



AMATROL®



ADVANCED MANUFACTURING

TECHNICAL EDUCATION LEARNING SYSTEMS

Amatrol Delivers Total Learning Solutions for Advanced Manufacturing!

Your success is our success. That's our philosophy and commitment to all of our customers. We provide total learning solutions for the ever growing critical problem of skill shortages in manufacturing. You will find that our many learning systems cover the full range of needed skills – from basics to advanced across every technology used in industry today. Our focus is job ready and we provide the tools you need to make that happen.

As your learning partner, we back up our commitment with outstanding support, from instructor training to customer service to technical support.

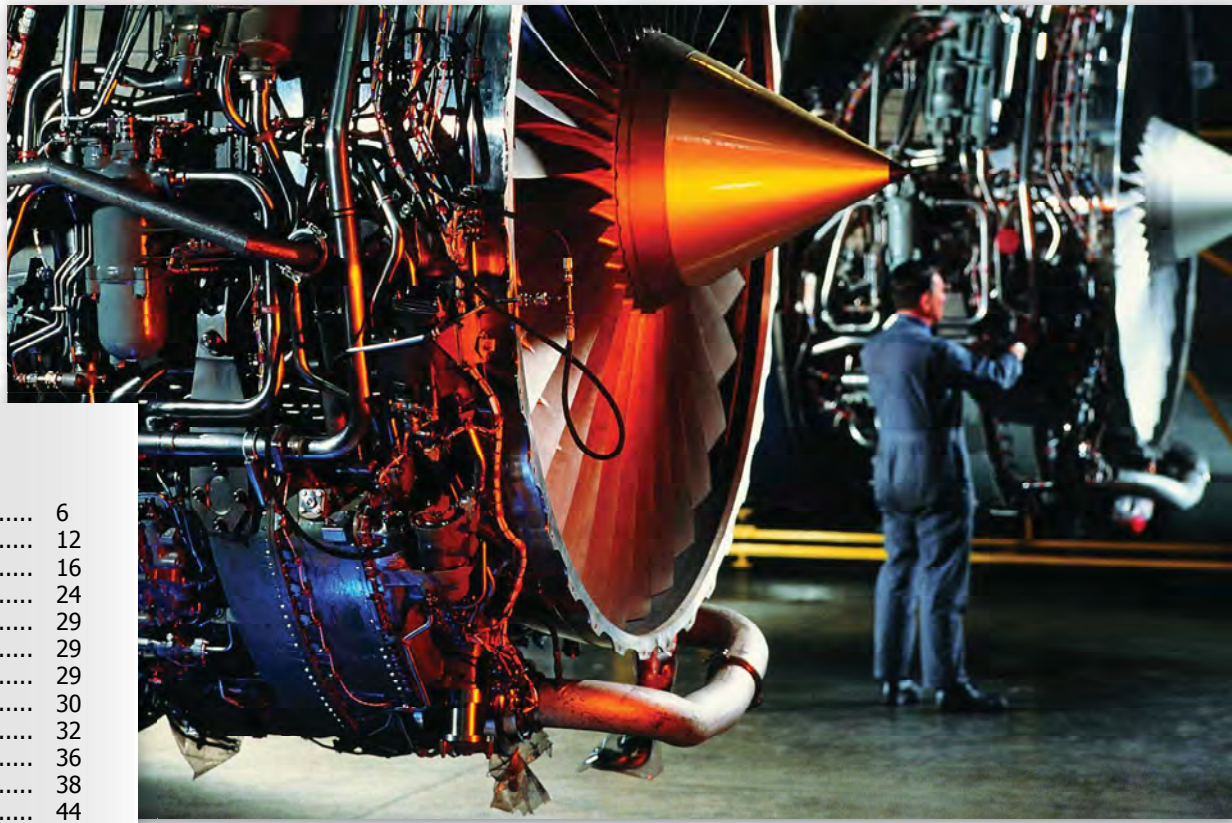


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Amatrol provides skill development across a broad range of both basic and advanced technologies. For example, we offer training in safety PLC, pressure compensated hydraulic pumps, multi-axis motion control, and PLC PID control to name a few.



**Highly Demanded
Industry Skills: Hands-On,
Job-Ready!**

**Individualized Self-Paced
or Group Learning
Flexibility**

**Extensive Curriculum
Spanning Basics through
Advanced**

**Authentic Industrial
Troubleshooting**

**Durable, Industrial
Equipment Designed
for Effective Teaching**

**Superior Multimedia
Interactivity Connects
with Learners**

**eAssessment to
Accelerate Learning,
Improve Effectiveness**

**Learning Anywhere,
Anytime – 24/7**

Outstanding Support

Learners are everywhere, and access to education needs to be everywhere as well. Amatrol offers portable learning solutions for many technologies. Below is our portable AC motor drives learning system. To see others, check out Electrical, Electronics, Mechanical, Fluid Power, and Quality Assurance.



Authentic Industrial Troubleshooting, Durable Industrial Equipment

Troubleshooting is one of the most seriously deficient skills in advanced manufacturing today and yet the most critically needed. Amatrol builds troubleshooting excellence through:

- **FAULTPRO** – Amatrol’s proprietary computer-based fault insertion system that automates tracking the student troubleshooting experience
- Equipment with **integrated electronic fault troubleshooting** across a wide array of technologies
- **Electronic ability to insert both electronic and mechanical faults** for realistic industry troubleshooting situations
- **Easy student monitoring** to see where each individual is challenged and needs more practice
- Incorporation of **typical industrial components** found on the plant floor today so learners troubleshoot what they will see on the job
- Use of a **wide variety of brands** and component types so students learn to apply troubleshooting broadly



Amatrol offers a wide array of elearning solutions to fit the ever changing landscape of today’s technical education needs. These fit seamlessly with our learning systems or can be used separately.

Multimedia

Genuinely interactive multimedia with vivid 3D graphics designed to teach as well as engage, checking for understanding and providing feedback – not the common quiz question so often claimed as “interactive.” Frequently includes virtual skills that allow students to perform the same activities in simulation they would perform with hands-on equipment. Available via the Web or to own.

eAssessment

Amatrol’s eAssessment establishes a knowledge baseline that can be used to tailor an effective, efficient learning plan for the individual customized to their needs. Assessment results are directly comparable to post course quiz results. Available via the Web.



Key Industry Skill Areas Integrated Into Amatrol's Learning Solutions:

- ✓ Foundation Skills
- ✓ Problem Solving & Analysis
- ✓ Troubleshooting
- ✓ Operation
- ✓ Tuning & Adjustment
- ✓ Installation
- ✓ Maintenance & Repair
- ✓ Application

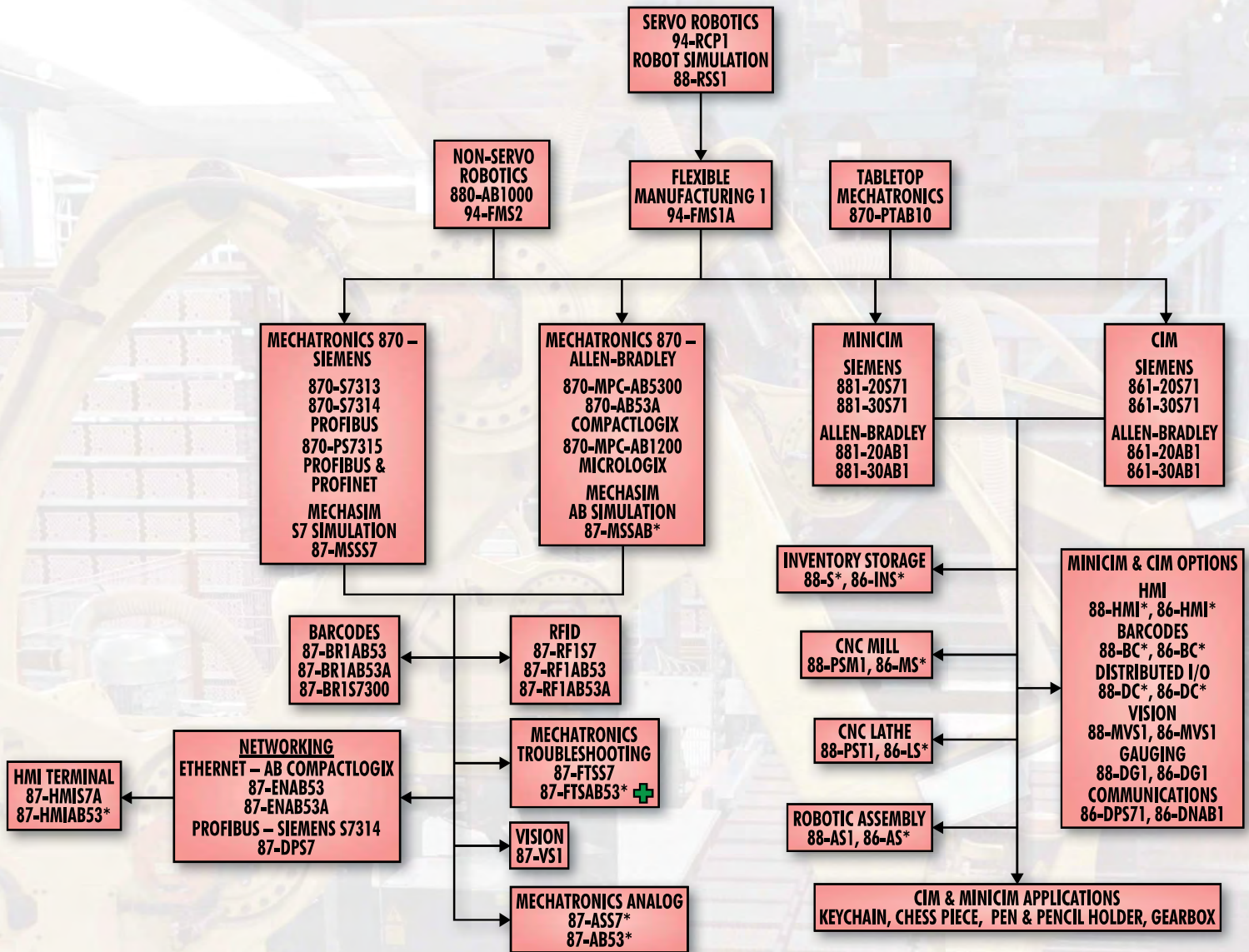


Comprehensive Curriculum For Individual Self-Paced or Group Learning Flexibility

Curriculum is, indeed, the key to learning. Great equipment alone is not enough. Excellent teaching materials is our promise and commitment to you:

- **Foundation skills** for entry level learners suitable for those who have no knowledge of the subject area
- **Progressively advanced skills** across each technology – for example, five levels of training in mechanical drives and six types of electronic motor drives
- **Complete** – Includes all text material and hands-on lab instructions. No other supplemental materials required
- **Emphasizes problem solving** and analysis skills throughout to develop learners' ability to think, not just memorize
- **Extremely detailed** enabling consistent outcomes for either individual self-paced or group learning
- **Short learning segments:** job task focused, active
- **Hands-on exercises** are presented as job tasks for learning the skills needed on the job
- **Text material and hands-on skills are interwoven** for immediate application of knowledge

AUTOMATION SYSTEMS



+ Includes Troubleshooting Skills



Maintain Real-World Automation Skills with Expansive Training Options

Amatrol's automation learning systems are constantly evolving to allow learners to gain hands-on experience with the technology that they will see on the plant floor.

Technology continues to advance and Amatrol's incredible range of learning solutions ensures that you will be able to provide a seamless learning experience.

ROBOTICS & AUTOMATION

Robotics and Computer Programming

► 94-RCP-1-A

- Basic Robot Operation and Programming
- Interfacing and Material Handling
- Application Development
- Flexible Manufacturing Cells
- Quality Control
- Production Control

Flexible Manufacturing

► 94-FMS-1-A

- Robotic Assembly/Linear Motion
- Point Arrays/Palletizing
- World & Tool Coordinates
- Servo Traverse Axes
- CNC/FMS I/O Interfacing
- Serial Communications
- Barcode Readers
- ASCII Data Manipulation
- Digital Indicators/Automated Gauging
- Multitasking/Program Interrupts



94-RCP-1-A and 94-FMS-1-A



94-RCP-1-A Optional Multimedia

Robotics Simulation ► 88-RSS1

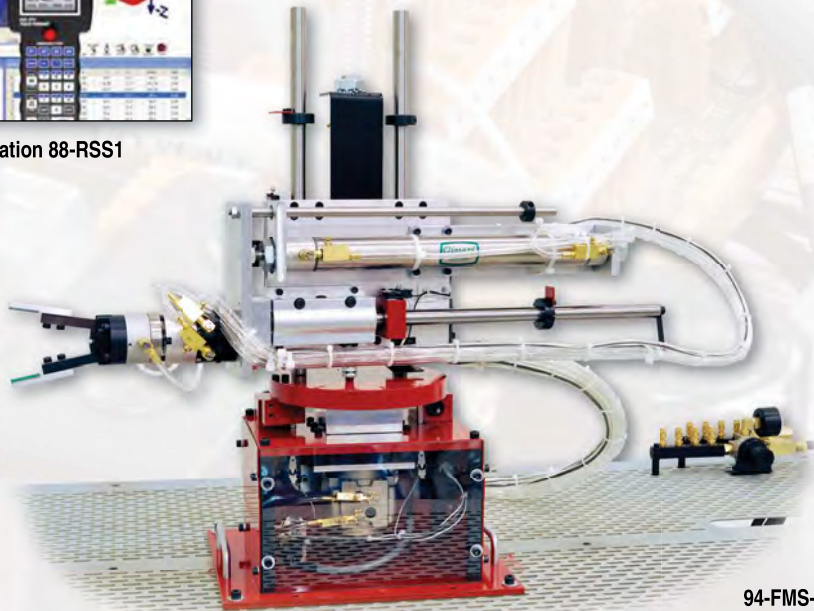
- Basic Robot Operation
- Movement & End Effector Commands
- Interfacing
- Flexible Manufacturing Cells
- Cartesian Coordinate Programming



Robotics Simulation 88-RSS1

Flexible Manufacturing ► 94-FMS-2

- Pneumatic Robot Systems
- Cylindrical Coordinates
- Maintenance and Troubleshooting
- Pneumatic Robot Control
- Robot Programming



Robot Control ► 880-AB1000

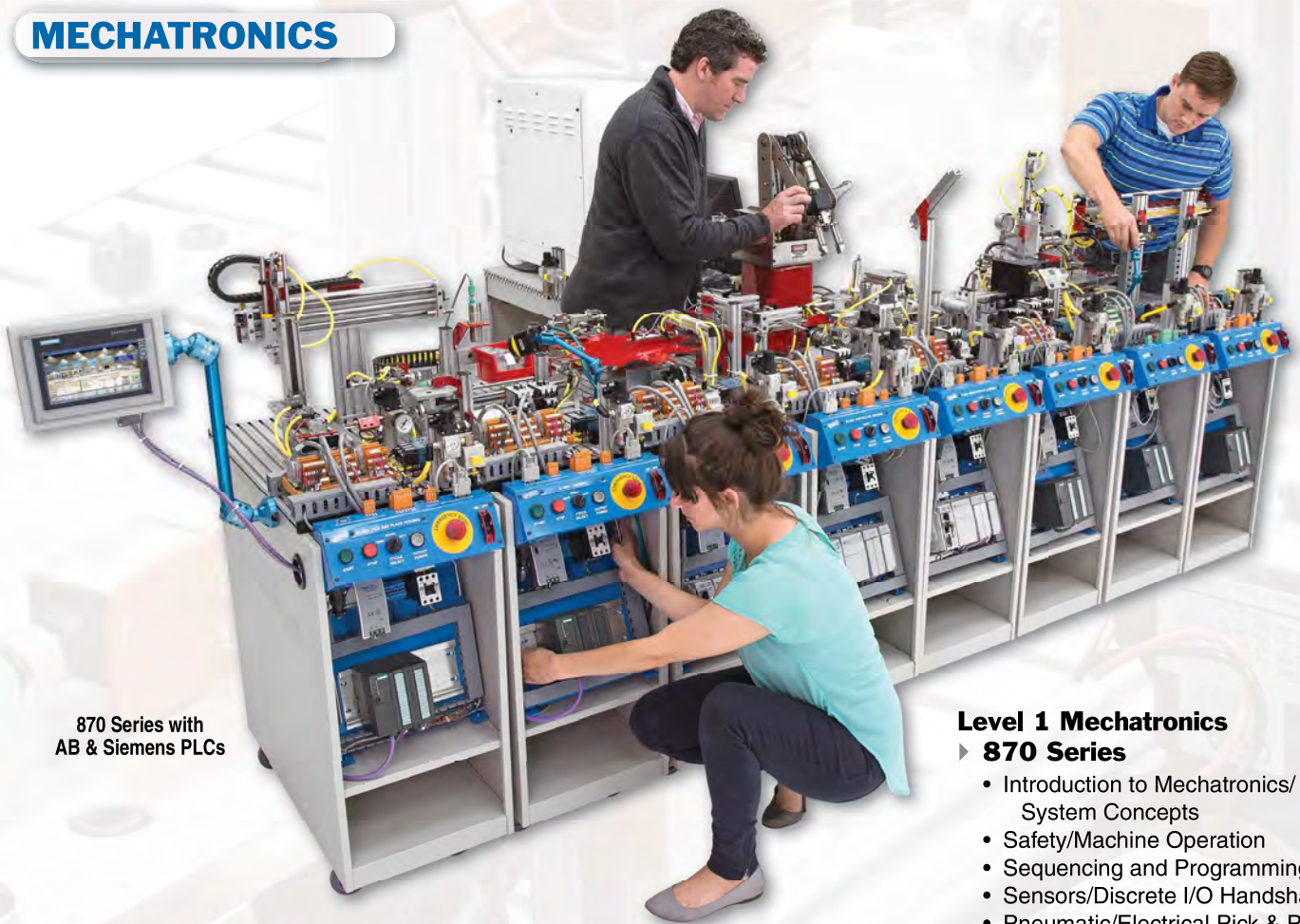
- PLC Program Design
- Discrete I/O Interfacing
- PLC Sequence Instructions
- PLC Program Applications



94-FMS-2 shown with 880-AB1000

AUTOMATION SYSTEMS

MECHATRONICS



870 Series with
AB & Siemens PLCs

Level 1 Mechatronics

► 870 Series

- Introduction to Mechatronics/ System Concepts
- Safety/Machine Operation
- Sequencing and Programming
- Sensors/Discrete I/O Handshaking
- Pneumatic/Electrical Pick & Place
- Integration Skills
- System Start-up/Halt, Stop/Reset
- FMS Programming
- Available with Siemens or Allen Bradley Processors or a Combination

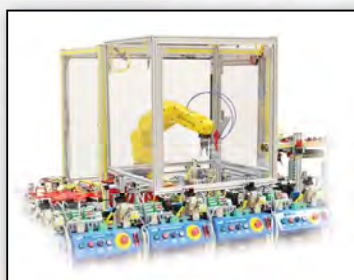
Fanuc Servo Robot Integration

Fanuc Robot Integration

► 87-500F, 25098

- User Supplied Fanuc Robot
- Fanuc Robot Interface and Cabling Package
- Custom Gripper Set
- Safety Enclosure

Available for Station 5



Fanuc 200iD/4S



Fanuc 200iC

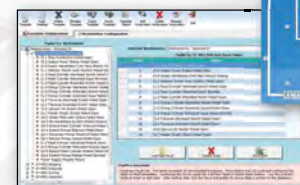
Electronic Fault Insertion: FaultPro

► 87-FTSS7, 87-FTSAB53, 87-FTSAB53A

- FaultPro Electronic Fault Insertion
- Single Fault Mode
- Random Fault Mode
- Data Tracking

Available for all Stations

FAULTPRO
COMPUTER-BASED FAULT INSERTION



HMI Terminal

▶ 87-HMIS7A, 87-HMIAB53, 87-HMIAB53A

- HMI Configuration
- HMI Operation
- Project Transfer
- Application Editing
- Field Objects
- Multi-Point Network Applications



Available for all Stations

Vision Inspection

▶ 87-VS1

- Vision Camera
- Vision Programming
- Output Discrete Signals
- Part Inspection



Available for all Stations



87-VS1 Multimedia Included

Mechatronics Barcode Learning System

▶ 87-BR1S7300, 87-BR1AB53

- Barcode Reader Operation
- Serial Communications
- PLC Data Instructions
- Barcode Reader Interface
- PLC Programming

Available for Individual Stations 4, 7 or Combination of 3 & 5



87-BR1 Multimedia Included

RFID Learning System

▶ 87-RF1S7300, 87-RF1AB53

- RFID Function
- RFID Operation
- RFID Applications
- RFID Components

Available for Individual Station 5 or Combinations of 3 & 4, 5 & 7, or 6 & 7



87-RF Multimedia Included

PLC Learning System

▶ 87-IOSS7, 87-IO5-AB5300

- Introduction to Programmable Controllers
- Basic Programming
- PLC Motor Control
- PLC Timer Control
- Event Sequencing

Available for all Stations



MechaSIM

▶ 87-MSSS7, 87-MSSAB53

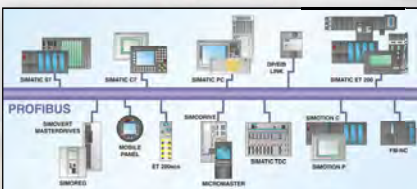
- PLC CIM Simulation
- MechaSIM Software Navigation
- Multiple Station Simulation



Mechatronics Profibus –Siemens S7314

▶ 87-DPS7

- Communication Network
- Data Exchange
- Network Configuration
- Multiple Station Control
- System Stop/Reset

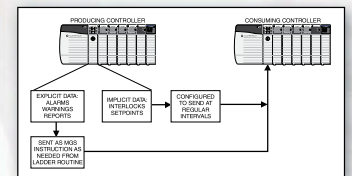


Use with any two Stations having Siemens S7314 processors

Mechatronics Ethernet

▶ 87-ENAB53

- Network Operation
- Network Installation
- Configuration
- Produced/Consumed Data & Messages
- Data Transfer



Use with any two Stations having AB 5300 series processors

AUTOMATION SYSTEMS

TABLETOP MECHATRONICS



870-PTAB10, 87-TMS1,
87-TMS2, 87-TMS3, 87-TMS4,
Pegasus Servo Robot & 88-200 Table

Inventory Feeding

▶ 87-TMS1

- Powered Parts Feeder
- Electro-Pneumatic Valve Adjustment
- Event Sequencing

Inspection & Indexing

▶ 87-TMS2

- Index Station Operation
- Stepper Motor Programming
- Sensor Adjustments

Sorting & Distribution

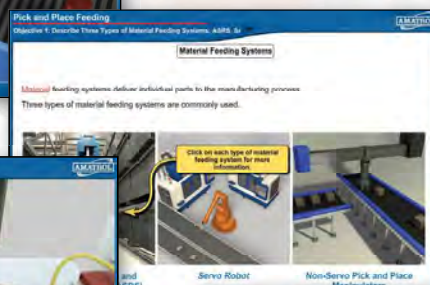
▶ 87-TMS3

- Sorting Operation
- Parts Storage
- Thru-Beam Photoelectric Adjustment

Servo Robot Station

▶ 87-TMS4

- Servo Robot Programming
- Robot Interfacing
- Robot Work Envelope



870-PTAB10 Multimedia Included

MiniCIM

MiniCIM ▶ 881 Series

- PLC Operation
- Servo Robots
- CNC Machining
- Assembly Operations
- Work Cells
- Ethernet Network



881 Series Multimedia Included



881 Series MiniCIM shown with options

MiniCIM

Available Processors

Allen Bradley AB5300 L16
SIEMENS S712

Optional Inventory Stations

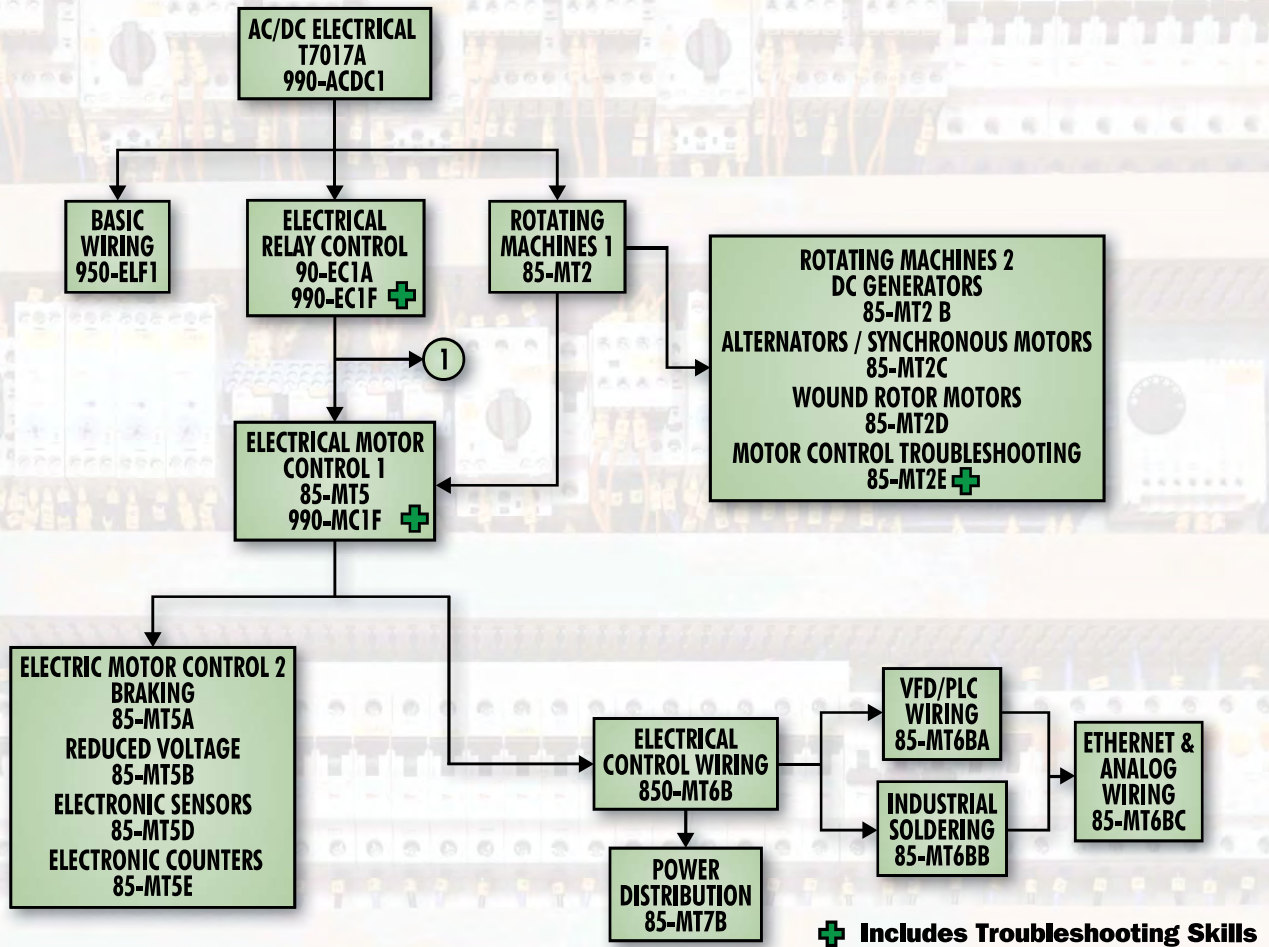
- 86-INS1 ▶ Pegasus Robot, Workstation, Gravity Feeder
- 86-INS2 ▶ Pegasus Robot, Linear Traverse, Palletized Grid Storage
- 86-INS3 ▶ Fanuc Robot Integration Package, Gravity Feeders

Optional Application Modules

- Keychain ▶ 88-700
- Chess Piece ▶ 88-701
- Pen & Pencil Holder Assembly ▶ 88-702
- Pen & Pencil Holder with Machining ▶ 88-702-A
- Gearbox Assembly ▶ 88-703
- Gearbox with Machining ▶ 88-703-A



881 Series MiniCIM shown with optional CNC Mill



Knowledge Building & Hands-On Electrical Skills

Amatrol's electrical training solutions start with basic electricity and continue to more advanced topics such as power distribution and motor control.

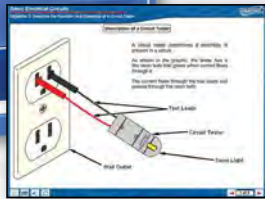
Hands-on electrical skills are also a key element in manufacturing's overall need for multi-skilled individuals. Only Amatrol offers a full range of multi-discipline, hands-on skill training and a plan for implementation.



BASIC ELECTRICITY



T7017A



T7017A Optional Multimedia

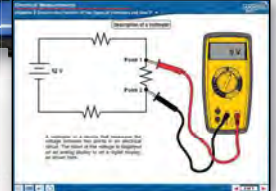
AC / DC Electrical

- ▶ **T7017A**
- ▶ **990-ACDC1 Portable**

- AC/DC Voltage and Current Principles
- Resistance, Inductance, and Capacitance
- Series and Parallel Circuits
- Multimeters / Manual Switches
- Circuit Protection, Breakers, and Testers
- Fuses/Resistors /Capacitors/ Inductors
- Potentiometers /Solenoids/ Control Relays



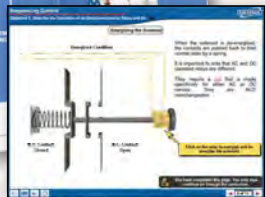
990-ACDC1



990-ACDC1 Multimedia Included



90-EC1A

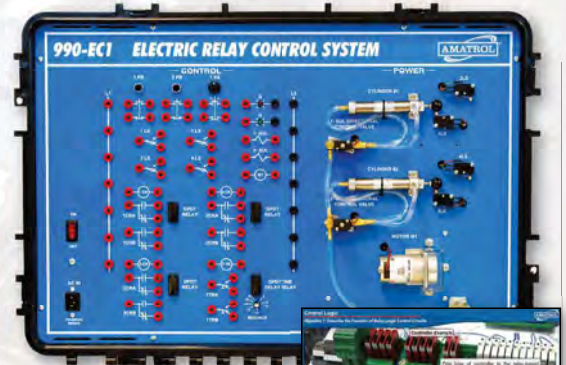


90-EC1A Optional Multimedia

Electrical Relay Control

- ▶ **90-EC1A**
- ▶ **990-EC1 Portable**

- Digital Logic/Relay Control
- Ladder Diagrams/Control Circuit Design
- Seal-in Holding, Relay Sequence, and Timer Relay Circuits
- Electric Motor and Electro-Fluid Power Control



990-EC1



990-EC1 Multimedia Included

ROTATING MACHINES

Level 1 Rotating Machines ▶ 85-MT2

- DC Series, Shunt, & Compound Motors
- Split Capacitor 1-Phase AC Motors
- Two Capacitor 1-Phase AC Motors
- Three-Phase AC Motors



85-MT2 shown with 85-MT2-B



85-MT2-C



85-MT2-D



85-MT2-E

Level 2 Rotating Machines

- DC Generators > 85-MT2-B
- Alternators/Synchronous Motors > 85-MT2-C
- Wound Rotor Motors > 85-MT2-D
- Electric Motor Troubleshooting > 85-MT2-E



Multimedia Optional for 85-MT2 & All Options

MOTOR CONTROL



85-MT5, 85-MT5-A and Options

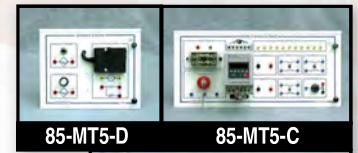


Multimedia Optional for 85-MT5 & All Options

Level 1 Electrical Motor Control

▶ 85-MT5

- Ladder Diagrams
- Control Relay Circuits
- Control Relays/Manual Switches
- Float, Limit, Pressure, Liquid Level Switches
- Magnetic Motor Starters
- Control Transformers
- Lockout/Tagout



Level 2 Electrical Motor Control

- Motor Braking > 85-MT5-A
- Reduced Voltage Starting > 85-MT5-B
- Variable Frequency AC Drive > 85-MT5-C
- Electronic Sensors > 85-MT5-D
- Electronic Counter > 85-MT5-E
- SCR Speed Control > 85-MT5-F

Fault Troubleshooting System

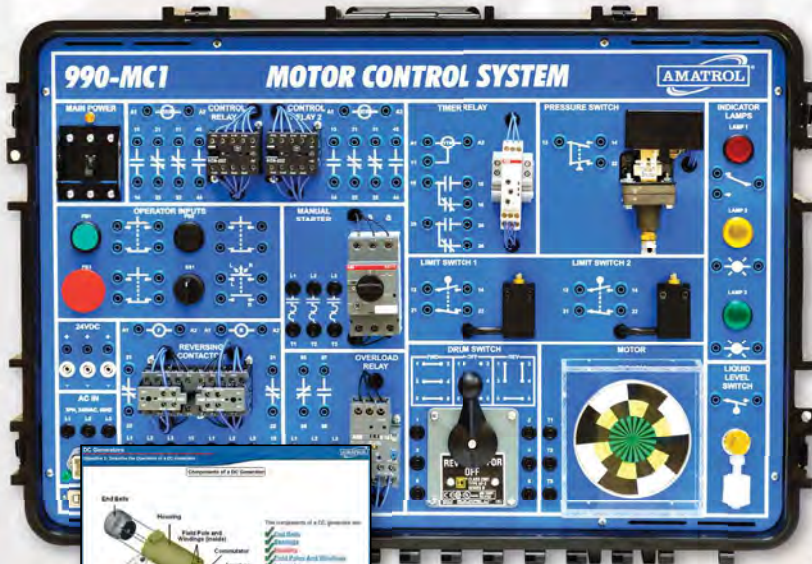
▶ 890-FTS

- Adds Electronic Fault Insertion to 85-MT5
- Provides Performance Tracking



890-FTS

FAULTPRO
COMPUTER-BASED FAULT INSERTION



990-MC1F

990-MC1F Multimedia Included

FAULTPRO
COMPUTER-BASED FAULT INSERTION

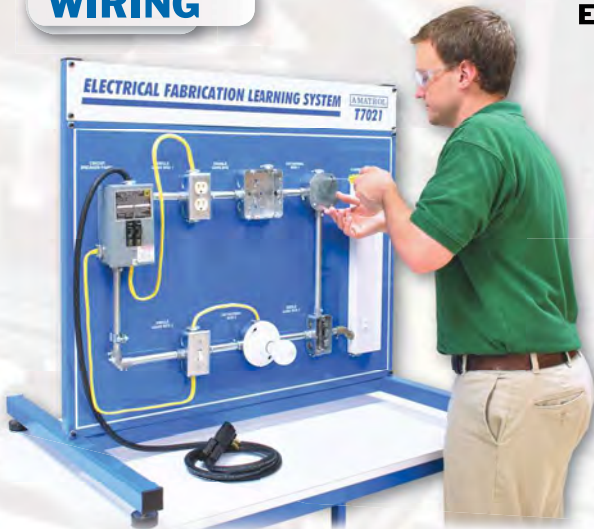
Electrical Motor Control Troubleshooting

▶ 990-MC1F

- Reversing Motor Control
- Control Ladder Logic
- Component Troubleshooting
- Automatic Input Devices



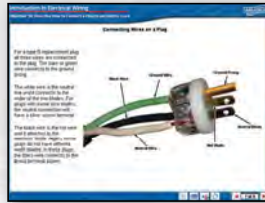
WIRING



950-ELF1

Electrical Fabrication 1 ▶ 950-ELF1

- Introduction to Electrical System Wiring
- Residential Wiring System Components
- Service Connection and Circuit Protection



950-ELF1 Optional Multimedia

Industrial Electrical Wiring ▶ 850-MT6B

- Electrical Control Wiring
- Electrical Prints
- Panel Wiring
- Pneumatic Control Circuit Wiring
- Overcurrent Protection



850-MT6B shown with 85-MT6BA & 85-MT6BC

VFD/PLC Wiring

▶ 85-MT6BA

- PLC Installation
- VFD Installation
- VFD Motor Control
- VFD/PLC Communication



85-MT6BA



Multimedia Optional for 85-MT6B & All Options



85-MT6BC

Ethernet & Analog Wiring

▶ 85-MT6BC

- Ethernet Installation Wiring
- Ethernet Switch Installation
- HMI Installation
- Analog Transmitter/ Thermocouple Installation

Electrical Power Distribution

▶ 85-MT7B

- Raceways
- Conduit Bending and Sizing
- Conductors; Disconnects
- Circuit Protection
- Wire Pulling Techniques



85-MT7B



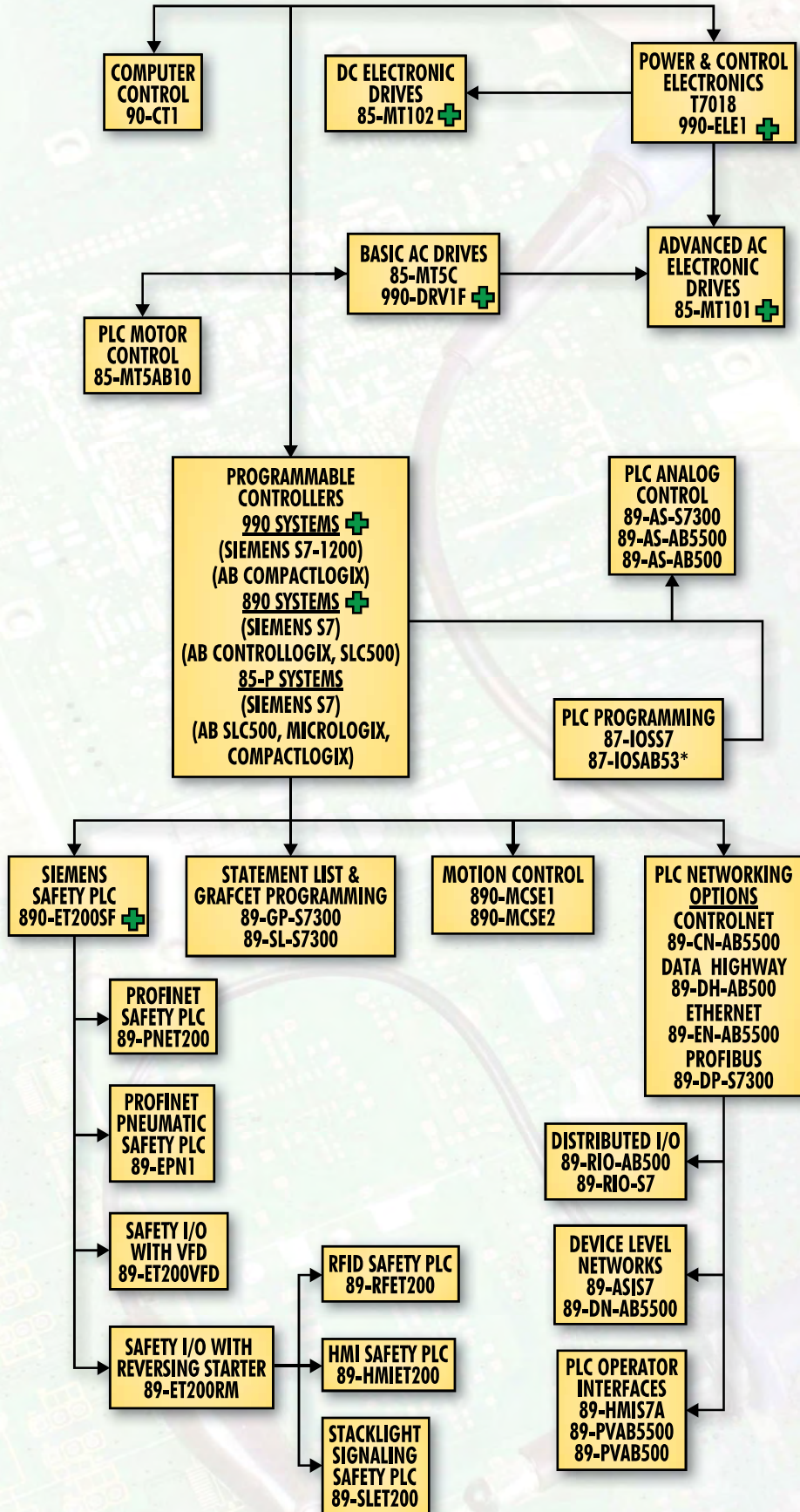
85-MT7B Optional Multimedia

Industrial Soldering ▶ 85-MT6BB

- Soldering Basics
- Soldering Inspection
- Solder Wick
- Electrical Panel Soldering Applications



85-MT6BB



Electronics Skills from Basics to Advanced

Amatrol's electronics training solutions are unmatched in their ability to provide hands-on training with the widest range available of PLCs, sensors, and other technologies, such as RFID and barcode readers.

Need a portable solution to teach electronics? Check out the 990-ELE1 Portable Power & Control Electronics Learning System. Need a PLC trainer that will allow your program to grow? Check out the 890-based PLC Systems. The 890 PLC series is available with various Siemens or Allen Bradley PLCs and depending on the PLC selected, there are over 20 add-ons, including HMI, VFD, and RFID.

If you need the ability to teach electronics troubleshooting, look for the FaultPro logo that indicates the system is compatible with Amatrol's computer-based fault insertion system. FaultPro is the industry's only realistic fault troubleshooting system.

+ Includes Troubleshooting Skills

POWER & CONTROL



990-ELE1 Multimedia Included

Power & Control Electronics ▶ 990-ELE1

- Oscilloscopes
- Power Supply Filtration & Regulation
- Discrete Sensing Devices
- Thermal Sensing Devices
- Analog Sensing
- Amplifiers and Op Amps

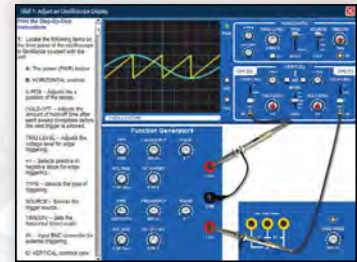
990-ELE1



T7018

Power & Control Electronics ▶ T7018

- Oscilloscopes
- Power Supplies, Diodes, Rectifiers
- Power Supply Filtration and Regulation
- Solid State Relays
- Discrete Sensing Devices
- Thermal Sensing Devices
- Amplifiers and OP Amps
- Analog Sensing Devices
- Solid State Switching
- Solid State Speed and Power Control



T7018 Optional Multimedia



Easy Panel Changeover

FAULTPRO
COMPUTER-BASED FAULT INSERTION

MOTION CONTROL



890-MCSE1

Level 1 Motion Control - 1-Axis ▶ 890-MCSE1

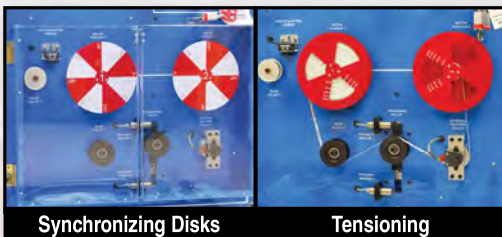
- Motion Control System Operation
- Drive Configuration & Tuning
- Drive Operation
- Project Configuration
- Function Blocks & Programming
- Position Control
- CANOPEN Bus & Programming
- Velocity & Current Control



890-MCSE2

Level 2 Motion Control - 2-Axis ▶ 890-MCSE2

- Multi-Axis Configuration and Gearing
- Gearing Function Blocks and Applications
- Camming
- Camming Function Blocks and Tappets
- Registration
- Rotary Knife
- Unwind/Wind



Synchronizing Disks

Tensioning

ELECTRONICS

PROGRAMMABLE CONTROLLERS

PLC Workstation and Fault Troubleshooting System

► 890-PECB Plus Controller

(Requires 890 Controller and Panels)

- Operation
- Programming
- System Troubleshooting
- PLC Motor Control
- Boolean Algebra/Logic
- Ladder Logic
- Discrete I/O Interfacing
- Timer Instructions
- Counter Instructions
- Event Sequencing
- Application Development
- Program Control

890-PECB with
890-AB5500, 890-S7300,
89-HMI and 890
Application Panels

FAULTPRO™
COMPUTER-BASED FAULT INSERTION

Computer not
included



OPTIONS FOR 890 BASED PLC SYSTEMS

Siemens S7 300 Series (313 - 315)

- Analog Application ► 89-AS-S7300
- ASI Bus ► 89-ASI-S7*
- Profibus ► 89-DP-S7300
- Graph Programming ► 89-GP-S7300*
- HMI Touch Screen ► 89-HMI-S7-A*
- Distributed I/O ► 89-RIO-S7*
- Statement List ► 89-SL-S7300*

Allen-Bradley ControlLogix (AB5500)

- Analog Application ► 89-AS-AB5500
- ControlNet ► 89-CN-AB5500*
- DeviceNet ► 89-DNAB5500
- EtherNet ► 89-EN-AB5500
- Process Control ► 89-PC-AB5500*
- PanelView Plus ► 89-PVAB5500*

Allen-Bradley SLC500

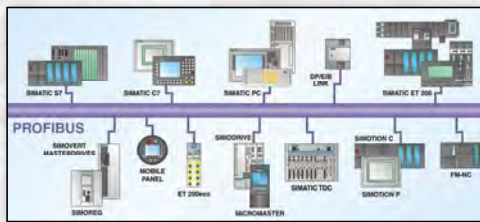
- Analog Application ► 89-AS-AB500
- Data Highway, SLC502 ► 89-DH-AB500*
- Data Highway, SLC503 ► 89-DH-AB500-A*
- PanelView ► 89-PV-AB500-A*
- Distributed I/O ► 89-RIO-AB500*

*Not Shown

Profibus

► 89-DP-S7300

- Network Operation
- Profibus DP Network Construction
- Network Configuration
- Data Exchange
- System Functions



89-DP-S7300



89-PVAB5500

PanelView Operator ► 89-PVAB5500

- Application Editing
- PanelView Construction and Configuration
- Tags and Communications
- Input and Output Objects



89-AS-S7300

PLC Analog Application

- 89-AS-S7300
- 89-AS-AB5500
- 89-AS-AB500

- Analog Input Modules
- Input Configuration and Troubleshooting
- Output Configuration and Troubleshooting
- Output Devices and Installation



89-EN-AB5500

PLC EtherNet ► 89-EN-AB5500

- Remote I/O
- Industrial Communications Networks
- Produced/Consumed Data and Messages
- Troubleshooting Ethernet/IP



89-DNAB5500

DeviceNet ► 89-DNAB5500

- Input/Output
- Industrial Communications Networks
- Troubleshooting

Siemens Safety PLC ▶ 890-ET200SF

- Safety System Components
- Safety Programming
- PLC Connections & Operations
- PLC Programming
- PLC System Troubleshooting
- Event Sequencing
- Application Development
- Program Control Instructions
- Math & Date Move Instructions



Supply Voltage Test

FAULTPRO
COMPUTER-BASED FAULT INSERTION

890-PECB shown with
Siemens ET200 PRO Safety
PLC & Options



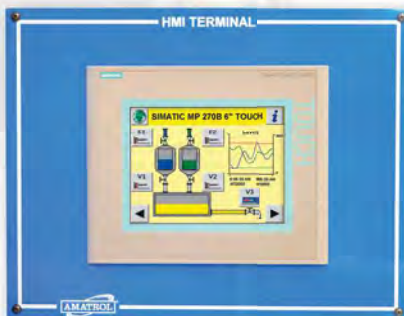
890-ET200SF shown with
89-ET200VFD

OPTIONS FOR 890 SAFETY PLC WORKSTATION

Siemens Safety PLC (ET200PRO)

- Profinet ▶ 89-PNET200*
- Profinet Pneumatic ▶ 89-EPN1*
- Safety I/O with VFD ▶ 89-ET200VFD
- Safety I/O with Reversing Starter ▶ 89-ET200RM*

- RFID Safety PLC ▶ 89-RFET200
- HMI Safety PLC ▶ 89-HMIET200
- Stacklight Signaling Safety PLC ▶ 89-SLET200



89-HMIET200

HMI Safety PLC ▶ 89-HMIET200

- HMI Construction
- HMI Configuration
- Application Editing
- WINCC Flexible Software
- Project Screens
- Input & Output Objects
- I/O Field Objects



89-ET200VFD

Safety I/O with VFD ▶ 89-ET200VFD

- Reversing Motor Starter Operation
- Reversing Motor Starter Programming
- Motor Starter Construction
- Disconnect Module Operation
- STEP 7 Project Component Configuration

Stacklight Signaling Safety PLC ▶ 89-SLET200

- Stack Light Function
- Siemens 8WD44 Signal Column components
- Memory Clock Bits Function
- Stack Light Operation
- Control Stack Light via PLC



89-SLET200

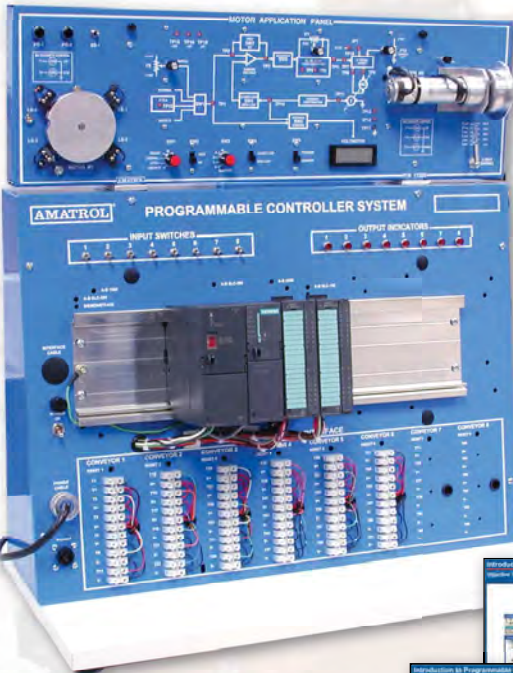
RFID Safety PLC ▶ 89-RFET200

- RFID Function
- RFID Components
- RFID Interface Module Configuration
- RFID System Selection
- Read/Write Device
- Data Exchange



89-RFET200

ELECTRONICS



Tabletop 85-P PLC Workstation Plus Controller

Allen Bradley

- ▶ 85-P-AB1000
- ▶ 85-P-AB503
- ▶ 85-P-AB5300

Siemens

- ▶ 85-PS7312
- ▶ 85-PS7315

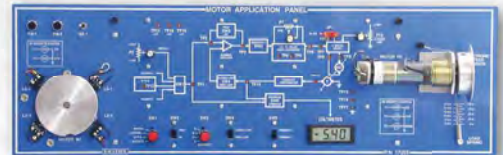
- Programmable Control Operation
- Controller Programming Languages
- Basic PLC Programming
- Numbering Systems
- PLC Motor Control
- Seal-In Program Logic
- Event Sequencing
- Application Development

Options for 85-P PLC Workstation

Pneumatic Application Panel ▶ 17200



Electric Motors Application Panel ▶ 17205



Discrete Wiring Application Panel ▶ 17250



85-P Shown with Siemens S7312 & Motor Application Panel 17205



85-P-AB1000 & 85-P-AB503
Optional Multimedia



87-IO5



870-PS7317

87-IOSS7 Shown with 870-PS7317
Adds to any 870 series Mechatronics Cart

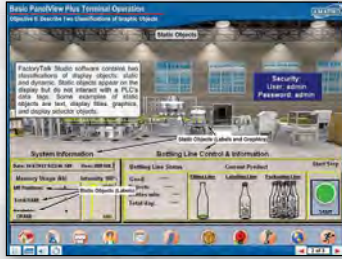
PLC Programming

- ▶ 87-IOSS7
- ▶ 87-IO5AB53

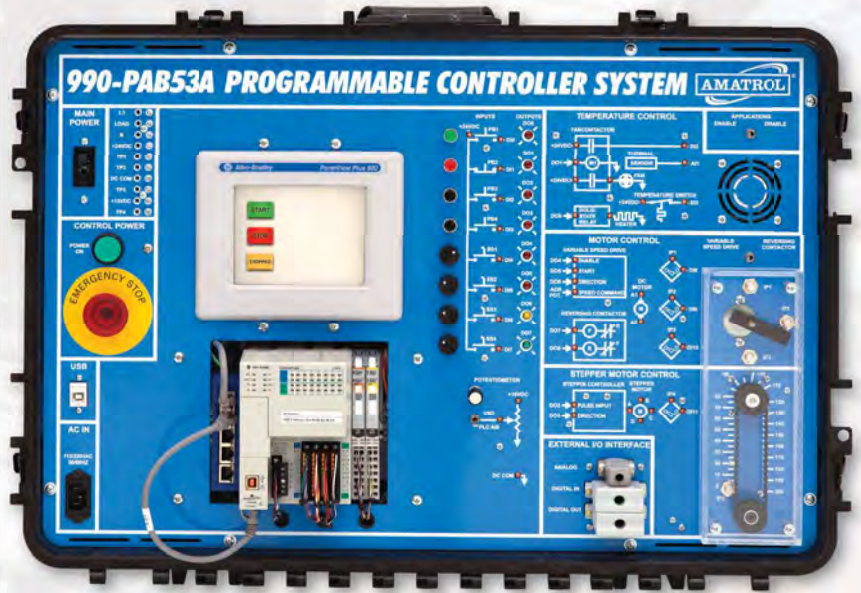
- PLC Operation
- Basic Programming
- PLC Motor Control
- Program Control Instructions
- Math & Data Move Instructions
- Event Sequencing

Portable PLC Troubleshooting - Allen-Bradley CompactLogix ▶ 990-PAB53AF

- Introduction to PLCs
- PanelView Plus
- Terminal Operation
- PLC Programming
- PLC Motor Control
- Event Sequencing



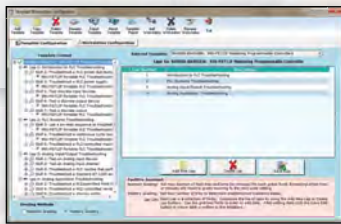
990-PAB53 Multimedia Included



990-PAB53AF (Includes 990-PAB53A and 99-FTSAB53A)

Portable PLC Troubleshooting Siemens S7-1200 ▶ 99-FTSS712 Allen-Bradley AB5300 ▶ 99-FTSAB53

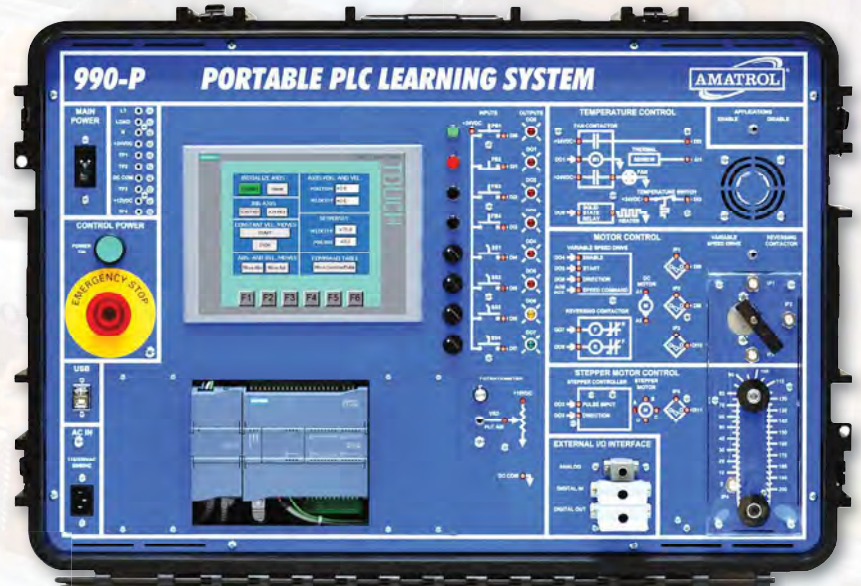
- Introduction to PLC Troubleshooting
- PLC Systems Troubleshooting
- Analog Input/Output Troubleshooting
- Analog Application Troubleshooting



Electronic Fault Troubleshooting System for Portable 990 PLC Systems

Portable PLC Troubleshooting - Siemens S7-1200 ▶ 990-S712F

- Introduction to PLCs
- Basic HMI Panel Operation
- PLC Programming
- PLC Motor Control
- Event Sequencing
- PLC Motion Control



990-PS712F (Includes 990-PS712 & 99-FTSS712)

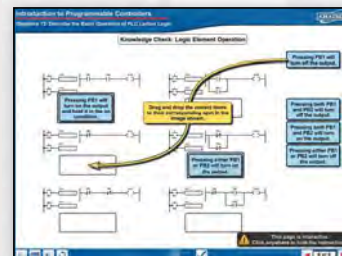
MOTOR CONTROL SYSTEM AMATROL 85-MT5



85-MT5AB10 Adds to 85-MT5

PLC Motor Control ▶ 85-MT5AB10

- PLC Orientation
- PLC Operation
- Motor Control Basics
- Timer Instructions
- Time-Driven Sequencing
- Count Up Instructions



85-MT5AB10 Multimedia Included

ELECTRONIC DRIVES



85-MT10-1 (Back Storage)

85-MT10-1 (Front)

AC Electronic Drives ▶ 85-MT10-1

- Inverter-Rated and Servo AC Motors
- Inverter and Vector (Spindle) Drives
- Servo Axis Drives
- Resolvers and Encoders
- Velocity and Position Servo Control
- Torque Control

Panels Included

- AC Vector Spindle Drive
- AC General Purpose Drive
- AC Servo Axis Drive



85-MT10-1 Optional Multimedia



Quick Panel Connection



Easy Panel Removal

DC Electronic Drives ▶ 85-MT10-2

- Servo Axis, Spindle, PWM and SCR Drives
- DC Permanent Magnet Motors
- Inner Loop Compensation
- Torque Control
- Position and Velocity Servo Control
- Tachometers, Resolvers and Encoders

Panels Included

- DC Spindle Drive
- DC PWM Drive
- DC Servo Axis Drive

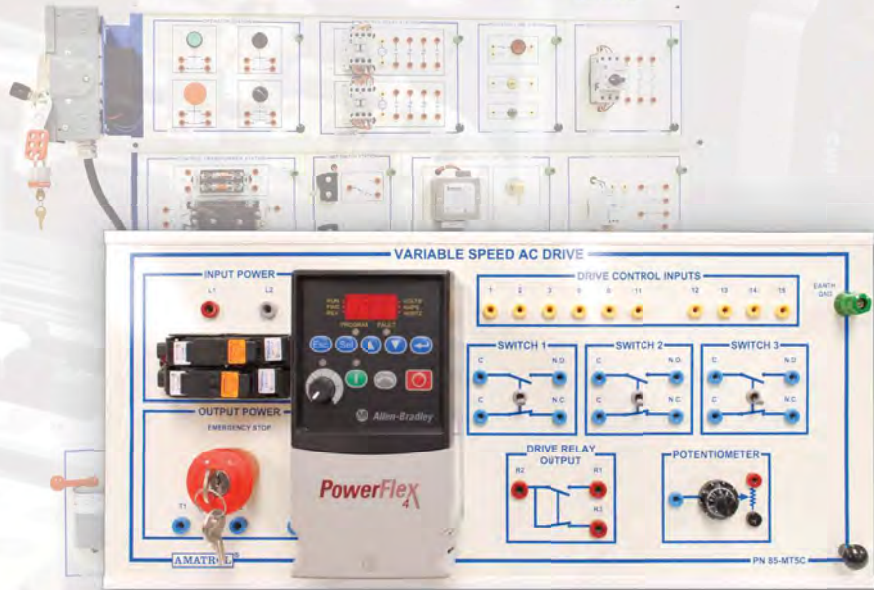


85-MT10-2 (Back Storage)

85-MT10-2 (Front)

MOTOR CONTROL SYSTEM

AMATROL
85-MT5



85-MT5C Adds to 85-MT5

Basic AC Electrical Drives ▶ 85-MT5C

- Variable Frequency AC Drives
- 2 & 3 Wire Motor Control
- Jogging
- Speed Control
- Torque Control
- Acceleration & Deceleration
- Braking
- Troubleshooting



85-MT5C
Optional
Multimedia

Portable AC Frequency Drives Troubleshooting

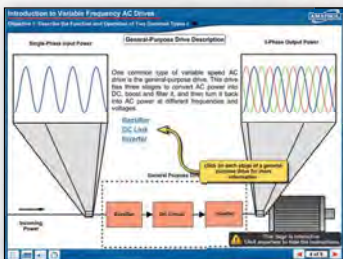
▶ 990-DRV1F

- Introduction to AC Drives
- 2 & 3 Wire Motor Control
- Jogging Control
- Motor Ramping
- Drive Input Troubleshooting
- Motor Input Troubleshooting
- Drive Relay Troubleshooting

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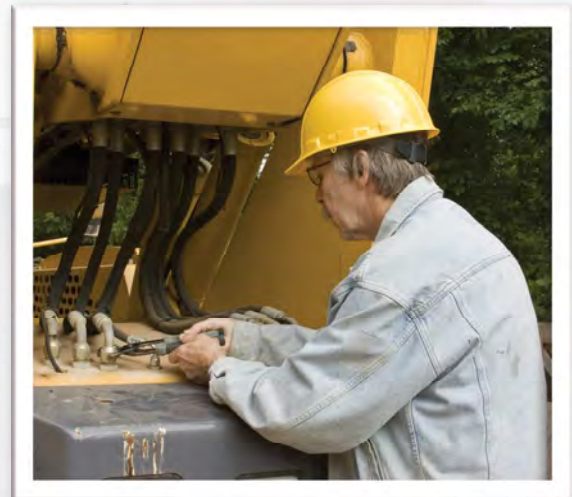
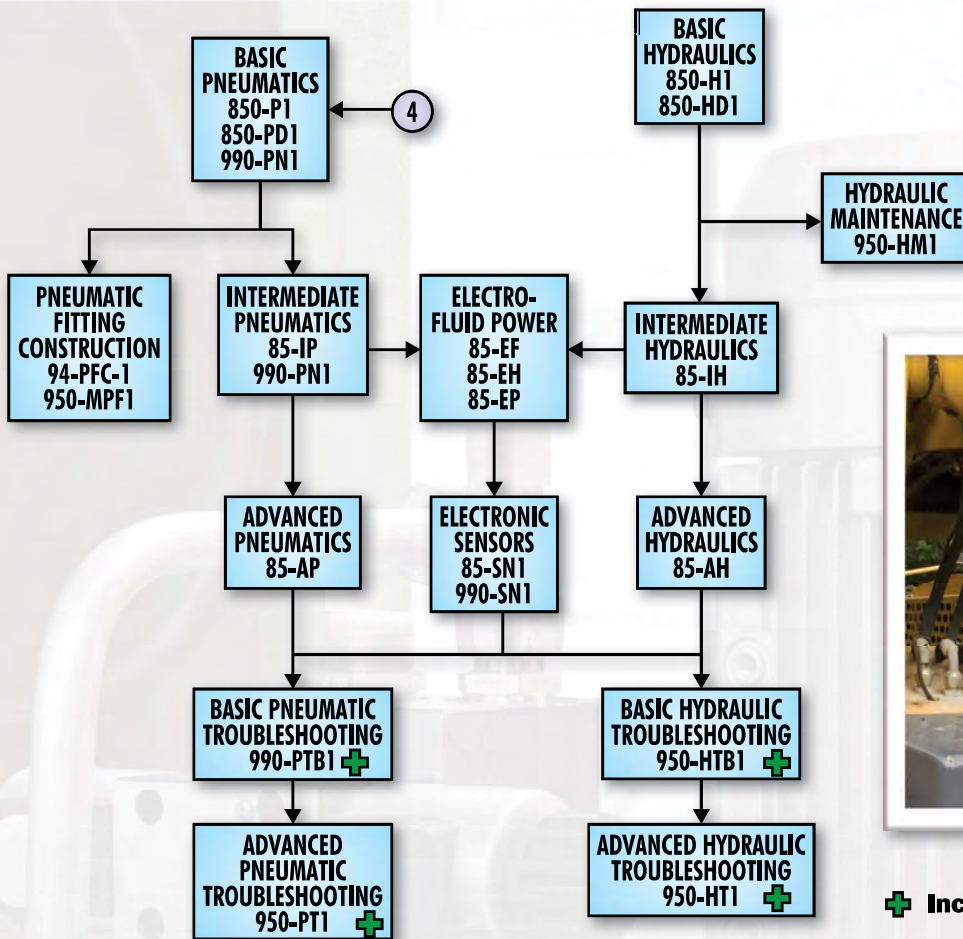
990-DRV1F



990-DRV1F Multimedia Included



FLUID POWER



+ Includes Troubleshooting Skills

Fluid Power Training for Every Need

Amatrol's first product was based on fluid power and decades later these learning systems continue to provide training opportunities that are unavailable anywhere else. This is because Amatrol continuously evaluates and updates its product offerings to ensure that the hands-on skills being taught are industry-relevant and that the curriculum uses proven learning methodologies.

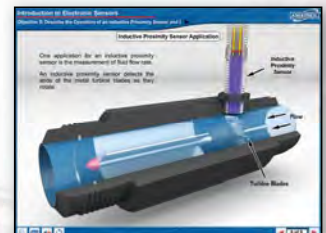


Electronic Sensors

- ▶ 990-SN1 Portable
- ▶ 85-SN1

(85-SN1 May Be Used with 850-H1)

- Sensor Applications
- Inductive and Capacitive Sensors
- Magnetic Reed and Hall Effect Sensors
- Photoelectric Sensors



Multimedia Included for 990-SN1
Optional Multimedia for 85-SN1

HYDRAULICS

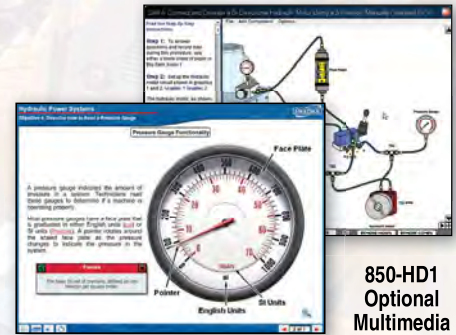


850-HD1 with 85-EF, 85-BP

Basic Hydraulics – Double-Sided ▶ 850-HD1

(Single-Sided 850-H1 model also available)

- Pumps/Cylinders/Motors
- Directional Control Valves
- Check, Relief, and Pressure Reducing Valves
- Sequence and Flow Control Valves
- Hydraulic Circuit Applications



850-HD1
Optional
Multimedia

Intermediate Hydraulics

▶ 85-IH

- Accumulators
- Pilot-Operated DCVs and Check Valves
- Direct-Operated Relief Valves
- Rapid Traverse Slow Feed Circuits
- Cylinder Sequencing
- CAM-Operated DCVs
- Remote Pressure Control/ Pump Unloading Circuits



85-IH Optional Multimedia

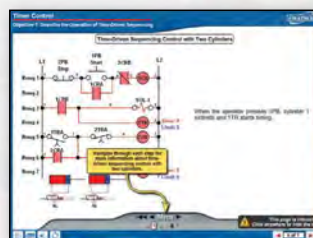


850-HD1

Electro-Hydraulics

▶ 85-EH

- Basic Control Devices
- Power Devices
- Control Relays
- Multiple Cylinder Control
- Sensor Applications
- Circuit Protection



85-EH Optional Multimedia

Advanced Hydraulics

▶ 85-AH

- Motor Applications
- Hydraulic Pump and Motor Performance
- Fluids and Conditioning
- Heat Exchangers
- Motor Circuits



85-AH Optional Multimedia

FLUID POWER

HYDRAULIC MAINTENANCE

Hydraulic Maintenance ▶ 950-HM1

- Hydraulic Filter Maintenance
- Hydraulic Fluid Maintenance
- Flushing Hydraulic Fluid
- Fittings & Seals
- O-Ring Seals
- Hose & Clamping Devices
- Cylinder Bleeding
- Tubing & Component Inspection
- Component Replacement



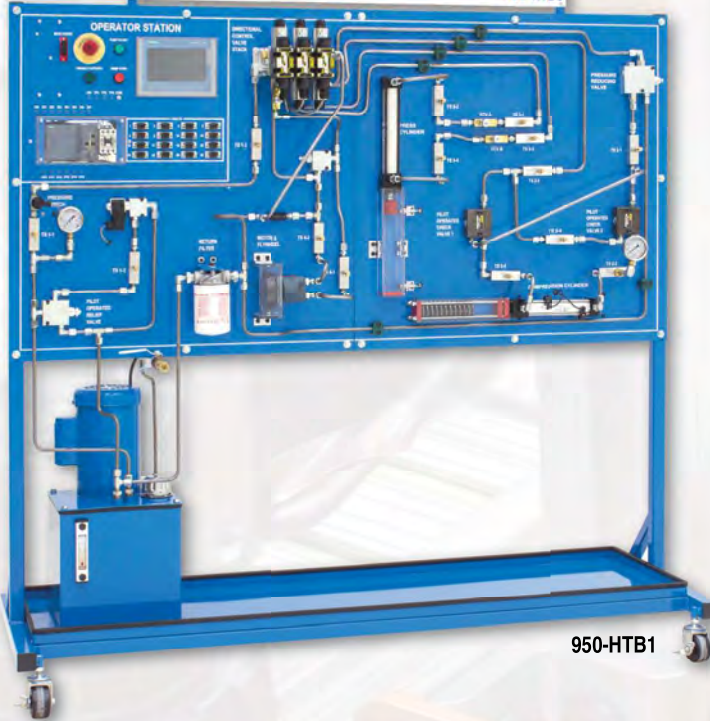
950-HM1 Multimedia Included



950-HM1

HYDRAULIC TROUBLESHOOTING

BASIC HYDRAULIC TROUBLESHOOTING SYSTEM 950-HTB1



950-HTB1

Basic Hydraulic Troubleshooting ▶ 950-HTB1

- Hydraulic Pump Troubleshooting
- Hydraulic Actuator Troubleshooting
- DCV Troubleshooting
- Hydraulic System Troubleshooting
- Machine Sequence Troubleshooting
- Machine Performance Troubleshooting



950-HTB1 Multimedia Included

Hydraulic Troubleshooting

▶ 950-HT1

- Valves: Unloader, Pilot-Operated, Counterbalance, Subplate Mounted, Pressure Compensated Flow Control
- Pilot-Operated DCVs
- Pressure-Compensated Pump
- Gear Pump
- JIC Tie-Rod Cylinders
- Maintenance
- Troubleshooting



Unloader Valve
on 950-HT1



2-Stage Directional Control Valve
on 950-HT1

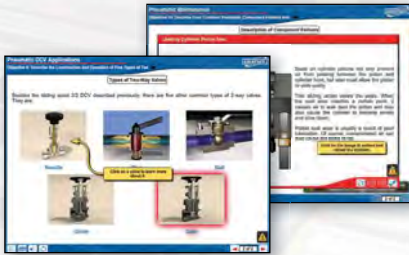


950-HT1

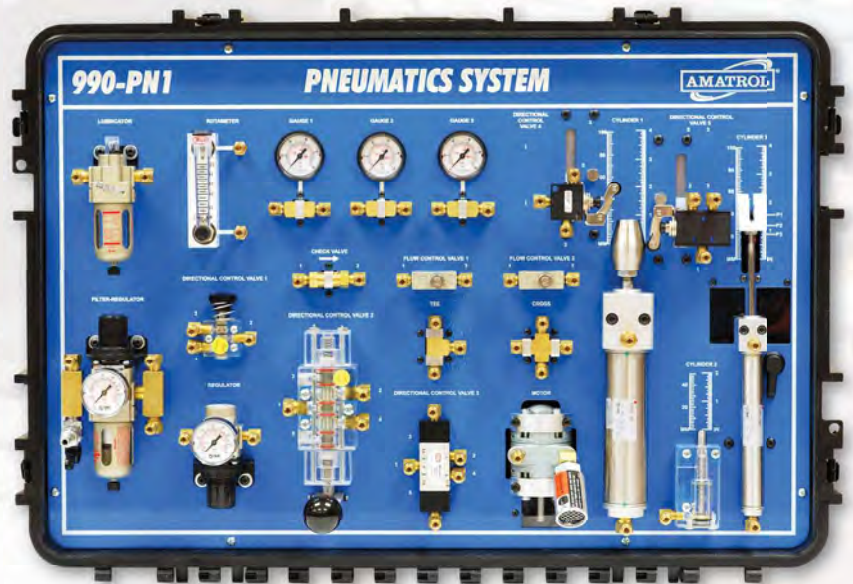
PNEUMATICS

Portable Pneumatics ▶ 990-PN1

- Pneumatic Power Systems
- Pneumatic Circuits
- Pressure and Flow Principles
- Speed Control Circuits
- Air Logic
- Schematics
- Pneumatic Maintenance



990-PN1 Multimedia Included

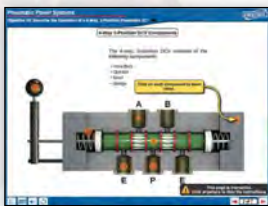


990-PN1

Basic Pneumatics ▶ 850-PD1

(Single-Sided 850-P1 Model Also Available)

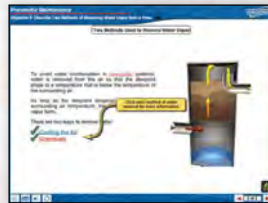
- Pressure, Force, Power, Work
- Pascal's and Gas Laws
- Cylinders/Motors
- Directional, Check, Pressure, & Flow Control Valves



850-PD1 Optional Multimedia

Intermediate Pneumatics ▶ 85-IP

- Cam and Pilot Operated Check Valves
- Cylinders/Shuttle Valves/Air Logic
- Water Removal Techniques
- Air Dryers/After-Coolers
- Water Traps/Air Lubricators



85-IP Optional Multimedia

Advanced Pneumatics ▶ 85-AP

- Pneumatic Cylinder Loads and Applications
- Quick Exhaust Valves
- Motor Loads/Air Bearings/Filtration
- Flow Measurement



85-AP Optional Multimedia



850-P1 Shown with 85-IP & 85-AP



850-PD1 Shown with Additional 85-BP & 85-IP

FLUID POWER

PNEUMATIC CONSTRUCTION



94-PFC-1 Fitting Panel (manifold, bracket, cylinder, DCV, and FCV)

Pneumatic Fitting Construction

► 94-PFC-1

- Air Supply Installation
- Control Air Connections
- Power Air Installation



94-PFC-1 Optional Multimedia



Component Kit includes pressure gauge, fittings, tubing, hose, & tape

PNEUMATIC TROUBLESHOOTING

Portable Basic Pneumatic Troubleshooting

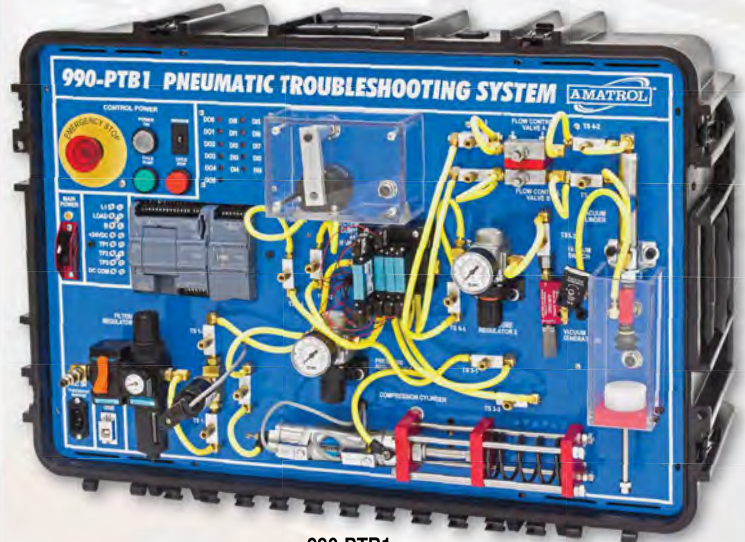
► 990-PTB1

- In-Circuit Pneumatic Component Testing
- Air Preparation Troubleshooting
- Regulator Troubleshooting
- Troubleshooting Vacuum Systems
- Quick Exhaust Valves

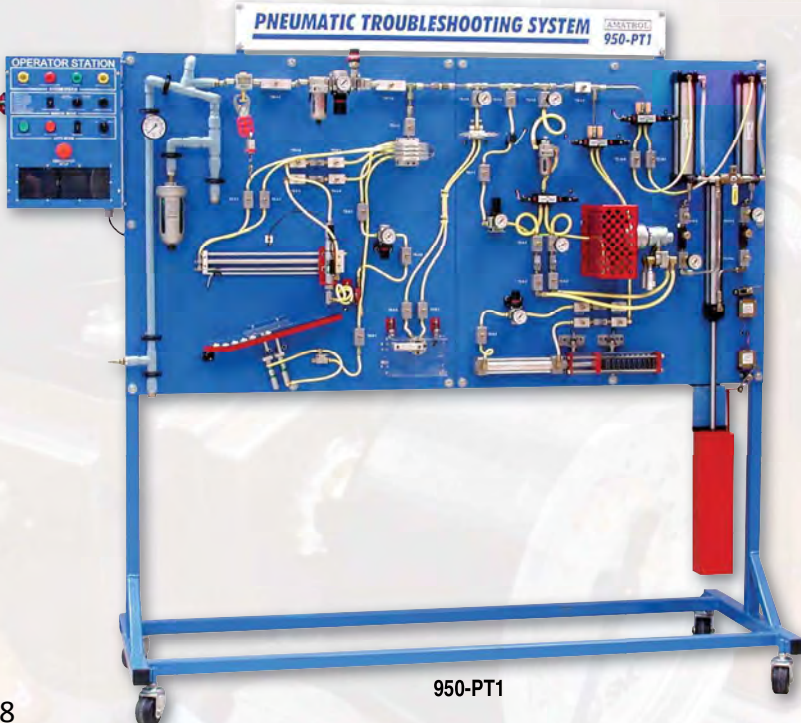
FAULTPRO™
COMPUTER-BASED FAULT INSERTION



990-PTB1 Multimedia Included



990-PTB1



950-PT1

Pneumatic Troubleshooting ► 950-PT1

- Air-Over-Oil systems
- Pilot-Operated DCVs
- Rodless and JIC Tie-Rod Cylinders
- Subplate-Mounted and Sandwich valves
- Cylinders
- Shock Absorbers
- Vacuum Systems
- Lockout/Tagout

FAULTPRO™
COMPUTER-BASED FAULT INSERTION

LEAN MANUFACTURING

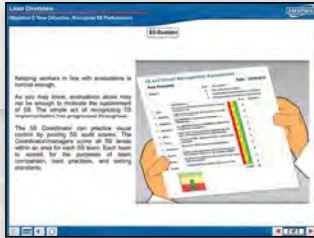
12 Courses Ranging from Introductory to Set-Up Reduction



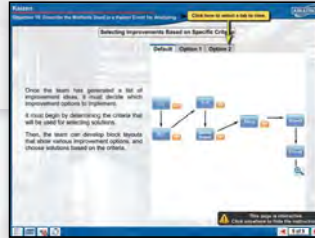
Lean Overview ▶ LM100



Visual Workplace ▶ LM205



5S ▶ LM102



Kaizen ▶ LM307

LEAN MANUFACTURING

LEAN OVERVIEW, LM100
 INTRODUCTION TO LEAN, LM101
 5S, LM102
 TOTAL PRODUCTIVE MAINTENANCE, LM103
 POKA-YOKE, LM104
 LEAN THEORY, LM203
 LEAN PROCESS FLOW, LM204
 VISUAL WORKPLACE, LM205
 STANDARDIZED WORK, LM206
 KAIZEN, LM307
 VALUE STREAM MAPPING, LM308
 SET-UP REDUCTION, LM409

SAFETY

7 Courses Covering Basic Safety in Manufacturing Operations

SAFETY

SAFETY PRACTICES & REGULATIONS, SA101
 PERSONAL PROTECTIVE EQUIPMENT, SA102
 HAZARDOUS COMMUNICATION, SA103
 CONFINED SPACES, SA104
 LOCKOUT/TAGOUT, SA105
 ACCIDENT RESPONSE, SA106
 OVERHEAD CRANE SAFETY, SA206



Safety Practices & Regulations ▶ SA101



Accident Response ▶ SA106



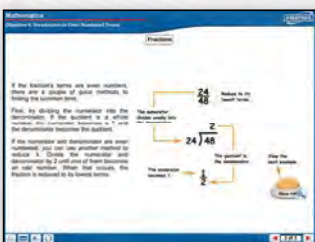
Lockout/Tagout ▶ SA105



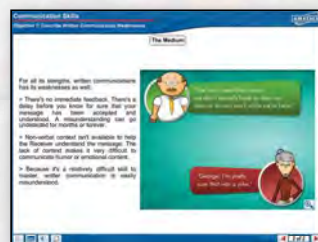
Hazardous Communication ▶ SA103

WORKPLACE EFFECTIVENESS

9 Courses Focused on Essential Skills for All Manufacturing Employees



Mathematics ▶ MA101

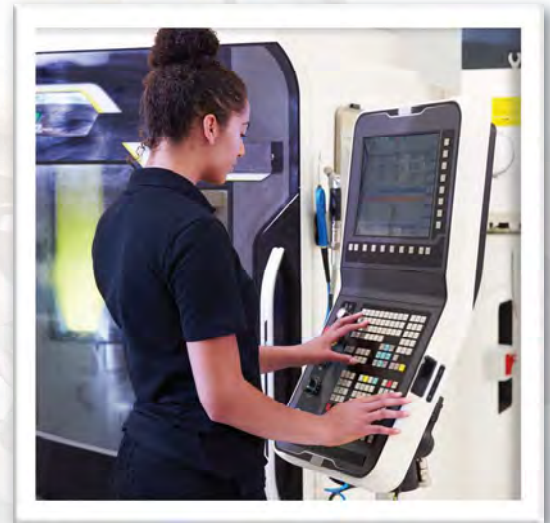
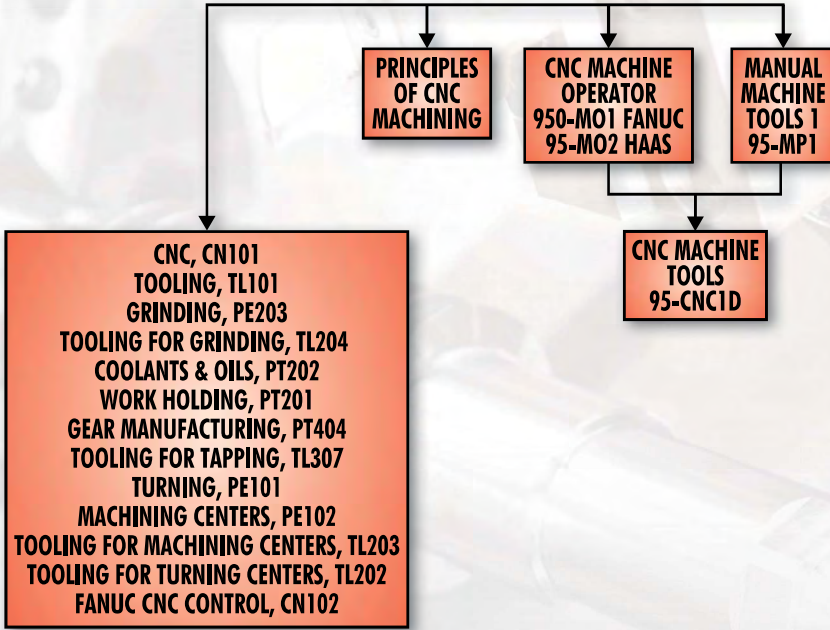


Communications Skills ▶ PD101

WORKPLACE EFFECTIVENESS

PRINCIPLES OF ADVANCED MANUFACTURING, AM101
 MATHEMATICS, MA101
 TRIGONOMETRY, MA304
 COMMUNICATION SKILLS, PD101
 CONFLICT RESOLUTION, PD102
 WORKING IN GROUPS, PD103
 TEAM CONCEPTS, WX11109-02
 PRODUCT DESIGN, WX11109-03
 BUSINESS PRESENTATIONS 1, WX11109-04

MACHINING



Amatrol has the Machining Program you Need!

Machining parts to today's high standards requires a solid grasp of a wide range of machines from manual machines to CNCs. Amatrol provides the knowledge and hands-on training individuals need.



95-CNC1-D Micromill and Tooling



95-CNC1-D
Optional
Multimedia

CNC Machine Tools ▶ 95-CNC1-D

- CNC Setup
- CNC Operation and Programming
- Circular Interpolation
- Speeds and Feeds
- CNC Mill Canned Cycle
- CNC Mill Cutter Compensation

CNC Machine Operator

- ▶ 950-MO1 (FANUC)
- ▶ 95-MO2 (HAAS)

- CNC Mill, Lathe, and Grinder Set-up and Operation
- Tool Identification, Set-up, Use and Management
- Fixture Set-up and Operation
- CNC Troubleshooting and Maintenance for Operators
- Precision Measurement and Gauging
- Print Reading
- Geometric Dimensioning and Tolerancing
- Machining Processes
- Statistical Process Control
- Quality and Cycle Time Optimization
- CNC Program Operation



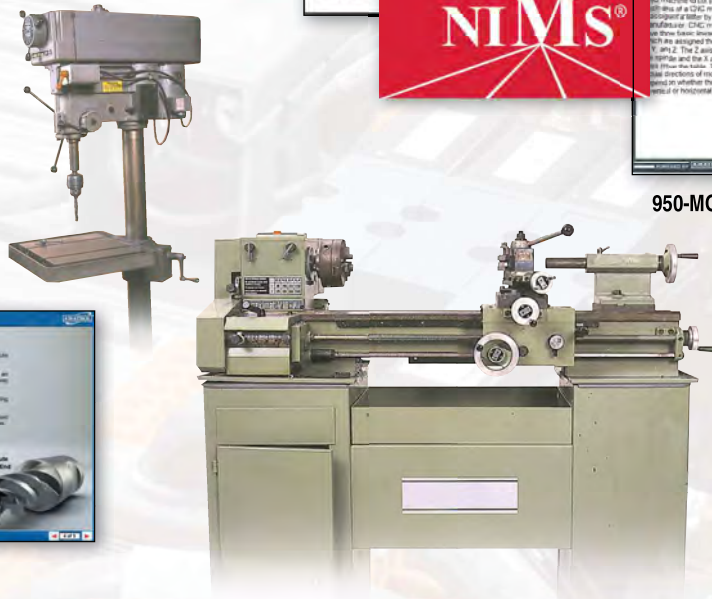
950-MO1 & 95-MO2 Multimedia Included

Machine Tools ▶ 95-MP1

- Bandsaws
- Drill Presses
- Hand Tools
- Manual Mills
- Manual Lathe



95-MP1
Optional Multimedia



PRINCIPLES OF CNC MACHINING

13 Courses Ranging from Work Holding to CNC Control



Principles of CNC ▶ CNC101



Coolants & Oils ▶ PT202



Tooling for Turning Centers
▶ TL202

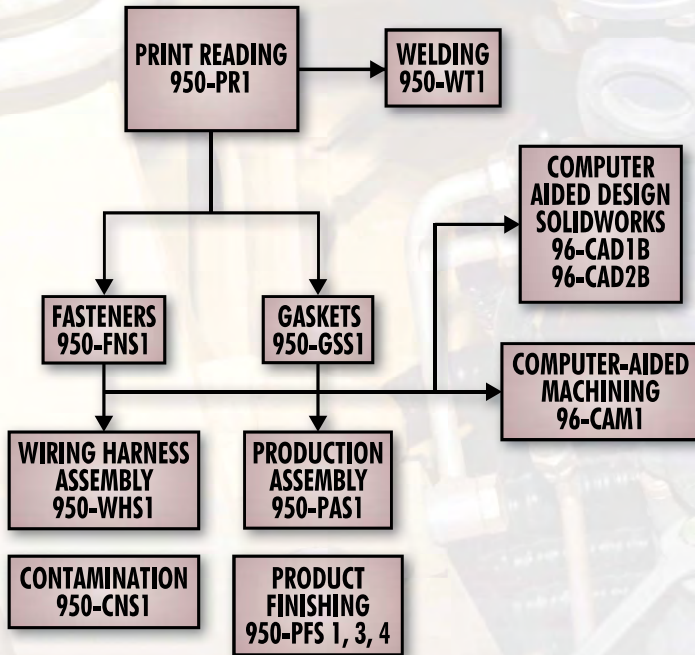


Tooling for Grinding ▶ TL204

PRINCIPLES OF CNC MACHINING

- CNC, CN101
- TOOLING, TL101
- GRINDING, PE203
- TOOLING FOR GRINDING, TL204
- COOLANTS & OILS, PT202
- WORK HOLDING, PT201
- GEAR MANUFACTURING, PT404
- TOOLING FOR TAPPING, TL307
- TURNING, PE101
- MACHINING CENTERS, PE102
- TOOLING FOR MACHINING CENTERS, TL203
- TOOLING FOR TURNING CENTERS, TL202
- FANUC CNC CONTROL, CN102

MANUFACTURING PROCESSES



Widest Range of Manufacturing Processes Covered

Manufacturing Skills vary depending on a company's specific products. Amatrol's learning systems emphasize the hands-on skills common to almost every industry including assembly, welding, and product finishing.

Computer Aided Design 1

▶ 96-CAD1B

(Includes SolidWorks software)

- Solid Modeling Introduction
- Solid Model Features
- Creating a Solid Model
- Extruded Boss/Base
- Drawing Planes
- Fillets and Chamfers
- Revolved Features
- Multi-View Drawings



96-CAD1B CAD Software & Multimedia Included

Computer Aided Design 2

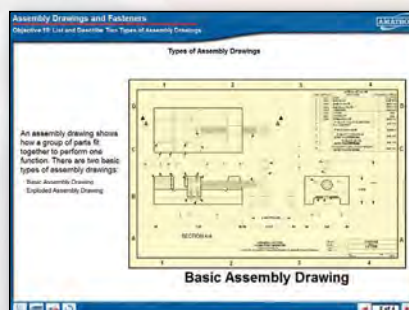
▶ 96-CAD2B

- 3D Assembly Model Creation
- Standard Mates and Component Manipulation
- Exploded Assemblies
- Exploded Assembly Animation

Print Reading 1

▶ 950-PR1

- Print Reading Introduction
- Multi-View Drawings
- Basic Dimensioning
- First-Angle Projection
- Assembly Drawings and Fasteners
- GD&T Fundamentals
- Feature and Control Frame



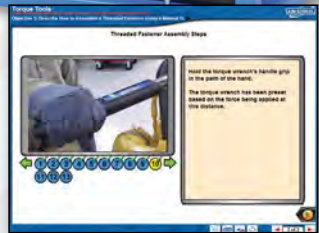
Production Assembly ▶ 950-PAS1

- Torque Basics and Click-type and Air Impulse Tools
- O-Ring and Lip Seals
- Hydraulic Fittings
- Hose and Coupling Assembly
- Hydraulic Fittings and Tubing



Back Side (Hoses, Tubing, & Fittings)

950-PAS1 Shown with 95-PAS2, 95-PAS3, 95-PAS4, 95-PAS5
Front Side (Torque Tools)



Multimedia Included for 950-PAS1 & All Options

OPTIONS FOR THE 950-PAS1 PRODUCTION ASSEMBLY

Split Flange Couple ▶ 95-PAS2

Electric Torque Wrench ▶ 95-PAS3

Stall Bar ▶ 95-PAS4

Instrumented DC Electric Torque Wrench ▶ 95-PAS5

Gaskets ▶ 950-GSS1

- Gasket Types
- Gasket Handling and Storage
- Installation
- T-Joints and RTV Sealant



Fasteners ▶ 950-FNS1

- Threaded and Non-threaded Fasteners
- Bolt Construction and Sizes
- Bolt Grades
- Bolt Grades
- Screws
- Washers
- Locking Nuts
- Pins and Keys



Contamination ▶ 950-CNS1

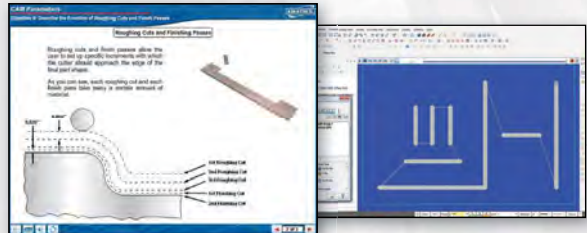
- Contamination Control
- Types of Contaminants
- Component Handling



Computer-Aided Machining ▶ 96-CAM1

(Includes MasterCAM software)

- Introduction to CAD/CAM
- CAD/CAM Part Geometry
- Contour CAM Toolpath
- Cycle Time Estimation
- Tool & Material Selection
- CAM Parameters
- Roughing & Finishing
- Drill & Pocket Toolpaths



96-CAM1 CAM Software & Multimedia Included

MANUFACTURING PROCESSES

Wiring Harness ▶ 950-WHS1

- Wiring Harness Function
- Wiring Harness Support
- Wiring Harness Installation
- Wiring Harness Inspection
- Handling and Storage
- Harness Connectors and Routing
- Battery Cable Installation
- Battery Cable Routing



950-WHS1 Optional Multimedia



Hand Tools Included

Welding Technology ▶ 950-WT1

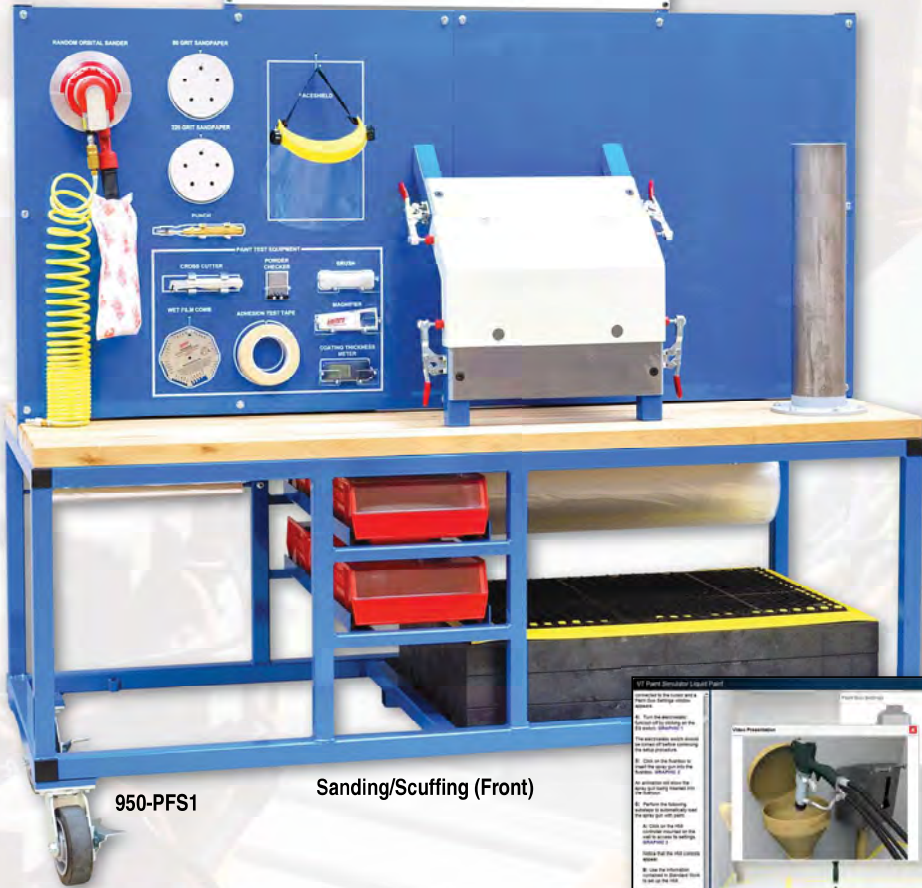
- Welding Safety/Metal Preparation
- Basic Welding/Welding Symbols
- Welded Joints: Lap, Butt, T, and Corner
- Welding Analysis
- Destructive and Non-Destructive Testing



950-WT1



PRODUCT FINISHING AMATEUR 950-PFS



950-PFS1

Sanding/Scuffing (Front)



950-PFS1 Multimedia Included

Product Finishing ▶ 950-PFS1

- Product Finishing Inspection
- Sanding and Scuffing
- Washing and Pretreatment
- Masking and De-Masking
- Liquid Spray Paint Processes
- Powder Paint Processes
- Protective Equipment
- Electrostatic Spray Equipment



Masking (Back)

Virtual Product Finishing Environments Included!

Sanding & Scuffing

- Inspect Parts for Defects
- Select Proper Sandpaper
- Orbital Sander Set Up Procedures
- Remove Defects
- Properly Scuff Paint on Variable Surfaces
- Proper Procedure Evaluation Report



Washing & Pretreatment

- Standard Work Instructions
- Proper Wash/Pretreatment/ Rinse Spray Patterns
- Proper Procedure Evaluation Report



Dry Off

- Air Blow Off Procedure
- Drying Variable Surfaces
- Vacuum Drying
- Drying Blind Holes



Powder Coating

- System Start Up
- Mode Selection
- Multiple Surface Scenarios
- Proper Procedure Evaluation Report



Liquid Spray Painting

- Load an Electrostatic Spray Gun
- Adjust Paint Flow Rate & Spray Pattern
- Proper Spray Gun Distance & Angle
- Adjust Electrostatic Control
- Proper Painting Sequences/ Multiple Parts
- Proper Procedure Evaluation Report



MATERIALS

FERROUS METALS ML201
 NON-FERROUS METALS ML202
 HEAT TREATMENT ML203
 PLASTICS ML204
 COMPOSITES ML205
 CERAMICS ML206

MATERIALS
 ENGINEERING
 94-MT1

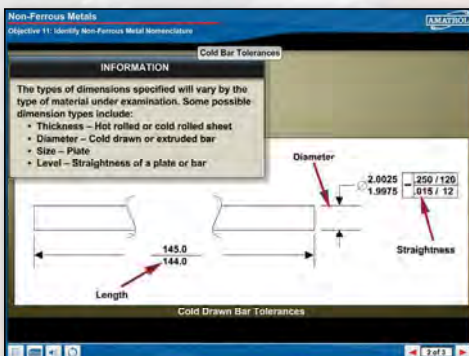
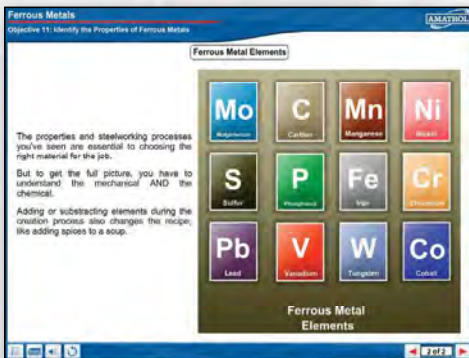
PLASTICS
 94-MP3T

MOLD DESIGN
 94-DFM3

Expand Your Material Knowledge!

Ferrous Metals ▶ ML201

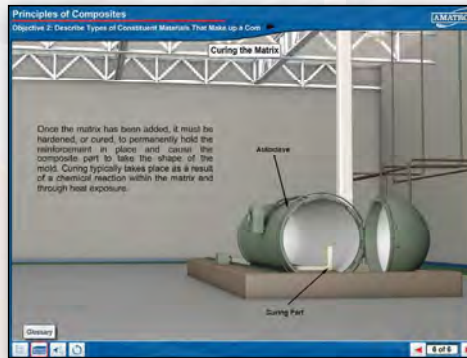
- Injection Mold Design/Part Design
- Multi-Cavity Molds
- Inserts & Undercuts
- Thermoplastics Molding Materials
- Blow Molding Design



Plastics

▶ ML204

- Thermoplastics & Thermosets
- Polymer & Polymerization
- Injection Molding
- Blow Molding
- Extrusion



Composites

▶ ML205

- Fiber-Reinforced Materials
- Hand Lay-Up Process
- Spray-Up Process
- Filament Winding
- Resin Transfer
- Curing

Ceramics

▶ ML206

- Ceramic Types
- Thermal & Physical Properties
- Milling, Batching, & Mixing
- Ceramic Forming Processes
- Post-Manufacturing Processes



Heat Treatment

▶ ML203

- Hardening
- Quenching
- Annealing
- Tempering
- Normalizing
- Stress Relieving

Non-Ferrous Metals ▶ ML202

- Non-Ferrous Metals
- Extraction Processes of Copper & Aluminum
- Tempering
- Formation Techniques

Level 1 Plastics Technology ▶ 94-MP3T

- Chemistry and Properties
- Manufacturing Characteristics of Plastics
- Injection Molding
- Blow Molding
- Extrusion



94-MP3T Optional Multimedia



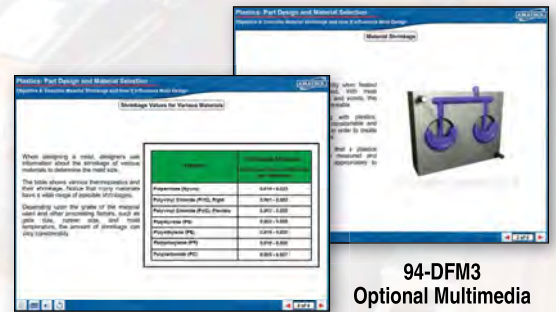
94-MP3T

Level 1 Plastics Technology ▶ 94-DFM3

- Injection Mold Design/Part Design
- Multi-Cavity Molds
- Inserts & Undercuts
- Thermoplastics Molding Materials
- Blow Molding Design



94-MP3T Accessories



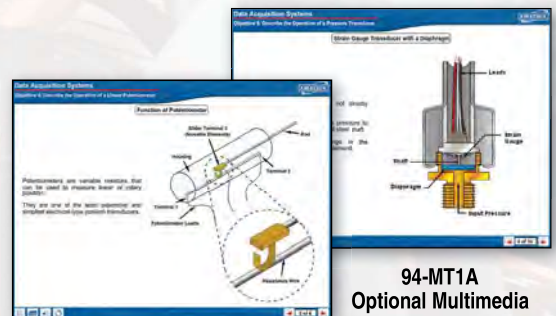
94-DFM3 Optional Multimedia



94-MT1A

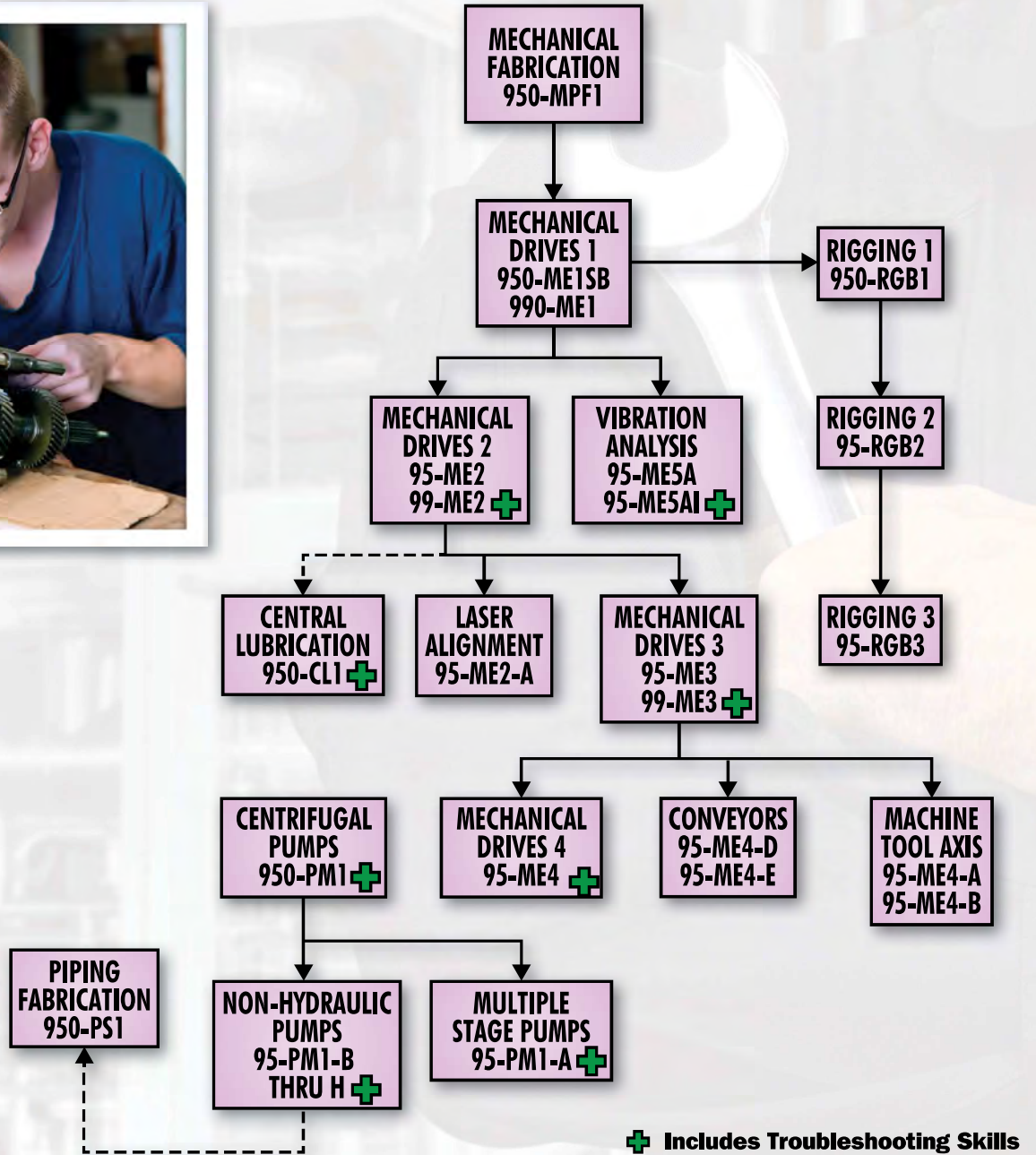
Materials Engineering ▶ 94-MT1A

- Tensile Strength Analysis
- Data Acquisition Systems
- Compression Testing and Analysis
- Shear Testing & Analysis
- Hardness Testing & Analysis



94-MT1A Optional Multimedia

MECHANICAL



Mechanical Skills are Essential to Manufacturing

Amatrol's mechanical learning systems are truly unique in that they provide knowledge and hands-on skill building opportunities. The skills taught in these systems, whether how to assemble a belt drive or rig a load, are derived from task analyses that identify skill sets desperately needed by employers.

As an example, Amatrol's 950 Mechanical Drives Level 1 Learning System contains seven modules providing approximately 30 hours of hands-on training. Moreover, this base learning system can be expanded to a staggering 34 modules providing over 130 hours of step-by-step, hands-on training to make learners job-ready on Day 1.

MECHANICAL DRIVES

Mechanical Drives 1

▶ 950-ME1

(Also Available as 950-ME1SB)

- Motor Mounting
- Soft Foot
- Chain and Belt Drives
- Spur Gear Drives
- Gear Trains
- Basic Shaft Alignment



950-ME1 Optional Multimedia

Mechanical Drives 2

▶ 95-ME2

- Bushings, Idler Systems
- Heavy-Duty Chain and Belt Drives
- Timing/HTD Belt Drives
- Variable Pitch Sheaves
- Reverse Indicator Shaft Alignment
- Lubrication



95-ME2 Optional Multimedia

Mechanical Drives 3

▶ 95-ME3

- Plain, Ball, Roller, Tapered Bearings
- Angular Contact Bearings
- Seals and Gaskets
- Miter, Helical, and Worm Gears
- Gearboxes



95-ME3 Optional Multimedia



950-ME1 shown with 95-ME2, 95-ME3

Mechanical Drives 4 ▶ 95-ME4

- Precision Ball Screws
- Linear Ball Bearings
- Linear Axis Slides
- Cam Clutches
- Electric Clutches
- Electric Brakes



95-ME4's Linear Ball Screw Drive Assembly

Portable Mechanical Drives 1 ▶ 990-ME1

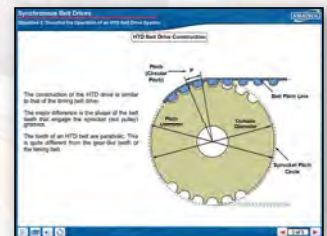
- Introduction to Mechanical Drives
- Shaft Speed Measurement
- Shaft Alignment
- V-Belt Drives
- Chain Drives
- Gear Drives



990-ME1 Multimedia Included

Portable Mechanical Drives 2 ▶ 99-ME2

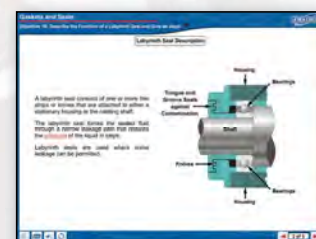
- Bushings
- Heavy-Duty Chain & Belt Drives
- Timing/HTD Belt Drives
- Reverse Indicator Shaft Alignment



99-ME2 Multimedia Included

Portable Mechanical Drives 3 ▶ 99-ME3

- Plain, Ball, & Tapered Roller Bearings
- Angular Contact Bearings
- Seals & Gaskets
- Miter, Helical, & Worm Gears
- Gearboxes



99-ME3 Multimedia Included



990-ME1

MECHANICAL

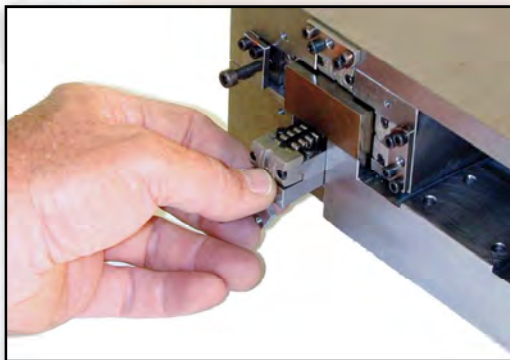
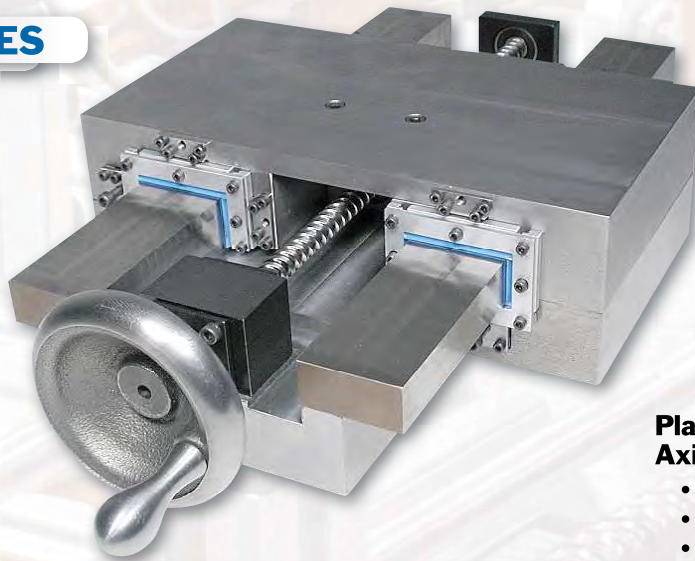
MACHINE TOOL SLIDES

RollerPack Machine Tool Axis

► 95-ME4-A

- Linear Roller Bearings Operation
- Roller Pack Installation
- Tapered Gib Adjustment
- Preload Setting

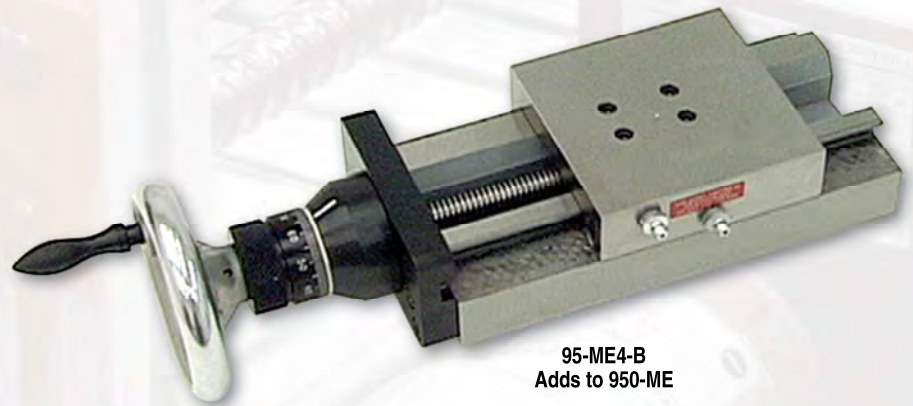
95-ME4-A
Adds to 950-ME



95-ME4A Roller Pack Installation

Plain Bearing Machine Tool Axis ► 95-ME4-B

- Dovetail Slide Operation
- Tapered Gibs Installation
- Dovetail Slide Maintenance
- Micrometer Dial/Slide Operation



95-ME4-B
Adds to 950-ME

MACHINE TOOL SLIDES

Floor Standing Belt Conveyor

► 95-ME4-D

- Belt Installation
- Belt Speed Calculation
- Belt Length Calculation
- Belt Maintenance

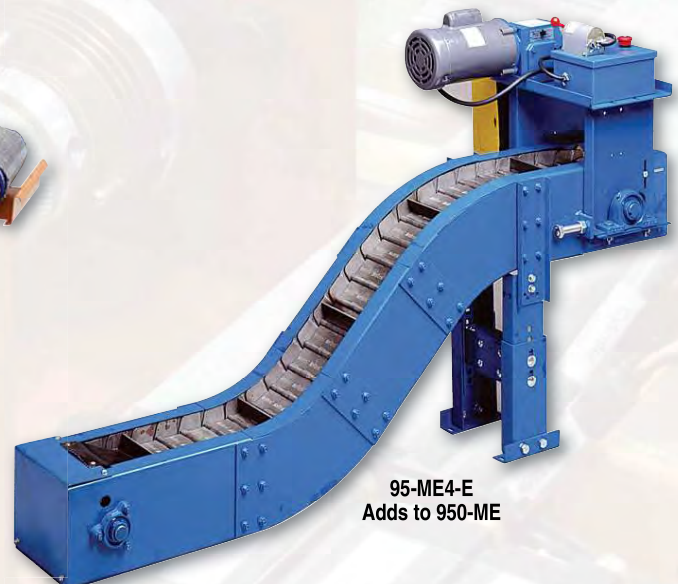


95-ME4-D
Adds to 950-ME

Machine Tool Chip Conveyor

► 95-ME4-E

- Chip Conveyor Operation
- Install Chip Conveyor Belt
- Chip Conveyor Start and Run-In
- Maintenance



95-ME4-E
Adds to 950-ME

VIBRATION ANALYSIS



95-ME5AI

Vibration Analysis

▶ 95-ME5AI

▶ 95-ME5A

(95-ME5A Adds to 950-ME1)

- Vibration Concepts & Analysis
- Resonant Frequency
- Sympathetic Vibration
- Velocity, Acceleration, Spike Energy
- Vibration Dampening, Isolation
- Severity Charts, Troubleshooting



Vibration Measurement

LASER ALIGNMENT

Laser Alignment ▶ 95-ME2A

(Adds to 950-ME1)

- Principles, Operation, Setup
- Soft-Foot Correction
- Parallel and Angular Alignment
- Data Collection, Error Analysis
- Laser Safety
- Motor Base Adjustments



95-ME2A
Shown with
950-ME

MECHANICAL

MECHANICAL FABRICATION



950-MPF1

Mechanical Fabrication ▶ 950-MPF1

- Assembly Concepts
- Pipe Thread Components
- Torque Wrenches
- Portable Power Tools
- Threaded Fasteners
- Wrenches
- Pneumatic System Fabrication
- Screwdrivers
- Pliers and Locking Devices



Optional Multimedia for 950-MPF1

RIGGING

Rigging 1 ▶ 950-RGB1

- Rigging Concepts
- Load Weight Calculations
- Hoists
- Slings & Lifts

Rigging 2 ▶ 95-RGB2

- Synthetic Slings
- Sling Operation
- Sling Maintenance
- Equipment Movement
- Cranes

Rigging 3 ▶ 95-RGB3

- Wire Mesh Slings
- Fiber Rope
- Load Turning
- Wire Rope Termination
- Rigging Knots



950-RGB1



95-RGB2



95-RGB3

PUMPS



950-PM1

Centrifugal Pump ▶ 950-PM1

- Pump Operation and Troubleshooting
- Flow Meters and Measurement
- Pressure/Flow Characteristics
- Pump Head
- Performance, Efficiency, Priming
- Cavitation and Pseudo-Cavitation

Pump Learning System Options

- Multiple Pump ▶ 95-PM1-A
- Turbine Pump ▶ 95-PM1-B
- Diaphragm Pump ▶ 95-PM1-C
- Peristaltic Pump ▶ 95-PM1-D

- Piston Pump ▶ 95-PM1-E
- Gear Pump ▶ 95-PM1-F
- Magnetic Pump ▶ 95-PM1-G
- Centrifugal Pump ▶ 95-PM1-H

CENTRAL LUBRICATION

Central Lubrication ▶ 950-CL1

- Central Lubrication System Operation
- Maxi-Monitor Controller Operation
- Viscometer Operation
- Divider Valve Servicing
- Troubleshooting

Includes These Panels

- Series Progressive Valve
- Fluid Recovery
- Piston Distributor
- Pneumatic Lubrication Pump



950-CL1

PIPING

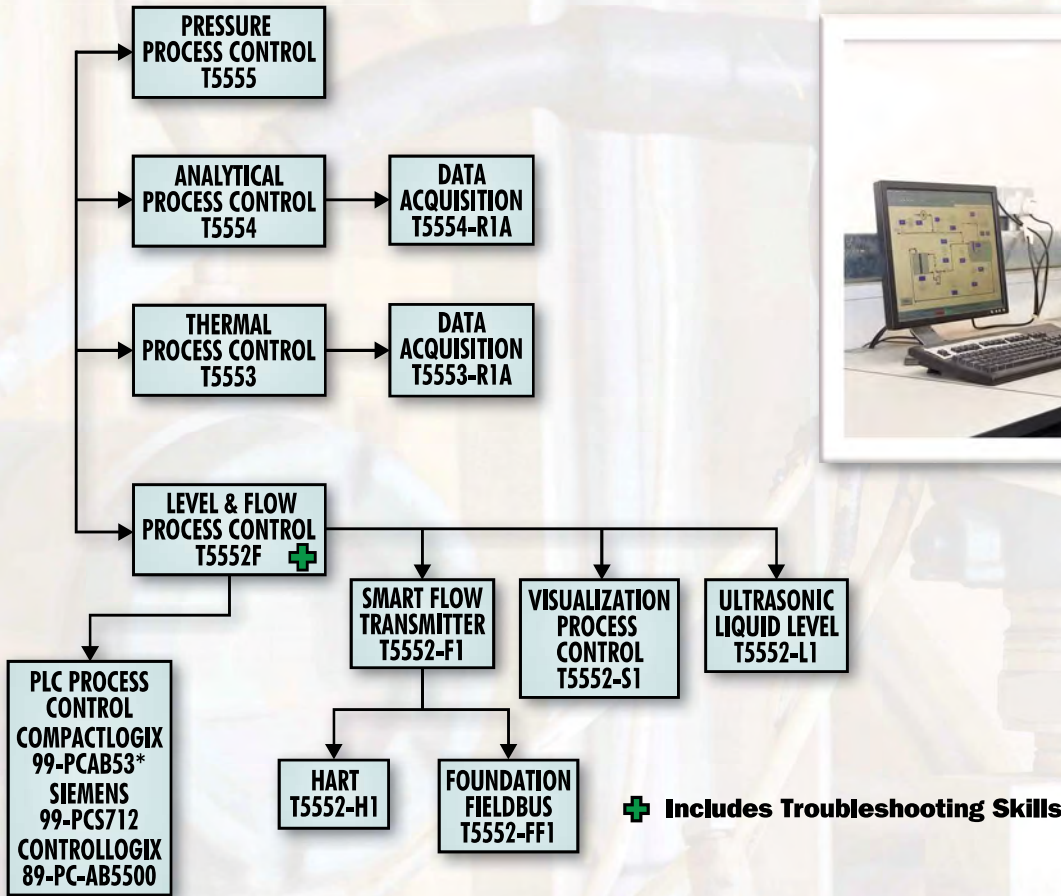
Piping Systems ▶ 950-PS1

- Plastic Piping Installation
- Iron Piping Installation
- Hose Installation
- Tubing Installation
- Sloan Valve Maintenance
- Fitting & Piping ID
- Schematic Reading
- Cutting & Bending



950-PS1

PROCESS CONTROL



Process Control/Instrumentation Skills for Rewarding Jobs

Process control is a versatile and vital part of major industries such as power generation, petrochemicals, food processing and bottling, chemical manufacturing, bio-technology, pharmaceuticals, and refineries.

Amatrol has developed the largest and most in-depth offering of process control training options available including level and flow, temperature, analytical, and pressure.

Foundation Fieldbus ▶ T5552-FF1

- Foundation Fieldbus Technology
- Fieldbus DCS Operation
- Communication Protocols
- Foundation Fieldbus Wiring
- Device Configuration
- Fieldbus Diagnostic & Maintenance Capability



T5552-FF1

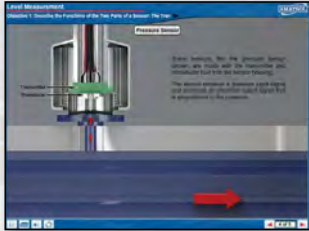


T5552-FF1
Multimedia
Included

Level / Flow Process Control Troubleshooting

► T5552F

- P&I Diagrams
- Flow & Liquid Level Measurements
- Transducers/Transmitters
- Component Level Troubleshooting
- System Level Troubleshooting
- In-Circuit Testing
- Out-of-Circuit Testing



T5552 Optional Multimedia



T5552F

Smart Flow Transmitter

► T5552-F1

- Differential Pressure Type
- Digital Display, LCD
- Calibration
- Zero and Span Adjustments
- Manifold Bleeding



T5552-F1

Ultrasonic Liquid Level System

► T5552-L1

- Ultrasonic Transducer
- Transmitter Connection
- Ultrasonic Level Measurement
- Sensor Calibration

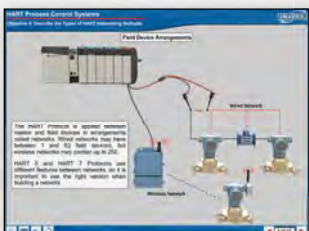


T5552-L1

Visualization Process Control

► T5552-S1

- Introduction to Process Visualization
- UDC Controller Configuration
- Application Editing
- Input & Output Objects
- Two-State Output Objects
- Symbolic I/O Field Output
- Alarms



T5552-S1 Multimedia Included



T5552-S1

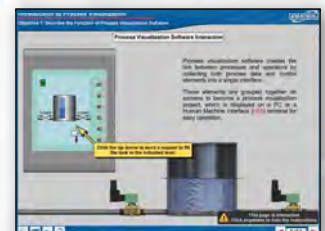
HART

► T5552-H1

- HART Components
- HART Networks
- System Integration
- HART Device Calibration
- Monitoring Current Loops
- Process Control Loop Operation
- Burst Mode on a Parked Field Device



T5552-H1



T5552-H1 Multimedia Included

PROCESS CONTROL



T5553



T5553-R1A

Three-Channel Data Acquisition for T5553 ▶ T5553-R1A

- Chart Recorder Applications
- Managing Chart Recorder Data
- Special Chart Recorder Functions
- Chart Recorder Software

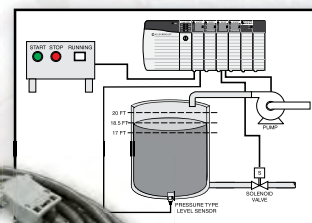
Temperature Process Control ▶ T5553

- Process Safety/P and I Diagrams
- Temperature Measurement
- Heat Transfer/Temperature Control
- PID Operating and Tuning
- 3-Way Control Valves
- Heat Exchangers and Chillers
- RTD, Thermocouples, Thermistors
- Controller/Axis Calibration

ControlLogix Process Control ▶ 89-PC-AB500

(Connects the T5552 and T5553)

- On/Off Control with Discrete and Analog Input
- Open Loop PLC Control
- Closed Loop PLC Control



89-PC-AB500
PID Control



Analytical Process Control ▶ T5554

- Analytical Control Concepts
- Chemical Pumps/pH Measurement
- Loop Controllers/Control Loop Performance
- Discrete and Closed Loop pH Control
- Alarms/Discrete Inputs
- Batch and Continuous pH Control Systems
- Proportional, Integrative, and Derivative Automatic Control

Three-Channel Data Acquisition for T5554 ▶ T5554-R1A

- Electronic Data Recorder
- Touchscreen LCD Monitor
- Paperless Chart Recording



T5554-R1A



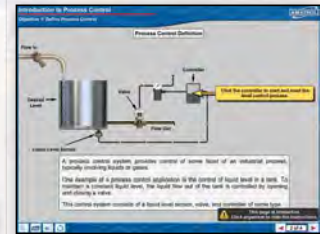
T5554



T5555

Pressure Process Control ▶ T5555

- Simultaneous Liquid Level and Tank Pressure Control
- Electric Proportional Valve
- Piezoelectric Pressure Sensor
- Open and Closed Loop Tuning
- HMI Panel Operation
- Block Diagrams
- Automatic Control Methods
- Control Loop Performance
- Process Systems Alarms



T5555 Multimedia Included

Connect All Four Systems to Create an Entire Process Plant!



T5552



T5554



T5555



T5553

PLC PROCESS CONTROL



99-PAB53A shown with T5552 & 99-PAB53A

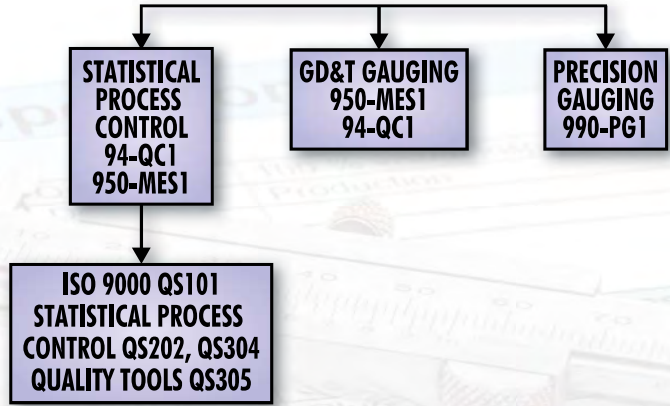
PLC Process Control

- ▶ **99-PCAB53***
- ▶ **99-PCS712**

- On/Off Control with Discrete & Analog Input
- Open & Closed Loop Control
- Closed Loop Performance
- Closed Loop Tuning



QUALITY ASSURANCE



Quality Assurance Requires Solid Skill Sets

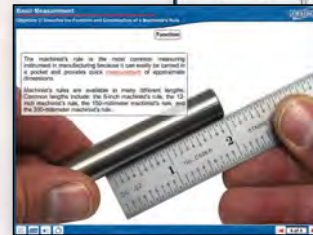
Amatrol's learning systems provide the opportunity to develop hands-on measurement skills as well as the knowledge to apply those skills in support of a quality assurance program.



990-MES

Portable Measurement Tools ▶ 990-MES1

- Basic Measurement
- Tape Measurement
- Precision Measurement Tools
- Dial & Digital Calipers
- Micrometers
- Data Collection



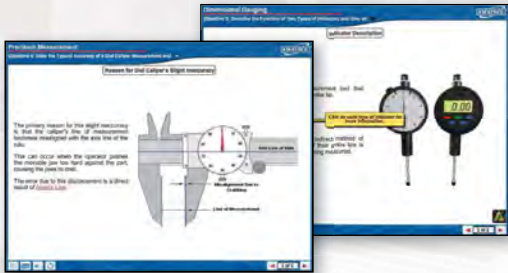
990-MES1
Multimedia
Included



990-MES1 Tools & Components

Portable Precision Gauging ▶ 990-PG1

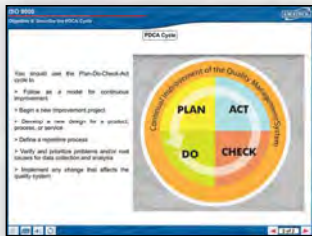
- Basic Measurement
- Dial and Digital Calipers
- US and SI Metric Micrometers
- Introduction to Gauging
- Indicator Measurement
- Go/No-Go Gauging Tools
- Indicator-Type Gauging Tools



990-PG1 Multimedia Included

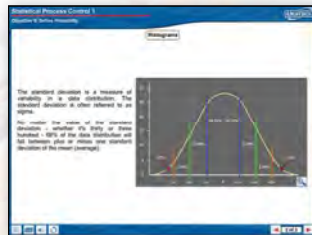


990-PG1 shown with Optional 99-PG2



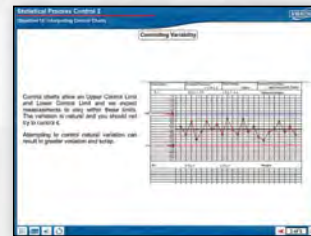
Statistical Process Control 1 ▶ QS202

- Identify Sources of Variation
- Histograms
- Control Charts
- X-Bar Charts
- R Charts



ISO 9000 ▶ QS101

- Covers ISO 9000 and TS 16949
- Explains International Standards
- Documentation Requirements
- Identifies Various Types of Quality Management Systems (QMS)



Statistical Process Control 2 ▶ QS304

- Statistical Control Limits
- Assignable Causes and System Causes
- Calculate Capability Index
- Interpret Cpk

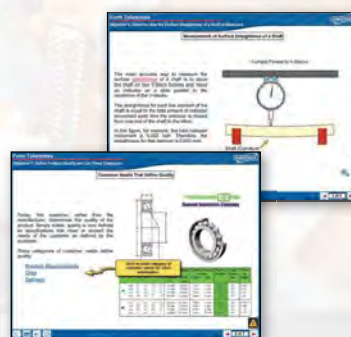
Quality Tools ▶ QS305

- Cause and Effect Diagrams
- Brainstorming Process
- Pareto Diagrams
- Six Sigma
- Quality Audits



Quality Assurance 1 ▶ 94-QC1

- Basic Measurement
- Dimensional Gauging
- Introduction to SPC
- Control Chart Operation & Analysis
- SPC Problem Solving
- GD & T
- Location, Orientation, & Form Tolerances



94-QC1 Optional Multimedia

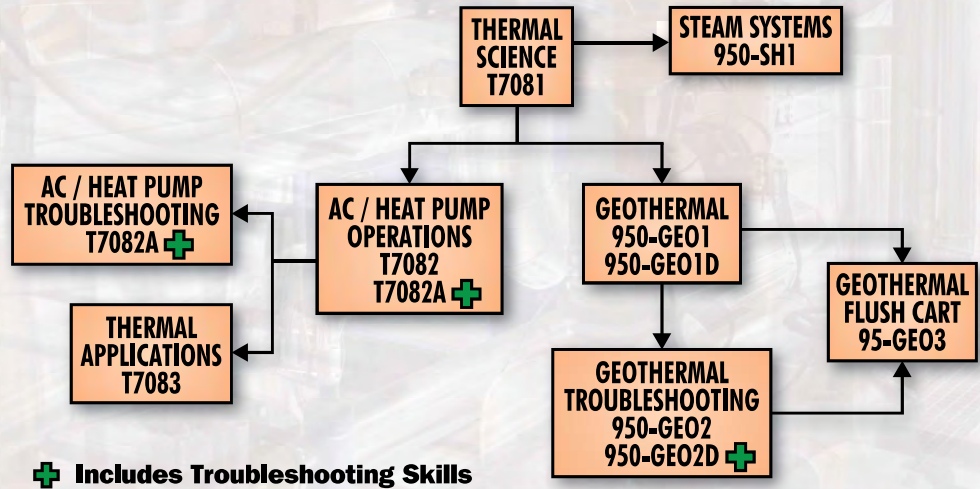
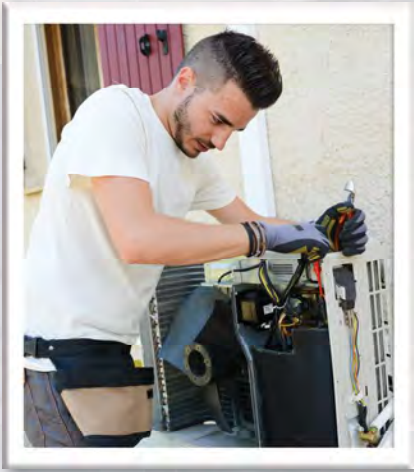


910-QC3 Also Available



94-QC1

THERMAL



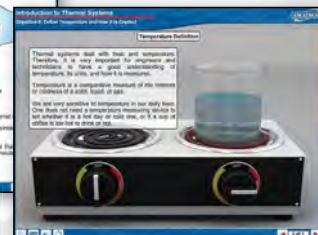
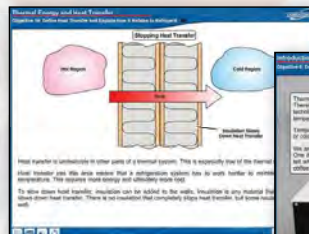
Thermal Skills Are Vital for Industrial & Residential Applications

Thermal skills, whether HVAC or steam power, are a unique skill set that demands a firm understanding of the principles involved. Amatrol's thermal learning systems start with the basics, such as phase change, and continue into more advanced concepts such as enthalpy and the laws of thermodynamics. These systems teach hands-on skills related to pressure measurements, preventive maintenance, and troubleshooting.

THERMAL SCIENCE

Thermal Science ▶ T7081

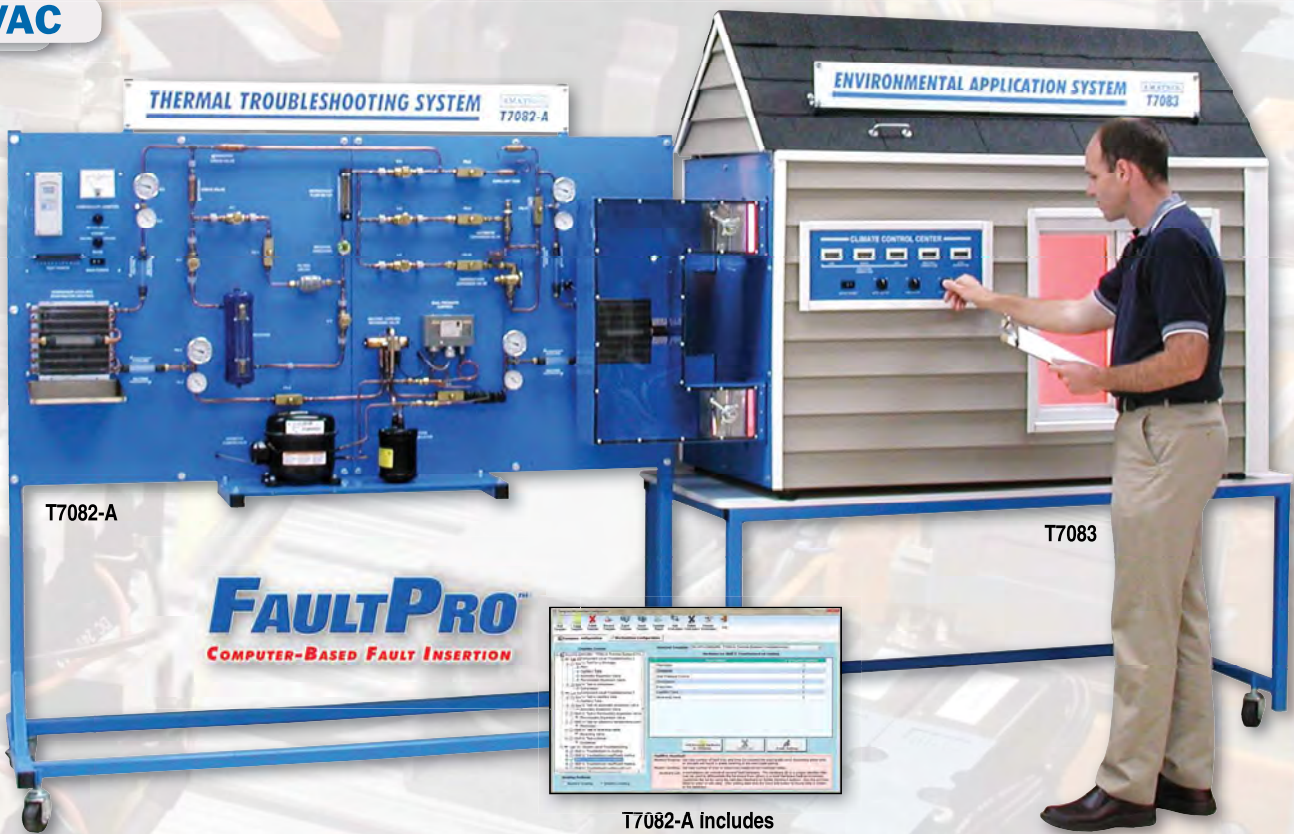
- Temperature and Pressure Measurement
- Thermal Expansion
- Enthalpy, Phase Change
- Heat Transfer, Thermodynamic Laws
- Gas Laws and Phase Equilibrium



T7081 Optional Multimedia



HVAC



T7082-A includes
FaultPro Electronic
Fault Insertion

Heat Pump Troubleshooting ▶ T7082-A

(Also Available as a T7082 without Troubleshooting)

- Thermal Energy and Heat Transfer
- Thermodynamic Laws and Properties
- Refrigeration Thermodynamics
- Heat Pump Operations
- Thermal System Troubleshooting
- Phase Diagrams
- Property Tables
- Refrigerant Types

Environmental Applications ▶ T7083

- Insulation
- Psychrometrics
- Residential Heating and Cooling
- Thermal System Performance

STEAM

Steam Systems ▶ 950-SH1

- Steam System Operation
- Temperature Measurements
- Pressure Measurements
- Thermal Expansion
- Steam States
- Internal Energy & Enthalpy
- Steam Tables & Diagrams
- Boiler Operation
- Boiler Subsystems
- Stem & Yoke Valve Operation
- Strainer Inspection
- Preventive Maintenance



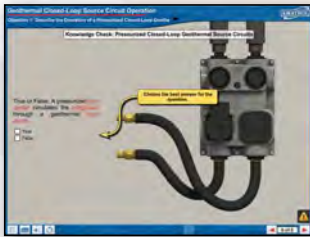
GEOHERMAL

Geothermal Troubleshooting

► 950-GEO2

(Also Available as a 950-GEO1 without Troubleshooting)

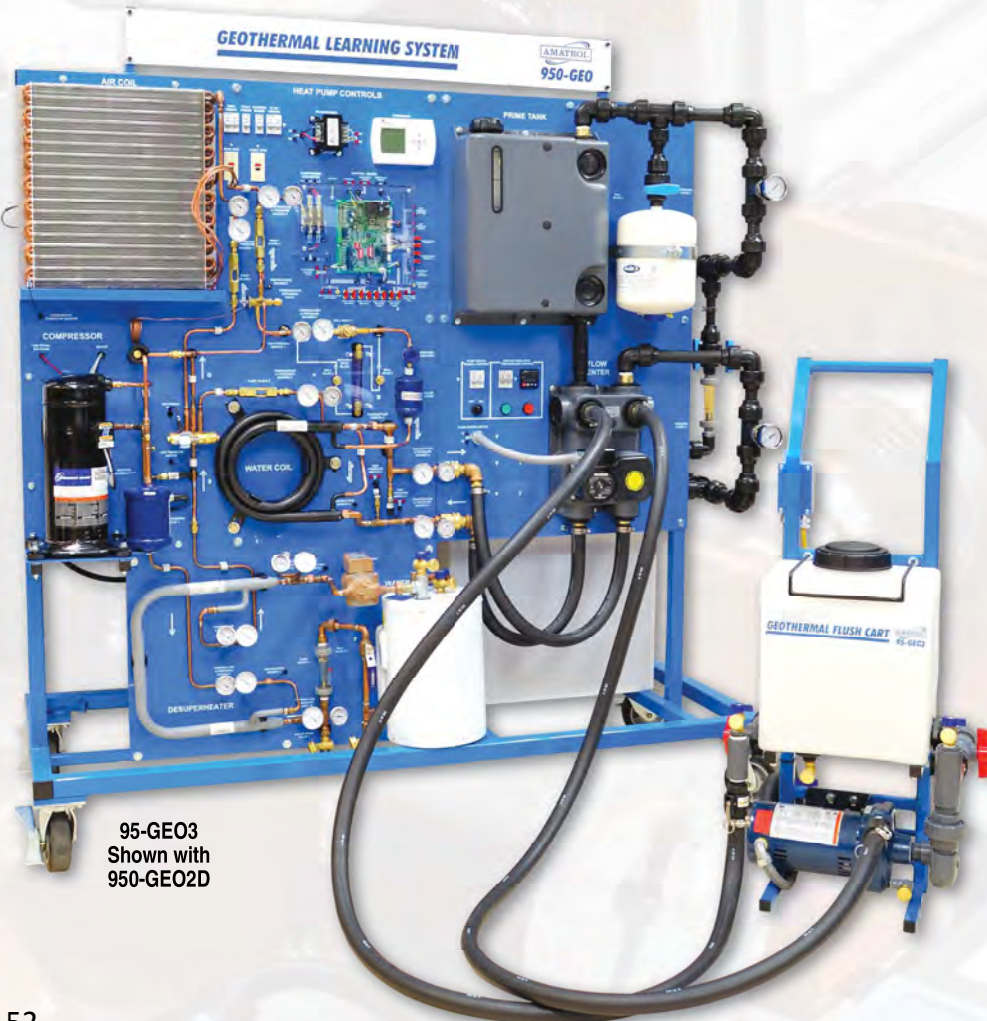
- Geothermal Heat Pump Systems
- System Performance
- Components and Operation
- Component Troubleshooting
- System Troubleshooting
- Coefficient of Performance
- Source Circuit Piping and Components
- Energy Units of Measure
- Phase Change Effects
- Heat Transfer



950-GEO2 Multimedia Included



950-GEO2D



95-GEO3
Shown with
950-GEO2D

Geothermal Flush Cart

► 95-GE03

(Adds to 950-GEO for Pressurized Operation)

- Circulator Pump
- Control Unit
- Control Valves
- Hose Set
- Water Tank



95-GE03 Multimedia Included

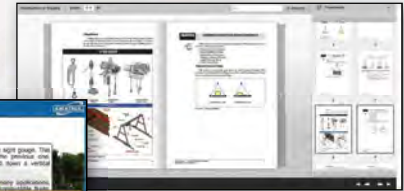
eLearning Solutions!

LEARNAMATROL

- Complete electronic access to all of Amatrol's eLearning material. 455 Courses containing 1,844 Modules. That's over 5,500 hours of training materials!
 - Interactive Multimedia
 - eBooks
- Available 24/7 for total learning flexibility
- Includes free content management system to administer quizzes, tracking, reporting, & much more
- Create tailored courses using any of the 1,844 modules for endless possibilities



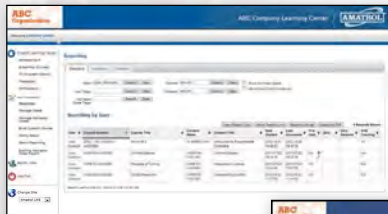
Process Control Interactive Multimedia



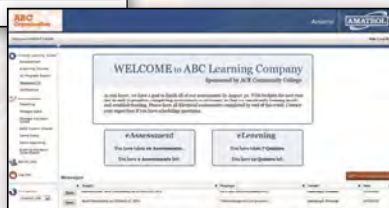
Rigging Systems eBook

eASSESSMENT

Amatrol's eAssessment takes the guess work out of identifying training most needed for different situations. The results let you choose how to spend your limited time and resources.



Communicate Goals and Direction with Administrator Messaging!

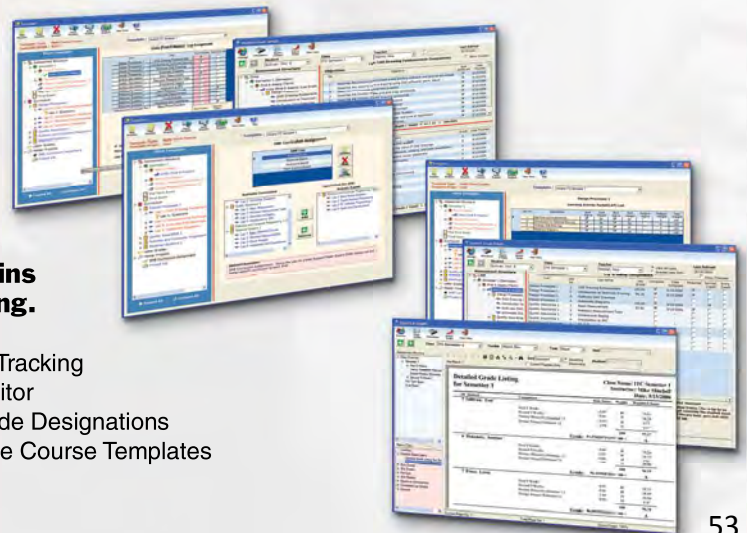


- Evaluate individuals, departments, or entire organizations
- Reveal strengths and identify weaknesses
- Reduce training time and costs by targeting knowledge gaps
- Create tailored assessments from any of Amatrol's 1,844 modules or use standard assessments for any of the 455 courses

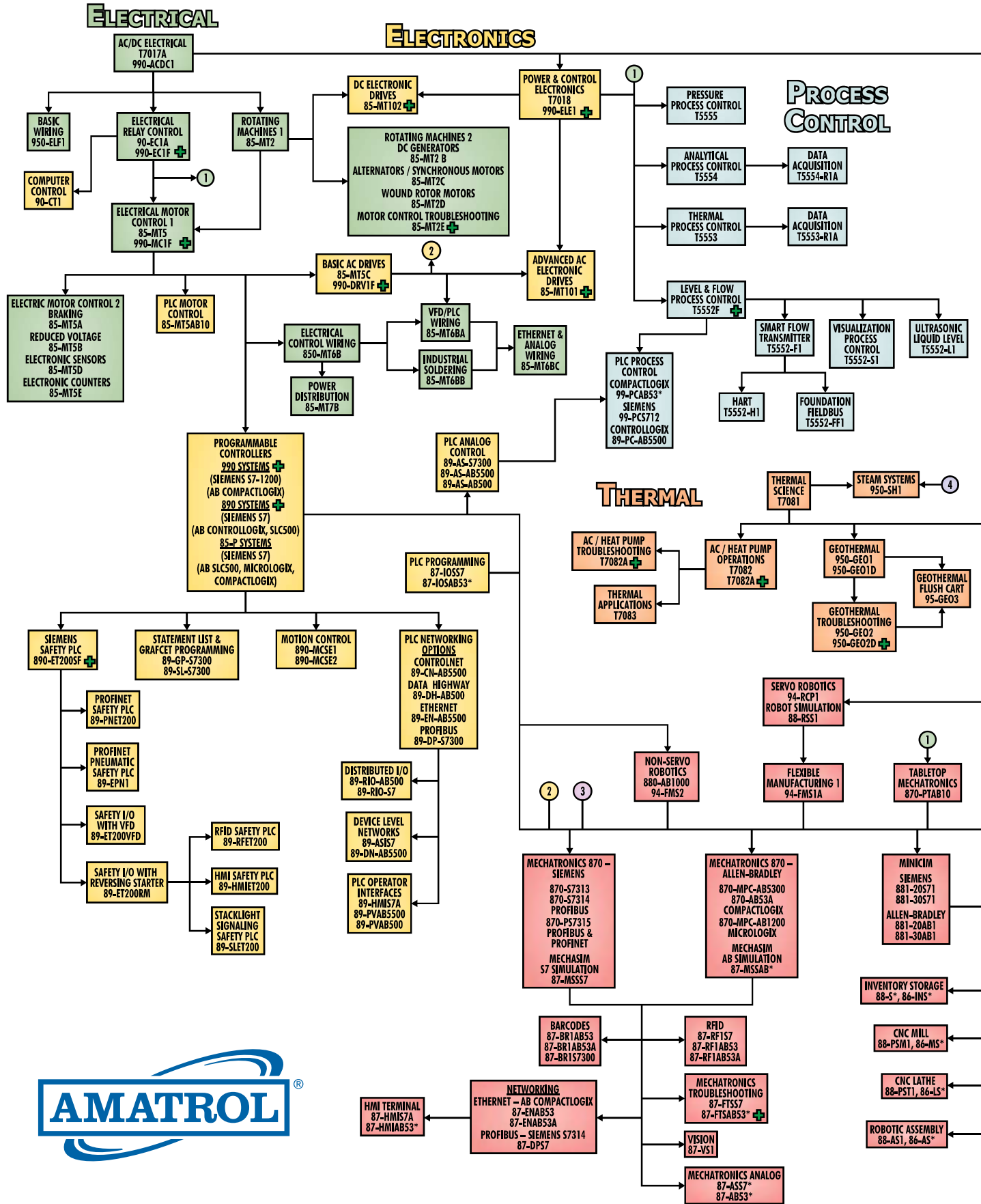


SkillACE, Amatrol's class management software, contains all the features you need when working in a class setting.

- Easy Class/Student Enrollment and Tracking
- Authentic Assessment
- Automated Pre-Quiz and Quizzes
- Class and Student Reports/Analysis
- Automated Grading
- Attendance Tracking
- Question Editor
- Custom Grade Designations
- Customizable Course Templates

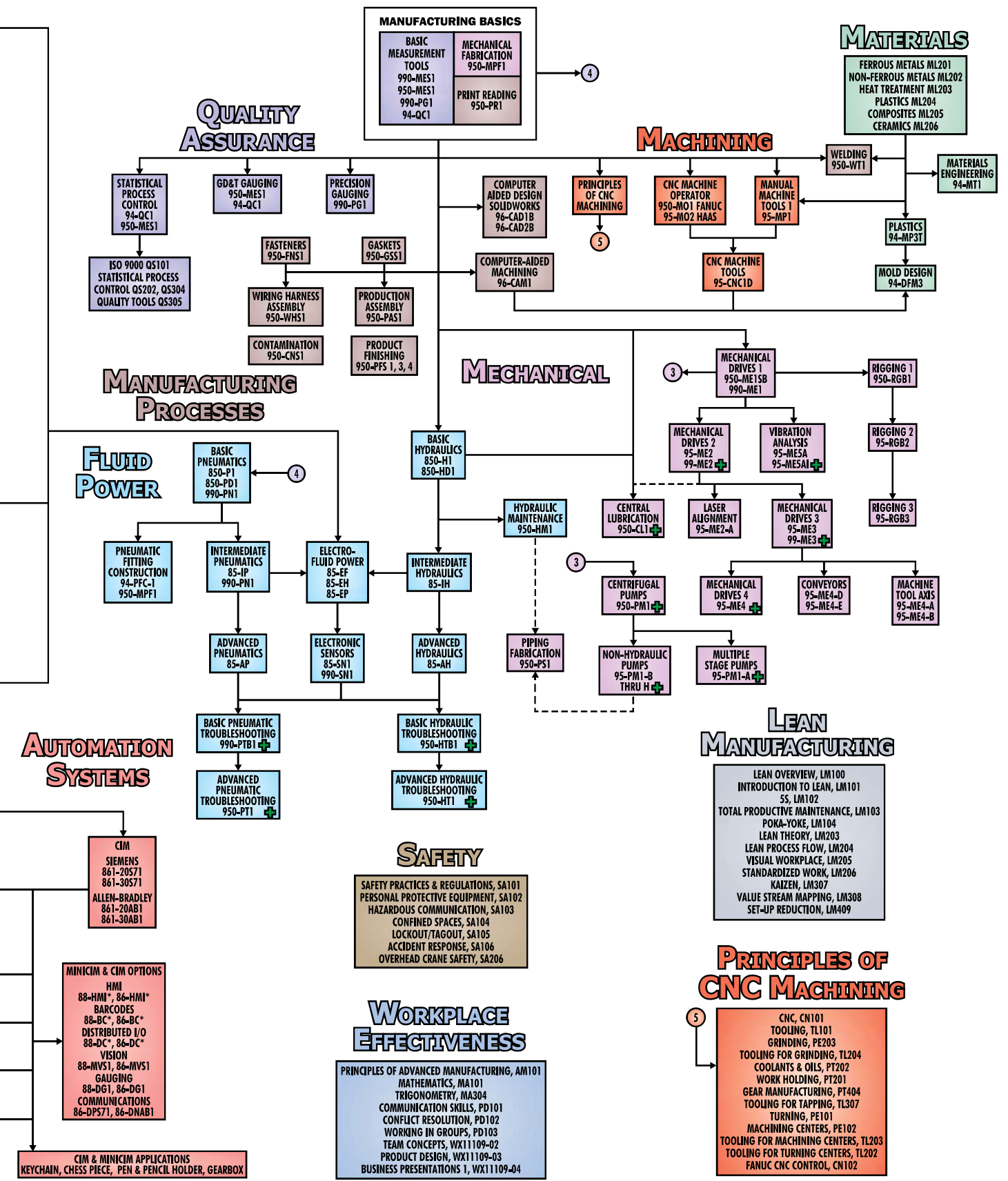


ADVANCED MANUF



Interactive Chart Available on Amatrol.com!

ACTURING SKILLS



+ Includes Troubleshooting Skills

**We believe in
manufacturing's
bright future.
Come join us in
transforming
the global workforce,
one life at a time.**

As a manufacturer, we at Amatrol know first-hand about the serious technical skill shortage in our industry. Finding machinists, maintenance technicians, assemblers, electricians, and all the rest with the troubleshooting and problem-solving skills needed in modern manufacturing grows more difficult every day.

As a technical training company, we bring effective learning solutions to industry and education for advanced manufacturing skills. We work directly with such industry partners as Ford, General Motors, Freeport McMoRan, Siemens, Miller Coors, Caterpillar, Toyota, General Mills, and others to ensure our learning systems meet the high standard of job-ready skills in such short supply for industry today. We invite you to visit us any time to experience the Amatrol difference for yourself. We offer:



- **In Demand Hands-On, Job-Ready Skills**
- **Exceptional Curriculum Quality and Depth**
- **Superior Multimedia to Engage and Teach**
- **Durable, Industrial Equipment Designed for Effective Teaching**
- **Real Industry Troubleshooting**
- **Individualized and Group Learning Flexibility**
- **Web Solutions Designed to Accelerate Learning**
- **Outstanding Support**



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