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PROCESS CONTROL

FUNDAMENTALS OF PROCESS CONTROL
Basics of Control Theory and Process Control Terms
Controller and Tuning
Process Control Loop
Intro to Measurement of Level, Flow, Temperature, & Pressure

PROCESS MEASUREMENT
Properties of Matter (Liquid/Air)
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Flow Measurement
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PLANT COMMISSIONING AND OPTIMIZATION
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Confirming Full-Wave DC Power Supply Operation
Connecting and Operating a Full-Wave DC PS
Confirming Single-Phase Bridge Rectifier Operation
Connecting and Operating Single-Phase Bridge Rectifier

SINGLE-PHASE AND THREE-PHASE POWER SUPPLIES JM-POWR-EB02B
Drawing Filter Schematic Diagrams
Connecting and Operating a Power Supply
Drawing Zener Schematic Symbols
Connecting and Operating a Zener Diode Voltage Regulator
Locating an IC Voltage Regulator
Connecting and Operating a DC Power Supply with an IC Voltage Regulator

Connecting and Operating a Bleeder Resistor
Connecting and Operating a Voltage Divider
Troubleshooting a DC Power Supply
Confirming Three-Phase Bridge Rectifier Operation
Testing a Three-Phase Bridge Rectifier
Connecting and Operating a Three-Phase Bridge Rectifier
Troubleshooting a Three-Phase Bridge Rectifier

THYRISTOR ELECTRIC MOTOR DRIVES JM-POWR-EB03
Locating an SCR and Drawing the Schematic Symbol
Testing an SCR
Connecting and Operating an SCR
Confirming Full-Wave SCR DC Motor
Connecting and Operating a Full-Wave SCR DC Motor Drive
Troubleshooting a Full-Wave SCR DC Motor Drive
Locating the TRIAC and drawing the TRIAC Symbol
Testing a TRIAC
Demonstrating TRIAC Control Principles
Locating a DIAC and Drawing the Schematic Symbol
Connecting and Operating a DIAC-Controlled TRIAC AC Motor Drive
Connecting and Operating a Schmitt Trigger-Controlled TRIAC AC Motor Drive
Connecting and Operating a TRIAC Motor Drive
Demonstrating PWM Principles
Connecting and Operating a PWM DC Motor Drive

ELECTRONIC TIMERS JM-POWR-EB04
Verifying a Monostable Timer Circuit
Connecting and Operating a 555 Timer in Monostable Mode
Verifying an Astable Timer Circuit
Connecting and Operating a 555 Timer in Astable Mode
Verifying a Pulse Train Circuit
Connecting and Operating an Electronic Pulse Train

STEPPER MOTOR DRIVES JM-POWR-EB05
Displaying Detent Torque
Confirming Stepper Motor Step Angle
Demonstrating Stepper Motor Principles
Confirming Stator Winding Connections
Demonstrating Unipolar Stepper Motor Drive
Installing, Connecting and Monitoring a Stepper Motor Drive
Testing and Troubleshooting a Basic Stepper Motor and Drive

SERVO MOTOR DRIVES JM-POWR-EB06
Demonstrate Closed-Loop Servo Motor Control Principles
Demonstrate Closed-Loop Servo Motor Principles
Demonstrate Servo System Feedback Device Principles
Demonstrate Analog and Digital Servo Motor Drive Principles
Install, Connect and Monitor a Basic Servo Motor Drive
Testing and Troubleshooting a Basic Servo Motor Drive

ELECTRO MECHANICAL MAINTENANCE CELL

BASIC MAINTENANCE CELL JM-EMMC-ZA01
CELL
Assemble the Base
Assemble & Install the Conveyor Mount Support Assembly
Install Pull Box, End and Feeder Tube Supports
Install Crossbars and Top Members
Inspect & Align Completed Frame
ENCLOSURES
Install Center Ladder
Install Cable Trays
Install Wireway
Install Pull Boxes
Install Equipment Enclosures
Install Safety Disconnects
Install Fuse Box and Station Transformer
CONDUIT & FITTINGS
Cut and Ream Conduit
Install Flexible Metal Conduit
Install EMT Conduit
LOW VOLTAGE & CIRCUIT PROTECTION
Wire & Connect Main Power Cord
Install & Connect Circuit Breakers
Install Equipment Grounds
Wire Fuse Box
Wire Station Transformer
Perform Megohmmeter Tests

CONVEYOR, DRIVE AND CONTROL JM-EMMC-ZA02
CONVEYOR
Install Conveyor
Install Conveyor Drive Components
Install and Align Conveyor Drive Chain
Install Conveyor Drive Safety Guard

CONVEYOR CONTROLS
Install and Connect Conveyor Drive Controls
Install Emergency Stop Circuits
Perform Circuit Continuity Tests
Megger Test Conveyor Drive
Test and Troubleshoot Conveyor Drive
PREDICTIVE/PREVENTIVE MAINTENANCE
Lubricate Conveyor Drive
Verify Conveyor Alignment
Verify Drive Chain Alignment
Obtain Vibration Profiles

PART MANIPULATOR JM-EMMC-ZA03
PART MANIPULATION
Install Part Stacker and Feeder Tray
Install Part Kicker
Install Stacker Part Sensor
PAINT, BAKE AND COOL TUNNEL
Install Paint Bake Heaters
Install Tunnel
Install Part Nozzles
Install Cool Down Blower
Install Part Count Sensor
Install Part Tunnel Status Indicators
PROGRAMMABLE LOGIC CONTROLLER (PLC)
Install PLC
Rough-in PLC power
Program PLC
Connect PLC input Sensor Circuits
Connect PLC Output Device Circuits
Troubleshoot Paint, Bake & Cool System

INDUSTRIAL LIGHTING JM-EMMC-ZA04
INDUSTRIAL LIGHTING CIRCUITS
Install Fluorescent Task Lighting
Install Low Bay Lighting
Install High Bay Lighting
Install Flood Lighting
Install Hazardous Location Lighting
INDUSTRIAL POWER CIRCUITS
Install Emergency Lighting
Rough-in Lighting Circuits
Megger Test Lighting Circuits
Install and Test GFCI Circuit
Troubleshoot Lighting and Power System

VARIABLE FREQUENCY DRIVE JM-EMMC-ZA05
Install Drive
Rough-in Drive Wiring
Megger Test VFD Wires
Program and Test Drive

DC MOTOR AND DRIVE JM-EMMC-ZA06
Identifying Anti-Friction Bearings
Mount and Remove AC Motor
Install DC motor
Install DC drive
Rough-in DC Drive Wiring
Set Up and Test DC Drive (Manual - jumpers)
Finalize Drive Wiring and Installation
Troubleshoot DC Drive System

FAULT INSERTION SYSTEM JM-EMMC-ZA07
Install fault insertion sub panel
Rough-in power circuit
Rough-in fault insertion wiring
Install and configure triggered faults
Test triggered fault system
Troubleshoot gas furnace