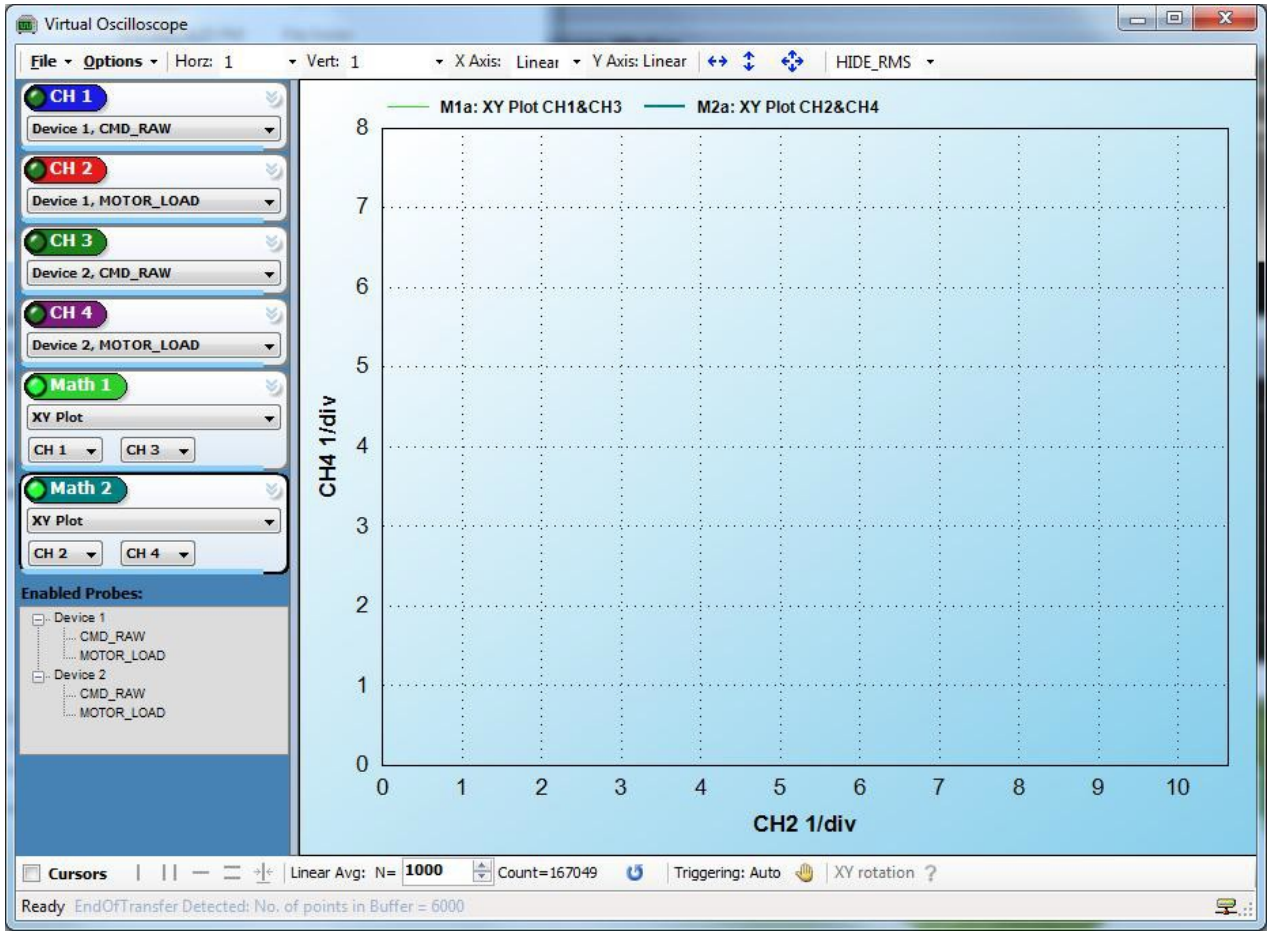


If sample size is too small, virtual scope will not see complete pattern. If sample size is too high, virtual scope will see multiple passes/traces

Virtual Scope (V-Scope)

* Run a job from SMD or other applications, use V-scope to monitor the result at real time



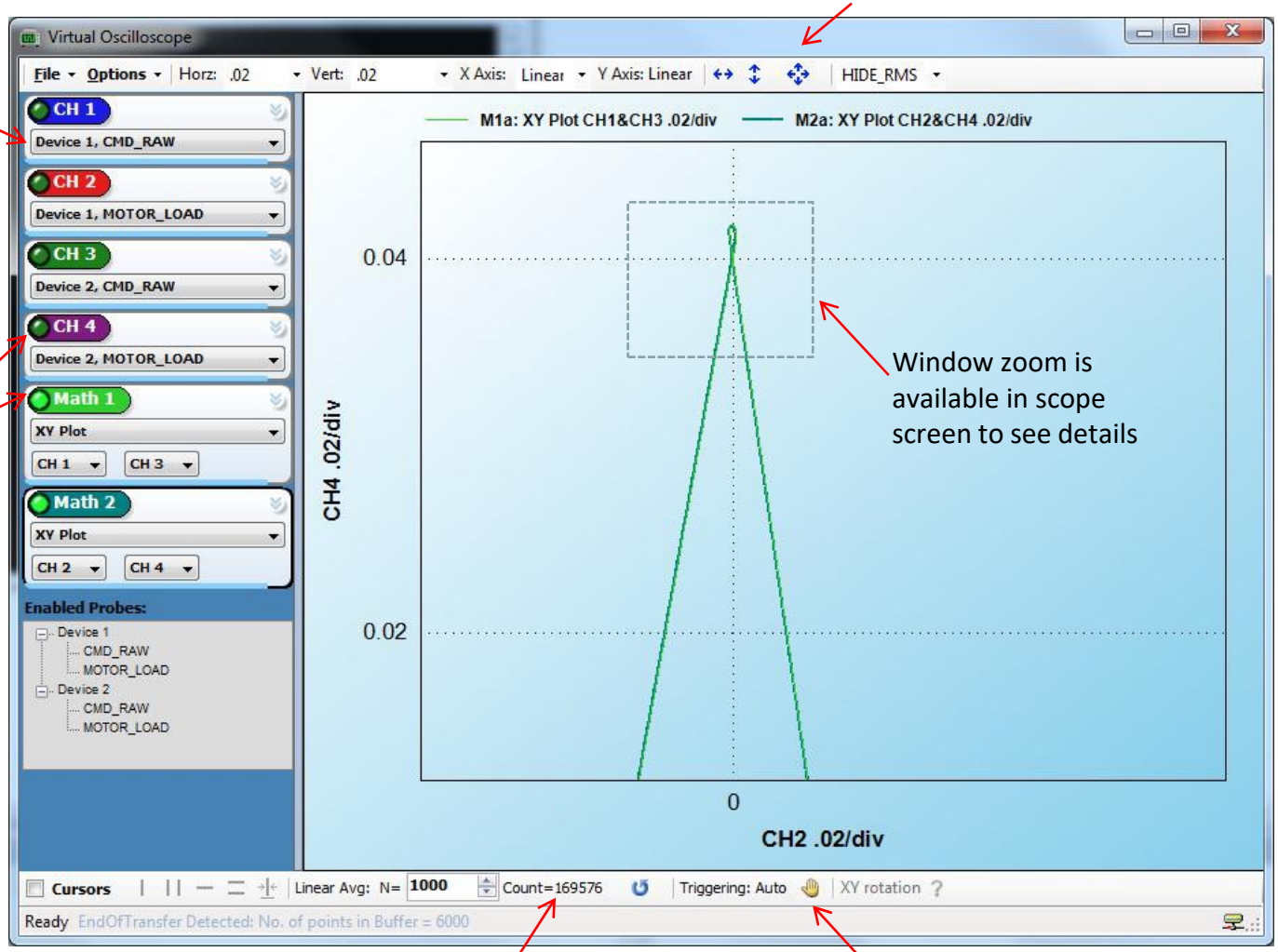


V-Scope: User Interface

Zoom out button

Choose different probe for each channel by using drop list

Click green light to turn on the individual channel or combination of them

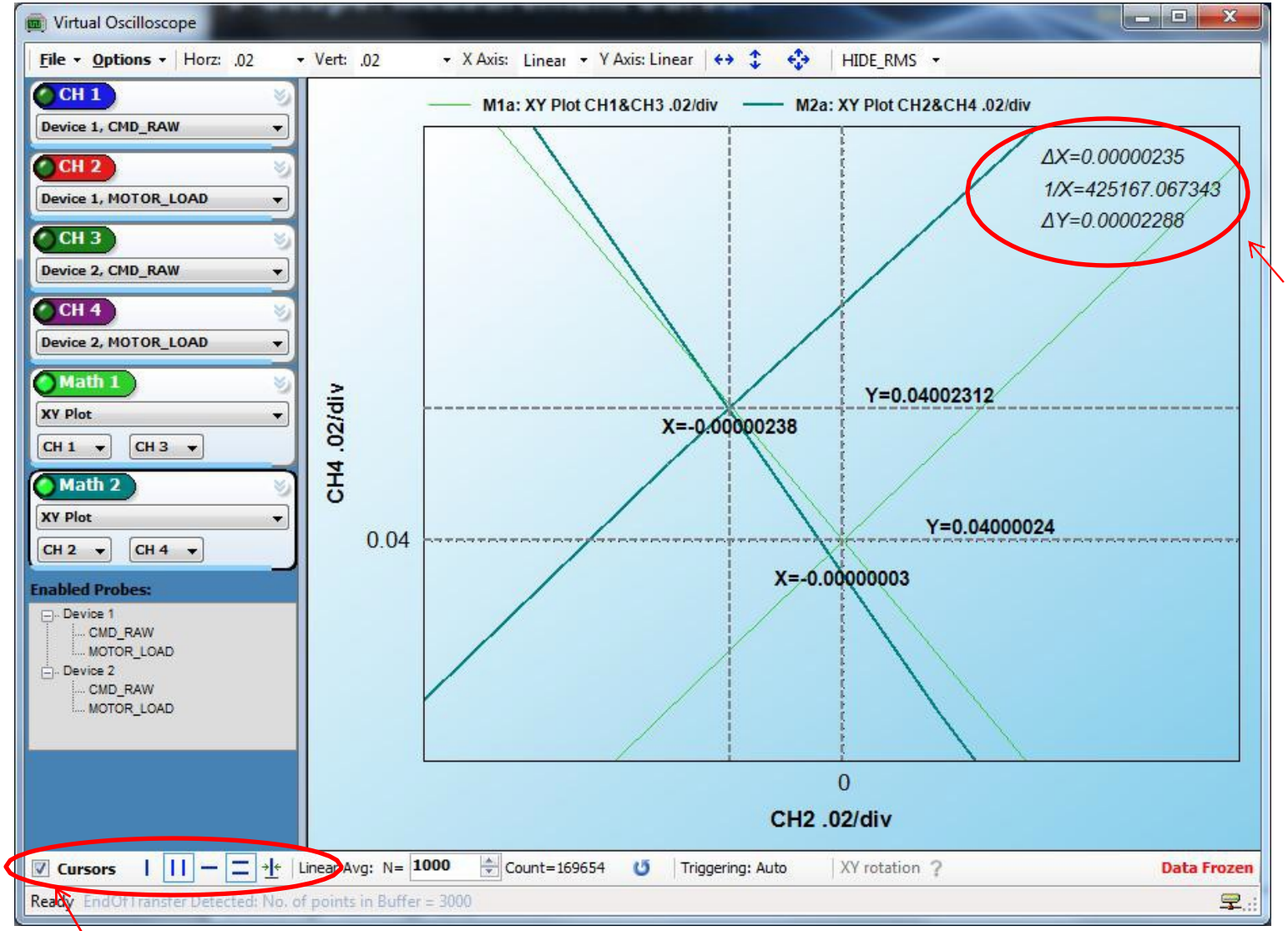


Window zoom is available in scope screen to see details

When triggering, Count number will automatically updated in real time

Start/Stop triggering by clicking “triggering hand”

V-Scope: Measurement Cursor

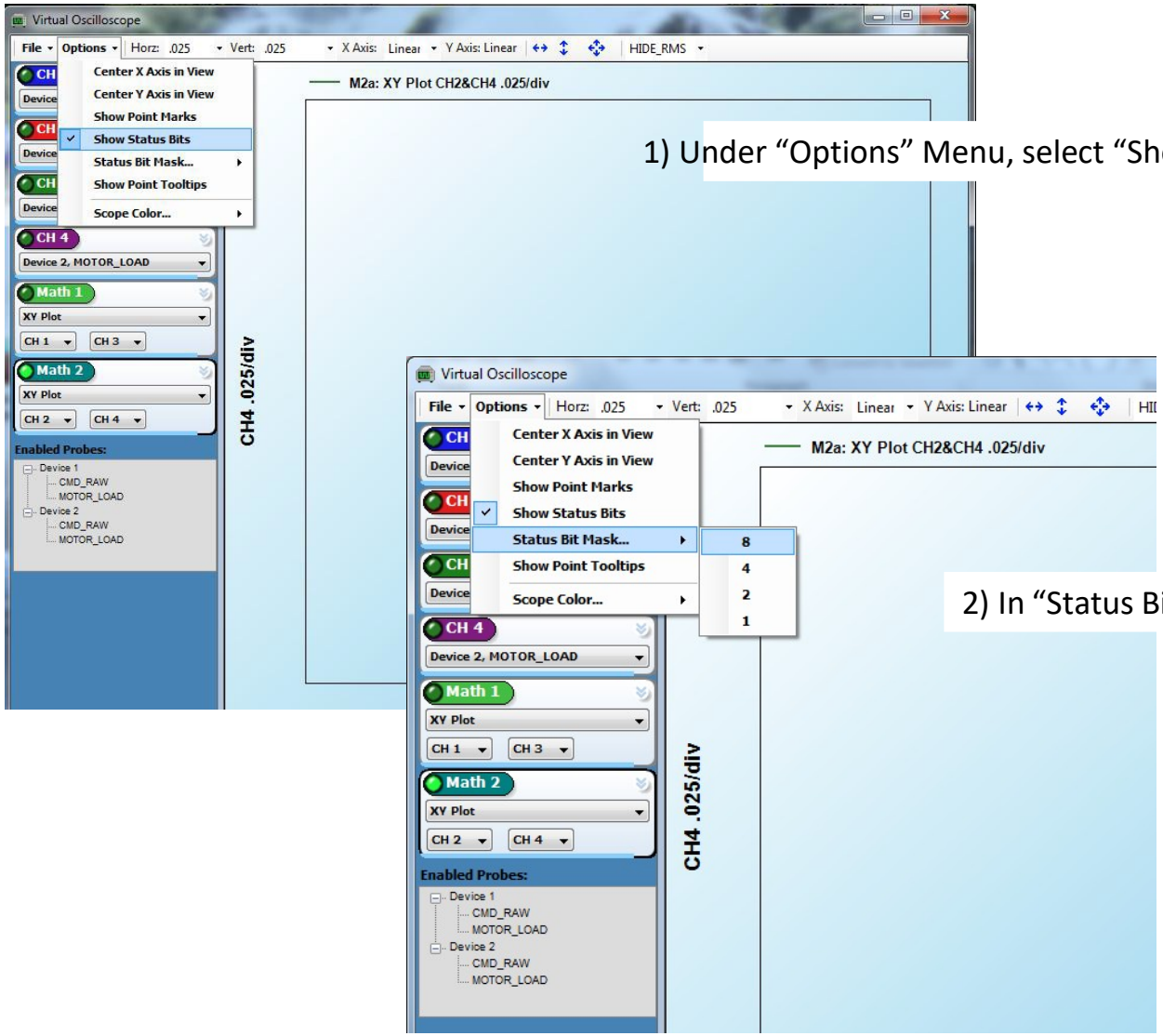


Here displays measurement result. For this case, unit for both CMD_RAW and MOTOR_LOAD is Radians.

Check box to turn on measurement cursors, then can select different type of cursors to be displayed in the scope screen

V-Scope: Laser Control Signal

Turn on Laser Control Signal Display in V-Scope

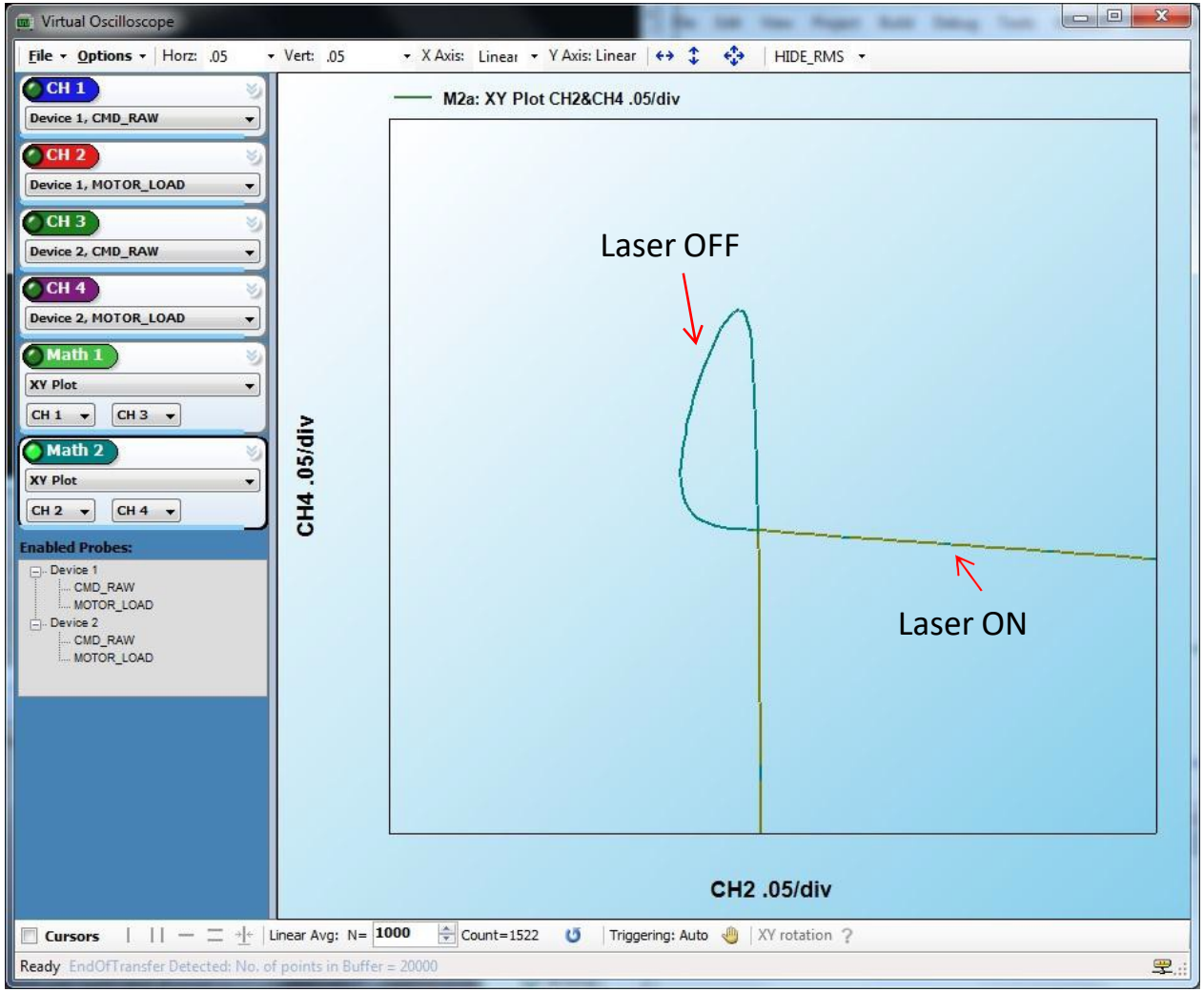


1) Under “Options” Menu, select “Show Status Bits”

2) In “Status Bit Mask…”, Select “8”

V-Scope: Laser Control Signal

In V-Scope, Laser ON and OFF will be displayed at different color



V-Scope: Probe Types

PROBE NAME	UNITS	INPUT TYPE	DESCRIPTION
NULL_TEST_POINT	NONE	Un defined	Un defined probe
AMBIENT_TEMP*	°C	User defined	User defined ambient temperature
MOTOR_CURRENT	AMPS	Actual	Average current drawn by the motor coils
MOTOR_EDDY_CURRENT	AMPS	Estimated from Model	Average eddy current drawn by the motor coils
MOTOR _DISTURBANCE	N.m	Estimated from Model	Disturbances in the output stage of the servo amplifier
MOTOR _POSITION	RADIANS	Estimated from Model	Average position of the rotor including the Mirror, Mount and encoder
MOTOR_VELOCITY	RADIANS/SEC	Estimated from Model	Average velocity of the rotor including the Mirror, Mount and encoder
MOTOR_RES1_POSITION*	RADIANS	Estimated from Model	Average position of the rotor including the Mirror, Mount and encoder as a result of the first resonant frequency
MOTOR_RES2_POSITION*	RADIANS	Estimated from Model	Average position of the rotor including the Mirror, Mount and encoder as a result oft the second resonant frequency
MOTOR_RES3_POSITION*	RADIANS	Estimated from Model	Average position of the rotor including the Mirror, Mount and encoder as a result of the third resonant frequency
MOTOR_RES4_POSITION*	RADIANS	Estimated from Model	Average position of the rotor including the Mirror, Mount and encoder as a result oft the fourth resonant frequency
MOTOR_RES1_VELOCITY*	RADIANS/SEC	Estimated from Model	Average velocity of the rotor including the Mirror, Mount and encoder as a result of the first resonant frequency
MOTOR_RES2_VELOCITY*	RADIANS/SEC	Estimated from Model	Average velocity of the rotor including the Mirror, Mount and encoder as a result oft the second resonant frequency
MOTOR_RES3_VELOCITY*	RADIANS/SEC	Estimated from Model	Average velocity of the rotor including the Mirror, Mount and encoder as a result of the third resonant frequency
MOTOR_RES4_VELOCITY*	RADIANS/SEC	Estimated from Model	Average velocity of the rotor including the Mirror, Mount and encoder as a result of the fourth resonant frequency
MOTOR_POSITION_INTEG_ERROR*	RADIANS.SEC	Estimated from Model	Motor position error measured at the output of the Integrator
MOTOR_CURRENT_OFFSET	AMPS	Actual	Current offset between the estimated and feedback current as measured by the current sensor
MOTOR_LOAD	RADIANS	Estimated from Model	Position of the mirror as a function of Motor Position and Load Vectors
MOTOR_POSITION_ERROR	RADIANS	Estimated from Model	Difference between the raw command supplied to the galvos and the motor load
MOTOR_VELOCITY_ERROR	RADIANS/SEC	Estimated from Model	Velocity error with respect to the motor load
VOLTAGE_OUT	VOLTS	Estimated from Model	Equivalent voltage applied across the motor leads for a particular duty cycle of the PWM amplifier
FEEDBACK_POSITION	RADIANS	Actual	Encoder feedback position
FEEDBACK_VELOCITY	RADIANS./SEC	Actual	Encoder feedback velocity based on encoder position
FEEDBACK_CURRENT	AMPS	Actual	Feedback current based on the Motor
EXPECTED_FEEDBACK_POSITION	RADIANS	Estimated from Model	Estimated feedback position based on Encoder feedback
EXPECTED_FEEDBACK_VELOCITY	RADIANS/SEC	Estimated from Model	Estimated feedback velocity based on Encoder feedback
EXPECTED_FEEDBACK_CURRENT	AMPS	Estimated from Model	Estimated feedback current based on the Motor
TEMPERATURE	°C	Actual	Temperature of the servo driver sensed by the thermistor
BUS_VOLTAGE	VOLTS	Actual	DC bus Voltage
ENCODER_POSITION_ZERO**	VOLTS	Actual	Absolute position of the encoder read head 0
ENCODER_POSITION_ONE**	VOLTS	Actual	Absolute position of the encoder read head 1
ENCODER_PHA_EXPECTED_ZERO**	VOLTS	Estimated from Model	Estimated phase of the sinusoidal component of encoder read head 0
ENCODER_PHA_EXPECTED_ONE**	VOLTS	Estimated from Model	Estimated phase of the sinusoidal component of encoder read head 1
ENCODER_PHB_EXPECTED_ZERO**	VOLTS	Estimated from Model	Estimated phase of the cosine component of encoder read head 0
ENCODER_PHB_EXPECTED_ONE**	VOLTS	Estimated from Model	Estimated phase of the cosine component of encoder read head 1
ENCODER_DELTA_ZERO**	VOLTS	Actual	Difference between actual and estimated encoder track signals in read head 0
ENCODER_DELTA_ONE**	VOLTS	Actual	Difference between actual and estimated encoder track signals in read head 1
INDEX	NONE	Actual	Encoder index pulse
ENCODER_DIFFERENCE**	VOLTS	Actual	Absolute difference between position of encoder read head 0 and read head 1
PHASE_A_ZERO**	VOLTS	Actual	Absolute phase of the sinusoidal component of encoder read head 0
PHASE_A_ONE**	VOLTS	Actual	Absolute phase of the sinusoidal component of encoder read head 1
PHASE_B_ZERO**	VOLTS	Actual	Absolute phase of the cosine component of encoder read head 0
PHASE_B_ONE**	VOLTS	Actual	Absolute phase of the cosine component of encoder read head 1
CMD	RADIANS	Estimated from Model	Pre-filtered raw command
CMD_VELOCITY	RADIANS	Estimated from Model	Velocity of the pre-filtered raw command
CMD_FILT	RADIANS	Estimated from Model	Final jerk limited command outputted to the galvos
CMD_VELOCITY_FILT	RADIANS/SEC	Estimated from Model	Velocity of the final jerk limited command outputted to galvos
CMD_ACCEL_FILT	RADIANS/SEC^2	Estimated from Model	Accelaration of the final jerk limited command outputted to galvos
COIL_TEMP	°C	Estimated from Model	Estimated Motor coil temperature
COIL_RESISTANCE	OHMS	Estimated from Model	Estimated Motor coil resistance
COIL_INDUCTANCE	HENRY	Estimated from Model	Estimated Motor coil inductance
COIL_TORQUE_CONSTANT	N.m/A	Estimated from Model	Estimated Motor coil torque constant
COIL_TEMP_ESTIM_CURRENT	AMPS	Estimated from Model	Probe used for internal use only
MOTOR_POWER_IN	WATTS	Actual	Instantaneous input power to the motor coils (watts)
MOTOR_POWER_OUT	WATTS	Actual	Average output steady state power dissipated by the motor
ROTOR_TEMP	°C	Estimated from Model	Estimated rotor assembly temperature
SERVO_ACKNOWLEDGE	NONE	Estimated from Model	Servo acknowldegement with respect to the motor "In Position"
CMD_RAW	RADIANS	Estimated from Model	The raw command fed into the system before any servo modelling takes place
CMD_LIM	RADIANS	Estimated from Model	Pre-filtered accelaration limited raw command
DESIRED_ACCEL	RADIANS/SEC^2	Actual	Desired maximum accelaration limit set for the motor
* Typically used for internal purposes only			
** Conversion to radians defined by encoder			