



**NIDA CORPORATION
COMPUTER ASSISTED INSTRUCTION**

LESSON AND OBJECTIVE LISTING

**Master Course Listing
Industrial**

2018-08-30

OBJECTIVE LISTING - Master Course Listing

TABLE OF CONTENTS

<u>MODEL 3604</u>	
MOD 76 - POWER DISTRIBUTION	1
<u>MODEL 3606</u>	
MOD 77 - AC MOTORS	2
<u>MODEL 3620</u>	
MOD 78 - INTRO TO PROCESS AUTOMATION	3
<u>MODEL 3621</u>	
MOD 79 - INSTRUMENTATION	4
<u>MODEL 3622</u>	
MOD 80 - CONTROLLERS	5
<u>MODEL 3623</u>	
MOD 81 - INTEGRATION	6

Representative



Technology Education Concepts

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OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 76 - POWER DISTRIBUTION

- 7231-714-130 3-Phase Fundamentals ES-151 Set
- Express the use of 3-phase power.
 - Describe the operation of an AC generator.
 - Describe the differences between 3-phase and single-phase services.
 - Describe the difference between 50 Hz and 60 Hz power.
 - Describe the operation of inverters.
 - Read a 3-phase power transmission block diagram.
 - Operate a 3-phase power transmission and distribution system.
 - Verify the presence of 3-phase power using an oscilloscope.
- 7231-714-160 Power Transmission and Distribution Fundamentals ES-151 Set
- Express the need for power transmission and distribution.
 - Describe the use of a power transmission system.
 - Give a brief description of power distribution.
 - Discuss power stabilization techniques.
 - Describe the operation of grid-tie interfacing.
 - Recognize tools used on power transmission and distribution systems.
 - Recognize safe maintenance methods.
 - Initialize a power transmission and distribution system using default settings.
 - Validate system operation using sensors, monitors, and display devices.
 - Power down the power transmission and distribution system.
- 7231-714-190 3-Phase and Single-Phase Service Feeds ES-151 Set
- Analyze the use of 3-phase service feeds.
 - Describe 3-phase service feeds.
 - Analyze the use of single-phase service feeds.
 - Describe single-phase service feeds.
 - Initialize a power distribution system using default settings.
 - Analyze 3-phase service feeds.
 - Analyze single-phase service feeds.
 - Power down the power transmission and distribution system.
- 7231-714-220 Power Transmission and Distribution Maintenance ES-151 Set
- Recognize power transmission and distribution preventive/scheduled maintenance routines.
 - Describe physical inspection techniques for power transmission and distribution systems (visual and sound).
 - Recognize power transmission and distribution unscheduled maintenance routines.
 - Describe when unscheduled maintenance is necessary.
 - Initialize a power transmission and distribution system using default settings.
 - Perform a power transmission and distribution system operational check.
 - Show proper use of measurement devices.
 - Examine power transmission and distribution system fault isolation procedures.
 - Demonstrate the ability to diagnose a defective subsystem in a power transmission and distribution system using fault isolation procedures.
- 7231-714-250 Power Grid Troubleshooting ES-151 Set
- Examine the troubleshooting process for power transmission and distribution systems.
 - Set up a power transmission and distribution system hardware following a given procedure.
 - Initialize a power transmission and distribution system with default settings.
 - Perform a power transmission and distribution system operational check.
 - Show proper use of measurement devices.

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 76 - POWER DISTRIBUTION (cont.)

7231-714-250 Power Grid Troubleshooting (cont.)

- Demonstrate the ability to maintain a power transmission and distribution system.
- Power down a power transmission and distribution system.

7231-714-920 Power Distribution Post-Test (Theory) ---

MOD 77 - AC MOTORS

7271-412-130 Single-Phase and 3-Phase Motor Familiarization MO-151 Set

- Explain advantages of AC motors over DC motors in industrial applications.
- Identify DC, AC single-phase, and three-phase power signals.
- Describe advantages and disadvantages of multiple-phase power as related to motors.
- Perform the proper wiring techniques for single-phase motors.
- Test and verify operation of a single-phase shaded-pole motor.
- Perform the proper wiring techniques for 3-phase wye-configured motors.
- Test and verify operation of a 3-phase wye-configured motor.

7271-414-130 Universal Motor Operation MO-151 Set

- Identify benefits and drawbacks of universal motors.
- Configure a universal motor for single-phase AC operation.
- Demonstrate ways to reverse the direction of a universal motor.

7271-414-160 Shaded-Pole Motors MO-151 Set

- Identify benefits and drawbacks for shaded-pole motors.
- Describe the configuration of an operational shaded-pole motor.
- Explain the steps necessary to reverse the direction of a shaded-pole motor.
- Perform the proper wiring techniques for a shaded-pole motor using single-phase AC.

7271-414-190 Split-Phase Motors MO-151 Set

- Describe the construction of single phase motors.
- Perform the proper wiring techniques for split-phase motors in both CW and CCW rotation directions.

7271-414-220 Permanent Split Capacitor Motors MO-151 Set

- Describe the construction of permanent split capacitor motors.
- Perform the proper wiring techniques for a permanent split capacitor motor in both CW and CCW rotation directions.

7271-414-250 Capacitor Start Motors MO-151 Set

- Describe the construction of capacitor start motors.
- Perform the proper wiring techniques for a capacitor start motor in both CW and CCW rotation directions.

7271-414-280 Capacitor Start / Capacitor Run Motors MO-151 Set

- Describe the construction of capacitor start / capacitor run motors.
- Demonstrate knowledge of the theory of the capacitor start / capacitor run motor.
- Perform the proper wiring techniques for a capacitor start/capacitor run motor in both CW and CCW rotation directions.

7271-414-920 Single-Phase Motors Post-Test (Theory) ---

7271-416-130 3-Phase Wye/Star Motors MO-151 Set

- Describe the construction of 3-phase wye/star motors.
- Configure a wye/star motor for 3-phase AC operation.
- Demonstrate ways to reverse the direction of a 3-phase wye/star motor.

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE	CARDS/KITS
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MOD 77 - AC MOTORS (cont.)

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| 7271-416-160 3-Phase Delta Motors | MO-151 Set |
| <ul style="list-style-type: none"> ▪ Describe the construction of 3-phase delta motors. ▫ Configure a delta motor for 3-phase AC operation. ▫ Demonstrate ways to reverse the direction of a 3-phase delta motor. | |
| 7271-416-190 3-Phase Wye/Star-Delta Motor Starters | MO-151 Set |
| <ul style="list-style-type: none"> ▪ Describe the need for 3-phase starters. ▪ Discuss the advantages and disadvantages of the 3-phase wye/star-delta motor starter. ▫ Configure a wye/star-delta motor for 3-phase AC operation. ▫ Demonstrate ways to reverse the direction of a wye/star-delta motor. | |
| 7271-416-220 3-Phase Resistive and Inductive Motor Starters | MO-151 Set |
| <ul style="list-style-type: none"> ▪ Describe the need for 3-phase starters. ▪ Discuss the advantages and disadvantages of alternative 3-phase motor starters. ▫ Set up a 3-phase motor using the primary resistive starting configuration. ▫ Demonstrate how to reverse the direction of a primary resistive starting configuration. ▫ Set up a 3-phase motor using the primary autotransformer starting configuration. ▫ Demonstrate ways to reverse the direction of an autotransformer starting configuration. | |
| 7271-416-250 AC Motor Frequency and Voltage Controllers | MO-151 Set |
| <ul style="list-style-type: none"> ▪ Describe the need for 3-phase starters. ▪ Identify the electronic starter benefits over other starters. ▪ Demonstrate knowledge of AC motor frequency and voltage controllers. ▫ Configure a soft starter configured motor for 3-phase AC operation. ▫ Demonstrate ways to reverse the direction of a soft starter configured 3--phase motor. | |
| 7271-416-920 3-Phase Motors Post-Test (Theory) | --- |
| 7271-418-130 Motor Nameplates | --- |
| <ul style="list-style-type: none"> ▪ Examine all IEC and NEMA motor standards for listing on motor nameplates. ▪ Categorize AC motor key performance standards. ▪ Identify AC motor environmental, efficiency, and service design standards. ▪ Classify standards for motor mounts, frames, and enclosures. | |

MOD 78 - INTRO TO PROCESS AUTOMATION

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|--|------------|
| 7241-112-130 Fundamentals of Industrial Safety | --- |
| <ul style="list-style-type: none"> ▪ Understand common safety concerns in industrial settings. ▪ Explain methods used to enhance safety. ▪ Define lockout-tagout. ▪ Explain procedures involved with lockout-tagout. | |
| 7241-112-160 Using Industrial Control Diagrams | --- |
| <ul style="list-style-type: none"> ▪ Identify basic characteristics found on control diagrams. ▪ Trace signal flow through a typical industrial diagram. | |
| 7241-112-190 Introduction to Troubleshooting | --- |
| <ul style="list-style-type: none"> ▪ Define troubleshooting. ▪ Compare component and system level troubleshooting. ▪ Recognize various troubleshooting methods. | |
| 7241-112-220 Introduction to Automated Systems | I3-101 Set |
| <ul style="list-style-type: none"> ▪ Identify basic functions of automated systems. ▪ Review open loop and closed loop control. ▫ Observe the operation of a batch process control system. | |

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 78 - INTRO TO PROCESS AUTOMATION (cont.)

- 7241-112-220 Introduction to Automated Systems (cont.)
 ▫ Observe the operation of a continuous process control system.
- 7241-112-250 Introduction to Process Control I3-101 Set
 ▫ Describe the basic elements of process control.
 ▫ Define common terms associated with process control.
 ▫ Perform basic operational checks on system processes.
 ▫ Observe central control feedback information.
 ▫ Use lockout-tagout safety features.
- 7241-112-280 Batch and Continuous Processing I3-101 Set
 ▫ Describe the function and operation of continuous processing.
 ▫ Describe the function and operation of batch processing.
 ▫ Identify basic faults in the primary process.
 ▫ Use built-in-test feedback information.
 ▫ Use lockout-tagout safety features.
- 7241-112-920 I3 Systems - Introduction to Process Automation Post-Test (Theory) ---

MOD 79 - INSTRUMENTATION

- 7241-212-130 Introduction to Instrumentation ---
 ▫ Describe the basic purpose of instrumentation devices used in automated industrial systems.
 ▫ Describe the basic function of elements of an electromechanical instrumentation system.
 ▫ Describe the basic function of elements of a hydraulic instrumentation system.
 ▫ Describe the basic function of elements of a pneumatic instrumentation system.
- 7241-212-160 Sensor Fundamentals ---
 ▫ Explain the purpose of a sensor.
 ▫ Understand important physical characteristics that are common to sensors.
 ▫ Define important operational characteristics that are common to sensors.
- 7241-212-190 Actuator Fundamentals ---
 ▫ Identify functions of actuators used in industry.
 ▫ Explain terms and basic principles associated with pneumatic and hydraulic instrumentation.
 ▫ Describe actuator types most often used in industry.
- 7241-214-130 Position, Proximity, and Displacement Sensors I3-201 Set
 ▫ Describe the different types of position sensors and their applications.
 ▫ Describe the different types of proximity sensors and their application.
 ▫ Describe the different types of displacement sensors and their applications.
 ▫ Test and confirm normal operation of limit and position sensors operating as part of automated processes in an industrial control system.
- 7241-214-160 Motion Sensors ---
 ▫ Describe the different types of motion sensors and their applications.
- 7241-214-190 Velocity Sensors I3-201 Set
 ▫ Describe the different types of velocity sensors and their applications.
 ▫ Test and confirm normal operation of velocity (speed) sensors operating as part of automated processes in an industrial control system.
- 7241-214-220 Vibration Sensors I3-201 Set
 ▫ Describe the different types of vibration sensors and their applications.
 ▫ Test and confirm normal operation of a vibration sensor operating as part of automated processes in an industrial control system.

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 79 - INSTRUMENTATION (cont.)

7241-214-250 Sensor Troubleshooting I	I3-201 Set
▫ Confirm normal operation of position sensors.	
▫ Troubleshoot a system containing position sensors.	
▫ Confirm normal operation of limit and speed sensors.	
▫ Troubleshoot a system containing limit and speed sensors.	
▫ Confirm normal operation of current level and vibration sensors.	
▫ Troubleshoot a system containing current level and vibration sensors.	
7241-214-310 Temperature and Humidity Sensors	I3-201 Set
▫ Describe IR heat generation.	
▫ Describe friction heat generation.	
▫ Describe chemical heat generation.	
▫ Describe heat dissipation.	
▫ Describe mechanical heat sensors.	
▫ Describe thermocouples.	
▫ Describe thermistors.	
▫ Describe the different types of humidity sensors and their applications.	
▫ Test and confirm normal operation of temperature sensors operating as part of automated processes in an industrial control system.	
7241-214-400 Sensor Troubleshooting II	I3-201 Set
▫ Confirm the normal operation of light and temperature sensors.	
▫ Troubleshoot light and temperature sensors.	
7241-214-430 LVDT Displacement Sensor	I3-201 Set
▫ Describe the operation of LVDT sensors.	
▫ Test and confirm normal operation of an LVDT displacement sensor.	
▫ Troubleshoot an LVDT displacement sensor.	
7241-216-130 Electromechanical Actuator Types and Applications	I3-201 Set
▫ Describe electromechanical positional actuators and their applications.	
▫ Describe electromechanical directional actuators and their applications.	
▫ Describe electromechanical rotational actuators and their applications.	
▫ Describe electromechanical regulatory actuators and their applications.	
▫ Test and confirm normal operation of positional and directional actuators in response to process controller output.	
▫ Test and confirm proper operation of subprocess actuators as part of automated processes in an industrial control system.	
7241-216-160 Electromechanical Actuator Troubleshooting	I3-201 Set
▫ Confirm the normal operation of an electromechanical actuator.	
▫ Troubleshoot an electromechanical actuator.	
7241-298-920 I3 Systems - Instrumentation Post-Test (Theory)	---

MOD 80 - CONTROLLERS

7241-312-130 System Process Controller Fundamentals	---
▫ Explore the history, present state, and future of process controllers.	
▫ Categorize discrete, batch, and continuous process control requirements.	
▫ Identify differences between the Programmable Logic Controller (PLC) and the Programmable Automation Controller (PAC).	
▫ Describe the functions of the Human Machine Interface (HMI) and the Remote Terminal Unit (RTU).	

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 80 - CONTROLLERS (cont.)

- 7241-312-130 System Process Controller Fundamentals (cont.)
 - Identify differences between a Distributed Control System (DCS) and a Supervisory Control and Data Acquisition (SCADA) system.
- 7241-312-160 PID Controllers ---
 - Identify the principles of proportional and derivative control.
 - Identify the principles of proportional and integral control.
 - Identify the principles of proportional, integral, and derivative control.
- 7241-314-130 PLC System Fundamentals ---
 - Describe the function of the basic components of the programmable logic controller.
 - Discuss the types of inputs and outputs used with the PLC.
 - Recognize and understand a simple ladder logic diagram.
 - Recognize the symbols used in a basic ladder logic diagram.
- 7241-314-160 PAC System Fundamentals ---
 - Describe the function of the basic components of the programmable automation controller system.
 - Compare PLC logic to PAC logic.
 - Discuss the methods used to program a PAC.
- 7241-316-130 Distributed Control (DCS) I3-257 Set
 - Describe DCS system architecture.
 - Define and identify a block diagram of a DCS system.
 - Examine the operation of a DCS system.
 - Troubleshoot a DCS system.
- 7241-316-160 Supervisory Control and Data Acquisition (SCADA) I3-257 Set
 - Describe SCADA system architecture.
 - Define and identify a block diagram of a SCADA system.
 - Describe the differences between DCS and SCADA Systems.
 - Examine the operation of a SCADA system.
 - Troubleshoot a SCADA system.
- 7241-398-920 I3 Systems - Controllers Post-Test (Theory) ---

MOD 81 - INTEGRATION

- 7241-412-130 Fundamentals of Industrial Systems Integration ---
 - Define HMI functions.
 - Define M2M functions.
 - Discuss standards used for modern industrial control systems.
- 7241-414-130 4-20 mA Current Loop I3-251 Set
 - Examine 4-20mA current loop basics.
 - Wire a 4-20 mA current loop system.
 - Perform measurements on a typical 4-20 mA current loop.
 - Troubleshoot a 4-20 mA current loop.
- 7241-414-160 Hardware Standard EIA-232 I3-251 Set
 - Explore hardware standard EIA-232.
 - Compare EIA-232 benefits and limitations.
 - Identify standard connectors and pin layouts used.
 - Examine EIA-232 basics.
 - Configure an EIA-232 subsystem for communications.

OBJECTIVE LISTING - Master Course Listing

LESSON ID/TITLE

CARDS/KITS

MOD 81 - INTEGRATION (cont.)

- 7241-414-160 Hardware Standard EIA-232 (cont.)
 - Observe an operating EIA-232 subsystem.
 - Troubleshoot an EIA-232 communication subsystem.
- 7241-414-190 Hardware Standards EIA-422 and 485 I3-251 Set
 - Explore hardware standard EIA-422 and 485.
 - Compare EIA-422 and 485 maximum allowed distances, maximum number of allowed devices, voltages, and protocols for each standard.
 - Configure an EIA-485 subsystem for communications.
 - Observe an operating EIA-485 subsystem.
 - Troubleshoot an EIA-485 communications subsystem.
- 7241-414-220 Ethernet I3-251 Set
 - Explore hardware standards TIA-568A and TIA-568B.
 - Examine an industrial system using TCP/IP Internet Protocol Suite.
 - Demonstrate knowledge of static and dynamic TCP/IP address assignments.
 - Explore hardware standards EIA-568A and 568B.
 - Test and verify the configuration of several Ethernet cable assemblies.
- 7241-498-920 I3 Systems - Integration Post-Test (Theory) ---



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