Certification Test

CT.Sigma7.01.eLV.Tuning.CertificationTest

Student Name: _____

Company Name: _____

Address: _____

Phone: _____

Email: _____

Test Date: _____

Answers:

1 _____	26 _____	_____	_____
2 _____	27 _____	_____	_____
3 _____	28 _____	_____	_____
4 _____	29 _____	_____	_____
5 _____	30 _____	_____	_____
6 _____	31 _____	_____	_____
7 _____	32 _____	_____	_____
8 _____	33 _____	_____	_____
9 _____	34 _____	_____	_____
10 _____	35 _____	_____	_____
11 _____	36 _____	_____	_____
12 _____	37 _____	_____	_____
13 _____	38 _____	_____	_____
14 _____	39 _____	_____	_____
15 _____	40 _____	_____	_____
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23 _____	_____	_____	_____
24 _____	_____	_____	_____
25 _____	_____	_____	_____

Taking the Test

- The purpose of this test is to validate the learning experience corresponding to the applicable eLearning Module. It is recommended to preview the questions before viewing the module, and answer them as the module progresses.

- The test is open book. You may use any website, manuals, software, demo, etc. The test must be taken individually; you may not contact another person for help.

- Each question has only one correct answer unless otherwise noted. Please clearly record all answers on the answer sheet. All questions are equally weighted. A passing score is 90%.

Returning the Test

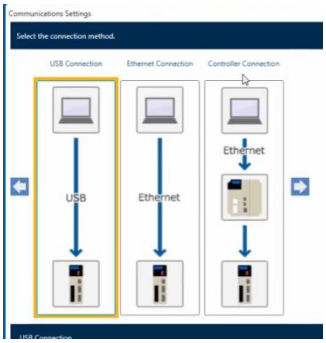
- Please return **only the first page** of the test (the answer sheet) with completed answers and contact information.

Option 1: Fax the answer sheet to **Yaskawa Technical Training Services** at **(847) 887-7185.**
Option 2: e-mail a scan, photo, or edited pdf of the answer sheet with all answers and contact information to **training@yaskawa.com**.

Receiving Your Score

You may review your answers only if a passing score is received. You will receive a system-generated email with your score. Please allow up to 5 business days.

Connection



1. Which connection method is required to communicate from SigmaWin+ Ver.7 through the MPiec controller to each configured Sigma-7 servo?
   A. USB Connection
   B. Ethernet Connection
   C. Controller Connection
   D. PCI Connection
   E. Remote PCI Connection
   F. MECHATROLINK Relay Device

2. The Test (Ping) button confirms communication between which 2 devices?
   A. Computer and MPiec Controller
   B. Computer and Sigma-7 Servo
   C. MPiec Controller and Sigma-7 Servo

Navigate to the MP3300iec WebUI, Status, PLC Variables and enter the letter answer for the required action. If you implemented all of the exercises and demonstrations from the training videos, then these answers will already appear.

Alarms and Monitors

3. TestAnswer.**AlmMon1** appears when the Z_axis alarm A.d00 was cleared **without the remote I/O**.
   - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

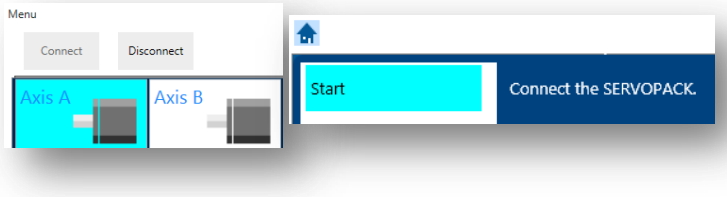
4. Set Z_axis Pn520 to default setting. Clear the alarm history. Attempt to command the Z axis move at a speed of 4500 in the Remote IO. What value most closely approximates the highest speed the motor reached before the alarm?
   A. 60 [min-1]
   B. 250 [min-1]
   C. 700 [min-1]

5. Command the Z_axis a speed of 30 from the Remote IO. What value most closely approximates the SigmaWin+ Ver.7 speed reference monitor?
   A. 0
   B. 1
   C. 5
   D. 10
   E. 30
   F. 60

6. TestAnswer.**AlmMon2** appears when the Z_axis alarm A.0b0 was cleared with software reset and ServoON was successful from remote IO interface.
   - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Parameters

7. After you open a SigmaWin+ Ver.7 project file, how do you connect?
   A. Use Menu – Connect on each axis
   B. Use Home – connect the SERVOPACK



8. Are the axis parameters for 7W dual axis saved together or separately?
   A. Together
   B. Separately

9. TestAnswer.**Param1** appears when the **Z**_axis Pn520 is set greater than default.
   - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

10. TestAnswer.**Param2** appears when the **Z**_axis Pn316 is set and alarm A.510 cleared.
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

11. TestAnswer.**Param3** appears when the **X**_axis parameters are initialized to default, which results in alarm A.F10
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Test Run

12. TestAnswer.**TestRun1** appears when the **Z**_Axis Jog speed is changed.
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

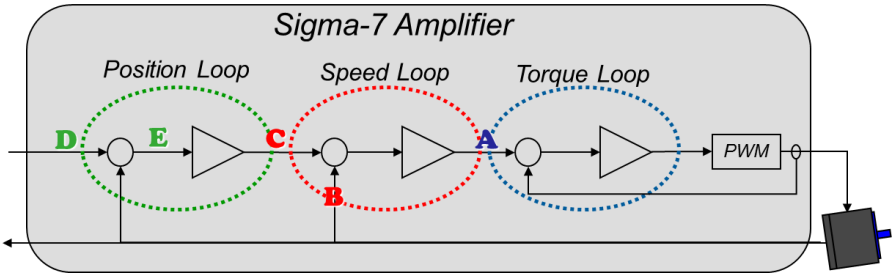
13. TestAnswer.**TestRun2** appears when the **Z**_Axis is jogged through one of the over-travels.
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

14. TestAnswer.**TestRun3** appears when the Z_Axis executes a Program Jog according to the setup parameters shown in the video
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Tuning Basics

15. Which of the following lists the amplifier control loops in order of fastest to slowest?
    A. Position, Speed, Torque
    B. Position, Torque, Speed
    C. Speed, Torque, Position
    D. Speed, Position, Torque
    E. Torque, Speed, Position
    F. Torque, Position, Speed

16. Which letter on the diagram represents the position error?
    A. A
    B. B
    C. C
    D. D
    E. E



17. What type of test move is best for tuning?
    A. A slow, easy move with low duty cycle
    B. A moderate move with moderate duty cycle
    C. A worst-case move with rapid duty cycle
    D. A worst-case move with low duty cycle

18. Which tuning method is appropriate for dynamically changing loads?
    A. Tuning-Less
    B. Autotuning
    C. Custom Tuning

Tuning Filters

19. Which tuning filter is best for controlling oscillation at the lowest frequencies?
    A. Vibration Suppression
    B. Anti-Resonance
    C. Notch Filter

20. Refer to the “Ballscrew Mechanical Analysis” file in the class materials download. What filter is appropriate for this mechanical system?
    A. Vibration Suppression
    B. Anti-Resonance
    C. Notch Filter

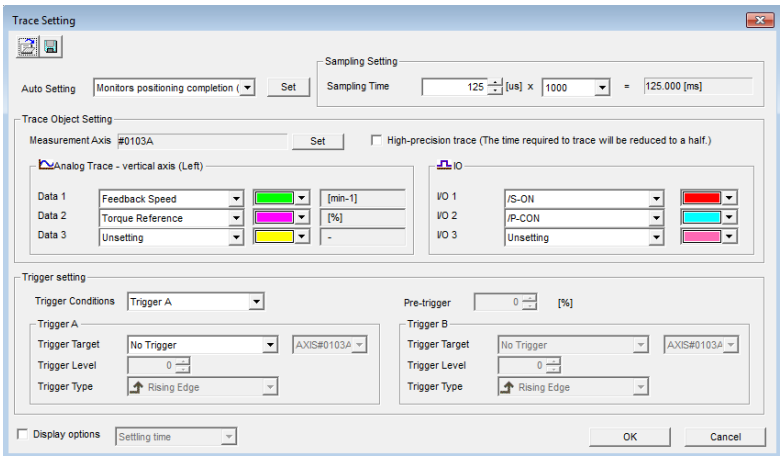
21. TestAnswer.**Filters1** appears when the Z_Axis **anti-resonance** is set according to the mechanical analysis result as shown in the video.
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

22. TestAnswer.**Filters1** appears when the Z_Axis **vibration suppression** is set according to the mechanical analysis result as shown in the video.

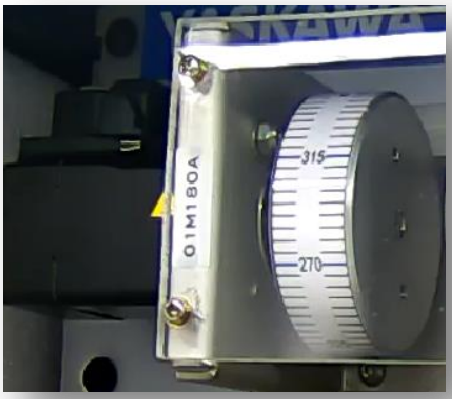
- Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Data Trace

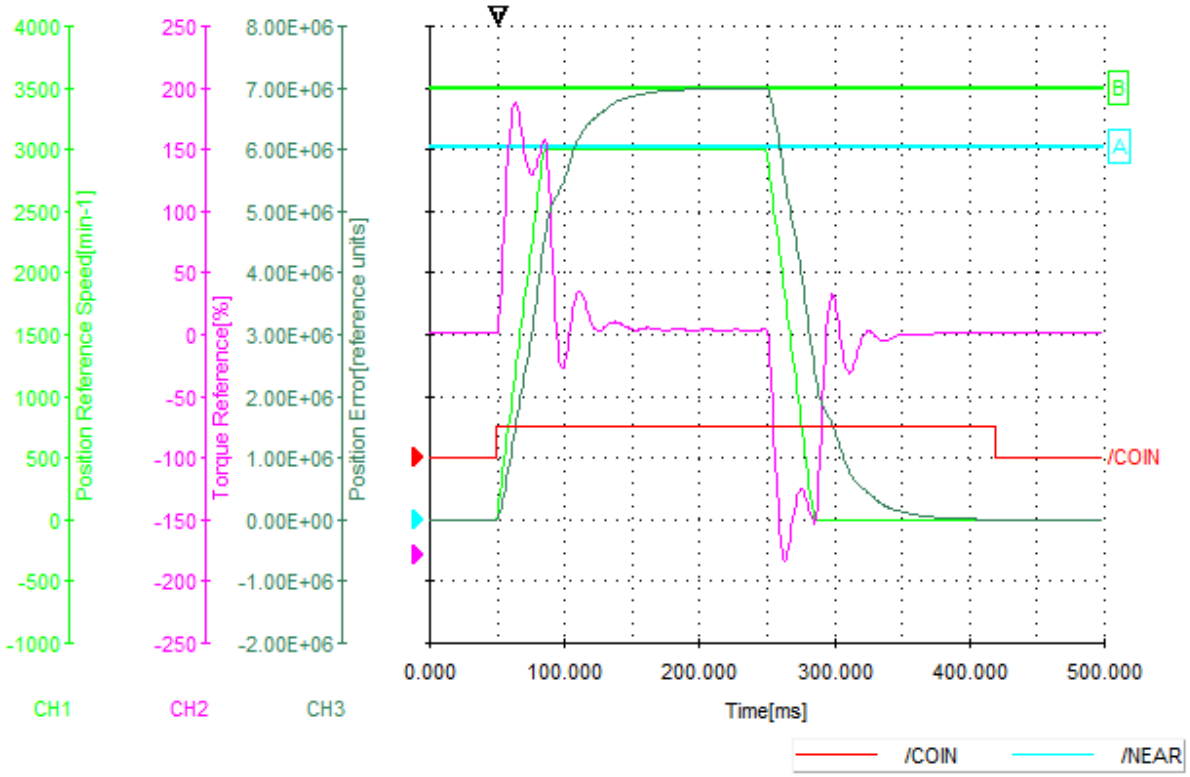
23. In Trace Setup, which Auto Setting is used to measure Position Reference Speed, Torque Reference, and Feedback Speed?
    A. Monitors positioning completion (Fwd).
    B. Monitors positioning completion (Rev).
    C. Monitors positioning completion (Fwd and Rev).
    D. Checks speed reference.
    E. Checks position reference
    F. Monitors positioning (From the start).
    G. Checks gain switching when motor is stopped.



24. An MPiec controller commands a Sigma-7 servomotor which directly drives a rotary load, as shown in the photo. The position completion width is 0.1[degrees]. What is the required value of Pn522?
    A. Pn522=0.1
    B. Pn522=1
    C. Pn522=10
    D. Pn522=290
    E. Pn522=4660
    F. Pn522=1048576
    G. Pn522=16277216



Refer to the data trace to answer the following questions. The data trace file "X_DataTrace.std" is included in the class materials download.



25. Which measurement most closely approximates the Position Settling Time?
    A. 0 [ms]
    B. 10 [ms]
    C. 100 [ms]
    D. 150 [ms]
    E. 500 [ms]
    F. 800 [ms]
    G. 2000 [ms]
    H. None of the above

26. Which measurement most closely approximates the Torque Ripple?
    A. 1 [%]
    B. 13 [%]
    C. 30 [%]
    D. 60 [%]
    E. 100 [%]
    F. 200 [%]
    G. None of the above

27. Which measurement most closely approximates the maximum Position Error?
    A. 50 [reference units]
    B. 200 [reference units]
    C. 500 [reference units]
    D. 3500 [reference units]
    E. 7E+06 [reference units]
    F. None of the above

28. What does the measurement between cursor A and B represent?
    A. Position Error
    B. Speed Error
    C. Torque Ripple
    D. Settling Time
    E. None of the above

Tuning-less

29. For which reason might the Tuning-less level (rigidity level) be decreased?
    A. To reduce settling time
    B. To reduce position error
    C. To reduce vibration

30. Which feed-forward parameter is effective in reducing position error and settling time during Tuning-less operation, assuming other tuning parameters are at default settings?
    A. Pn109
    B. Pn141
    C. Pn147

31. TestAnswer.**Tless1** appears when the **X**_**Axis** Tuning-less level and feed forward have been optimized as shown in the video.
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Autotuning

32. Which Autotuning "Mode Selection" will result in the lowest position settling time?
    A. 1: Standard
    B. 2: For Positioning
    C. 3: For positioning especially to prevent overshooting

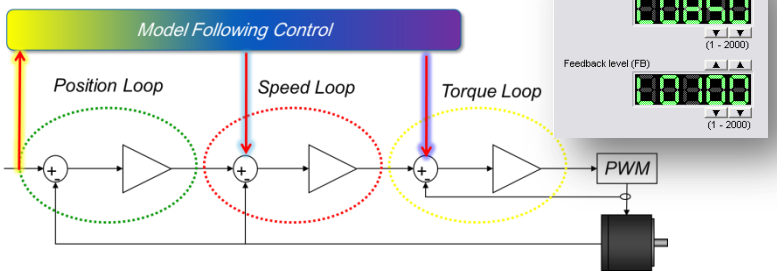
33. TestAnswer.**Autotune1** appears when the **X**_Axis moment of inertia has been measured and set
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

34. TestAnswer.**Autotune2** appears when the **X**_Axis Autotuning has been completed
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

35. TestAnswer.**Autotune3** appears when the **Y**_Axis Autotuning has been completed
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Custom Tuning

36. The “Feedback level (FB)” adjustment affects which part of the control system?
    A. Position loop and speed loop gain
    B. Model Following control gain



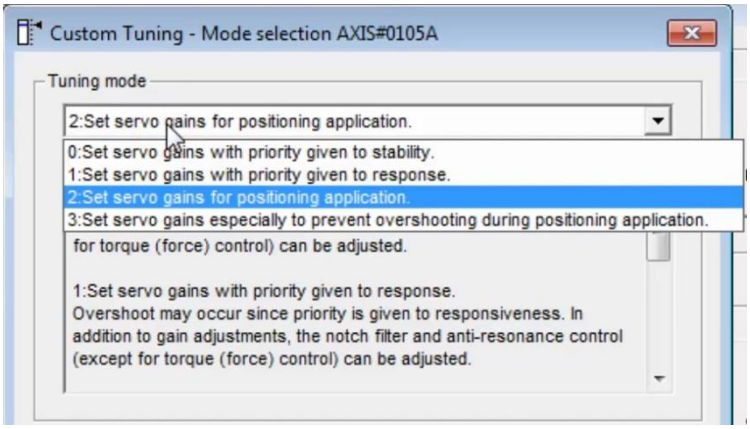
37. TestAnswer.**Custom1** appears when the **X**_Axis position completion width is properly set for 0.01 [degrees] and the **X**_Axis custom tuning has been completed as shown in the video
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

38. TestAnswer.**Custom2** appears when the **X**_Axis and Y_axis are synchronized to run with the same position error, as shown in the video
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

Tuning for Low Position Error

39. What is the recommended setting of feed forward (Pn109) when tuning for lowest position error?
    A. Pn109=0
    B. Pn109=25
    C. Pn109=50
    D. Pn109=75
    E. Pn109=100

40. Which custom tuning “Mode Selection” is required for when tuning for lowest position error?
    A. 0: “…stability”
    B. 1: “…response”
    C. 2: “…positioning …”
    D. 3: “…overshooting…”



41. TestAnswer.**LowPE1** appears when the **Z**_Axis has been autotuned for low position error
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet

42. TestAnswer.**LowPE2** appears when the **Z**_Axis runs the worst-case test move with low position error
    - Write the answer (from WebUI➔Status➔PLC Variables) on the answer sheet