B&R 2022 Training Catalog
USA

PERFECTION IN AUTOMATION

A MEMBER OF THE ABB GROUP

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Training Schedule is available at:
https://www.br-automation.com/en-us/academy/dates-and-registration

1. DIAGNOSTICS AND SERVICE

1.1. DIAGNOSTICS AND SERVICE FOR MACHINES

Duration: 2 Days

Order Number: SEM920.2

Prerequisite:

- Bring a Windows XP/Vista/7/8/10 laptop
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll get an overview of typical B&R systems and topologies.
- You'll be able to locate product serial numbers and obtain product manuals on the B&R website.
- You'll be able to carry out routine maintenance.
- You'll be able to isolate the source of machine errors.
- You'll be able to assess hardware status based on hardware LED status.
- You'll be able to collect diagnostic data using Runtime Utility Center and the web-based System Diagnostics Manager.
- You'll be able to back up and restore the controller's memory.
- You'll be able to properly replace modules.

Reference Material Provided:
TM920 Diagnostics and Service

1.2. DIAGNOSTICS AND SERVICE WITH AUTOMATION STUDIO

Duration: 3 Days

Order Number: SEM920.3

Prerequisite:

- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software
- ***Also Recommended***: Project source files from the OEM (OEM machines usually don't save viewable/editable projects on the controller) and same Automation Studio version as the OEM's

Objectives: Same objectives as SEM920.2, plus –

- You'll be able to use Automation Studio help system to look up product information and error codes.
- You'll be able to navigate Automation Studio work area and the project's software structure.
- You'll be able to set up online connection to the controller.
- You'll be able to use tools in Automation Studio for I/O status monitoring and troubleshooting.
- You'll be able to monitor and log process values.
- You'll be able to collect diagnostic data of servo axes.
- If you have obtained the project files from the OEM, you'll be able to monitor the safety CPU programming and diagnose safety functionality.

Reference Material Provided:
TM920 Diagnostics and Service
TM923 Diagnostics and Service with Automation Studio

2. AUTOMATION STUDIO PROGRAMMING: ACCELERATED BASICS
2.1.PROJECT CONFIGURATION AND CONTROL

Duration: 3.5 days of project configuration and control task management

Order Number: SEM210.4A

Prerequisite:

- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll be able to use the programming tool Automation Studio and its help system.
- You'll be able to configure hardware functions and set up CPU simulation.
- You'll be able to configure the target's network options and use Target Browser to find the target.
- You'll be able to create, compile, and transfer project to target. Ladder Diagram will be the language of choice for the basic courses, but the instructor can provide pointers for Structured Text or ANSI C.
- You'll be able to manage variable declaration and data retention.
- You'll be able to use standard functions (e.g. compare and compute) and function blocks (e.g. timers and counters) in Ladder Diagram and create custom function blocks.
- You'll be able to use B&R mapp Technology to configure and run the recipe management feature.
- You'll be able to store project source code on the CPU's flash memory.
- You'll be able to utilize common Automation Runtime features, such as cycle time adjustment.
- You'll be able to use Runtime Utility Center to back up and restore the CPU's flash memory.
- You'll be able to use System Diagnostics Manager, Runtime Utility Center, and Automation Studio to diagnose hardware issues and troubleshoot software bugs.

Reference Material Provided:
TM920 Diagnostics and Service
TM210 Working with Automation Studio
TM213 Automation Runtime
TM223 Automation Studio Diagnostics
TM240 Ladder Diagram
TM246 Structured Text

2.2.INTEGRATED MOTION CONTROL (SINGLE-AXIS) USING ACP10

Duration: 1 day

Order Number: SEM410.1A

Prerequisite:

- Complete SEM210.4A
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll be able to configure servo hardware and initialize motion parameters.
- You'll be able to diagnose axis errors and auto-tune the axis.
- You'll be able to set up drive and motor simulation.
- You'll be able to use the latest motion library provided in Automation Studio to quickly start single-axis movement.
- You'll be able to understand the concept of the motion control state diagram.
- You'll be able to control an axis using B&R mapp libraries.

Reference Material Provided:
TM400 Introduction to Motion Control
TM410 Working with Integrated Motion Control
TM440 Motion Control: Basic Functions

2.3.INTEGRATED MOTION CONTROL (SINGLE-AXIS) USING MAPP MOTION

Duration: 1 day

Order Number: SEM415.1A

Prerequisite:

- Complete SEM210.4A
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll be able to configure servo hardware and initialize motion parameters.
- You'll be able to diagnose axis errors and auto-tune the axis.
- You'll be able to set up drive and motor simulation.
- You'll be able to use the latest motion library provided in Automation Studio to quickly start single-axis movement.
- You'll be able to understand the concept of the motion control state diagram.
- You'll be able to control an axis using B&R mapp libraries.

Reference Material Provided:
TM400 Introduction to Motion Control
TM410 Working with Integrated Motion Control
TM440 Motion Control: Basic Functions

3. VISUALIZATION

Duration: 2.5 days (5 half days)

Prerequisite:

- Complete SEM210.4A
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

3.1.MAPP VIEW

Order Number: SEM611.3

Objectives:

- You'll be able to use XML-based mapp View to integrate web browser-rendered visualization into the process control application.
- You'll be able to display mapp Technology-based application alarms.
- You'll be able to display a live signal or historic data using various chart widgets.
- You'll be able to use the user role system to control widget visibility and operation.
- You'll be able to use the unit system built into OPC UA to configure unit conversion.
- You'll be able to use the text system functions to configure language switching.
- You'll be able to configure trigger-specific actions when events occur.
- You'll be able to apply procedures and options for the animation of widgets.

Reference Material Provided for VC4 Training via PDF:
TM611 Working with mapp View
TM641 Alarms, Charts, Data in mapp View
TM671 Creating Powerful mapp View Visualizations

3.2.INTEGRATED VISUALIZATION (VC4)

Order Number: SEM610.3

Objectives:

- You'll be able to use layer-based Visual Components to integrate controller-rendered visualization into the process control application.
- You'll be able to display virtual visualization using a VNC client.
- You'll be able to display mapp Technology-based application alarms.
- You'll be able to display a live signal or historic data using the trend window.
- You'll be able to create context-sensitive information display and control input operation.
- You'll be able to scale process variables, configure languages and switch between them at runtime.
- You'll be able to program and activate touch screen calibration.
- You'll be able to display animated graphics to indicate machine state and progress.

Reference Material Provided for VC4 Training via PDF:
TM610 Working with Integrated Visualization
TM640 Alarms, Trends and Diagnostics
TM670 Advanced Visual Components

4. GOING BEYOND THE BASICS

Are you ready to join the Intermediate Programming and Safety Programming seminars? Use the following self-assessment checklist to see if you are prepared to take your programming to the next level:

	Things you'll need to be able to do by yourself:	"I can do it!" ☑
Control	Create a project and insert or upload the X20 / X67 modules used by the training demo	
	Set up the CPU's IP address	
	Communicate with the CPU using Ethernet connection	
	Use folders ("packages") to group together programs, visualization, and documents	
	Declare customized structure types and initialize variable values	
	Declare global variables and remnant variables; allocate enough memory for them	
	Assign programs to a different cyclic; change cyclic duration and tolerance	
	Map variables to I/O channels	
Diagnosis	Check the CPU boot-up state; know the difference between warm and cold restart	
	Use the Logger to determine the cause of service mode	
	Use the Watch window to monitor variable values	
	Use the Trace window to record trends	
	Use the Profiler to check the maximum runtime of a program or a cyclic task class	
	Back up and restore variable values as well as the whole CF card	
Motion	Insert an ACOPOS drive into the hardware tree and configure axis settings	
	Control an axis with a MpAxis mapp configuration	
	Auto tune an axis and save its tuning parameters	

5. AUTOMATION STUDIO PROGRAMMING: WORKING WITH MAPP SERVICES

Duration: 2 days

Order Number: SEM270.2

Prerequisite:

- Complete SEM210.4A
- Proficient in a high-level text-based programming language, such as ST or ANSI C
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll be able to understand the general concept of mapp Technology
- You'll be able to recognize the structure of the mapp technology packages
- You'll be able to combine mapp services components and transfer data between them
- You'll be able to connecting to the standard mapp user interface
- You'll be able to bind services to mappView widgets
- You'll be able to use the unit and text system of Automation Studio
- You'll be able to implement the following mapp services components: Recipe, Data, AlarmX, UserX, Audit, File, Report

Reference Material Provided:
TM270 – Configuring, commissioning and diagnosis of mapp services

Electronic Gears and Cams using ACP10

Duration: 2 Days

Order Number: SEM441.2A

Prerequisite:

- Complete SEM210.4A and SEM410.1A
- Proficient in a high-level text-based programming language, such as ST or ANSI C
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll be able to configure servo hardware for multi-axis applications.
- You'll be able to understand the ACOPOS control concept and manually tune each axis.
- You'll be able to trace drive parameters and POWERLINK network commands.
- You'll be able to update drive configuration parameters in runtime.
- You'll be able to synchronize a slave axis to a real/virtual master axis.
- You'll be able to program cam motion and its transitions using the latest motion library provided in Automation Studio.
- You'll be able to program gearing and its transitions using the latest motion library provided in Automation Studio.
- You'll be able to adjust the phasing and offset of linked axes.

Reference Material Provided:
TM441 Motion Control: Multi-axis Functions
TM450 ACOPOS Control Concept and Configuration
TM460 Initial Commissioning of Motors

6. SAFEDESIGNER PROGRAMMING

6.1.MAPP SAFETY LOGIC

Duration: 2 Days

Order Number: SEM515.2

Prerequisite:

- Complete SEM210.4A
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.6 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll get an overview of B&R safety technology and products.
- You'll be able to use the programming tool SafeDESIGNER in collaboration with Automation Studio.
- You'll be able to configure safety hardware's functionality.
- You'll be able to evaluate safety I/O channel status in the application.
- You'll be able to set up communication between the standard CPU and the safety CPU.
- You'll be able to develop, compile, and transfer your safety application to the safety CPU.
- You'll be able to commission and diagnose safety components in a machine.
- You'll be able to document safety functionality and project information within the source code.

Reference Material Provided:
TM500 Introduction to Integrated Safety
TM515 Programming and commissioning safety applications with mapp Safety

6.2.INTEGRATED SAFE MOTION CONTROL

Duration: 2 Days
Order Number: SEM540.2

Prerequisite:

- Complete SEM210.4A, SEM410.1A, and SEM510.2
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.6 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll get an overview of the principle and various functions of safe motion control.
- You'll be able to set up and configure safety axes.
- You'll be able to develop a SafeDESIGNER application using PLCopen Safety function blocks.
- You'll be able to commission and diagnose safety axes in a machine.

Reference Material Provided:
TM540 Integrated Safe Motion Control

7. AUTOMATION STUDIO PROGRAMMING: ADVANCED

We are able to offer other advanced training courses at the B&R North America headquarters. These courses can be scheduled on an as-needed basis. Currently available training topics include:

- Stepper control using SDC and ramp mode (3 days)
- VFD control using SDC and I/O registers (2 days)
- CNC system programming (5 days)
- Fieldbus I/O configuration and communication (1 day; must specify fieldbus technology)
- X90 Mobile PLCs (4 days)
- Integrated Safety, SEM510.2 (2 days)
- Change Your View (CYV) applications, SEM680.3 (3 days)
- Robotics (days vary)

The topic list continues to expand, so check Academy.US@br-automation.com for the latest training offers.

8. INTEGRATED TRANSPORT SYSTEMS

8.1. ACOPOSTRAK BASICS

Duration: 3 Days

Order Number: SEM1415.3

Prerequisite:

- Complete SEM210.4A
- Proficient in a high-level text-based programming language, such as ST or ANSI C
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll become familiar with the basics of LLM technology.
- You'll become familiar with the difference between SuperTrak and ACOPOStrak.
- You'll understand the software concept of ACOPOStrak.
- You'll know how the ACOPOStrak software components work.
- You'll become familiar with the simulation possibilities of ACOPOStrak.
- You'll be able to add and configure the ACOPOStrak hardware in the System Designer.
- You'll be able to configure the POWERLINK network correctly.
- You'll be able to use dynamic node allocation (DNA) with the ACOPOStrak hardware.
- You'll be able to add the ACOPOStrak configuration files and use them correctly.
- You'll become familiar with the available PLCopen function blocks and can use them in the project.
- You'll be able to add and remove shuttles at runtime and know the advantage of connecting ACOPOStrak to other systems.
- You'll become familiar with the different movement possibilities of shuttles and configure them.
- You'll become familiar with the concept of process stations and be able to program them.
- You'll be able to perform coupling between a shuttle and axis.
- You'll be able to perform coupling between two shuttles.
- You'll be able become familiar with and can apply the basics of ACOPOStrak dimensioning.
- You'll be able to start up ACOPOStrak.
- You'll be able to perform ACOPOStrak diagnosis.

Reference Material Provided:
TM1415 Dimensioning and Programming for ACOPOStrak
TM1423 Assembly, commissioning, and diagnostics for ACOPOStrak

8.2. ACOPOSTRAK ASSEMBLY, ALIGNMENT, AND DIAGNOSTICS

Duration: 1 Day

Order Number: SEM1423.1

Prerequisite:

- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed

Objectives:

- You'll become familiar with ACOPOStrak.
- You'll become familiar with the mechanical components of ACOPOStrak.
- You'll be able to use the user's manual.
- You'll be able to set up an ACOPOStrak system using the assembly instructions.
- You'll be able to commission ACOPOStrak.
- You'll be able to use dynamic node allocation (DNA) with the ACOPOStrak hard-ware.
- You'll be able to perform ACOPOStrak diagnosis.
- You'll be able to identify and solve typical errors.
- You'll be able to carry out maintenance work on the shuttle.
- You'll be able to replace a segment.

Reference Material Provided:
TM1423 Assembly, commissioning, and diagnostics for ACOPOStrak

8.3. SUPERTRAK BASICS

Duration: 1 Day

Order Number: SEM1410.3

Prerequisite:

- Complete SEM210.4A
- Proficient in a high-level text-based programming language, such as ST or ANSI C
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll become familiar with the basics of LLM technology.
- You'll know how SuperTrak works.
- You'll know how to assemble and maintain the mechanical structure.
- You'll understand the hardware and software concept of SuperTrak.
- You'll know how the SuperTrak software components work.
- You'll become familiar the ATS TrackMaster software
- You'll be able to simulate the system.
- You'll know how to setup the communication between components.
- You'll be able to perform SuperTrak diagnosis.

9. INTEGRATED MACHINE VISION

Duration: 2 Days

Order Number: SEM1610.3

Prerequisite:

- Complete SEM210.4A
- Proficient in a high-level text-based programming language, such as ST or ANSI C
- Bring a Windows Vista/7/8/10 laptop with Automation Studio 4.5 or higher installed
- Be able to manually configure your laptop's IP address and install software

Objectives:

- You'll implement the vision hardware into a project and then configure it.
- You'll perform image feeds with different exposures, shutter speeds, and depth of field
- You'll use various image processing functions.
- You'll use the mapp Vision configuration interface.
- You'll synchronize the vision hardware with the POWERLINK bus system.
- You'll use Vision Hardware in combination with a drive.

Reference Material Provided:
TM1610 Introduction to Integrated Machine Vision

10.CUSTOMER-SPECIFIC AND ON-SITE TRAINING (SEM099.1)

In addition to the standard courses in the training calendar, we offer on-site training as well as custom curriculum. We can customize the training to your specific needs. If you are interested in this please contact us at Academy.US@br-automation.com. Our training team will be happy to assist in tailoring your class.

11.PAYMENT AND CANCELLATION POLICY

Purchase Orders for training will be invoiced immediately. B&R must receive payment for all courses at least 2 weeks prior to the training start date.

To schedule classes or to inquire further information, please contact Orders.US@br-automation.com or call us at 770-772-0400.

CANCELLATION AND RESCHEDULE POLICY

B&R North America reserves the right to cancel any course that is not sufficiently attended two weeks prior to training.

Customer withdrawals or reschedules will be charged at the following cancellation rates:

2 weeks prior to course date — 25% of list price
1 week prior to course date — 50% of list price

Custom trainings can be rescheduled free of charge 30 days before the scheduled start date of a class, otherwise reimbursement for travel and shipping costs will be required.

Training Schedule is available at:
https://www.br-automation.com/en-us/academy/dates-and-registration

12.TRAINING COURSE SUMMARY AND PRICELIST

Category	Course Module	Order Number	Price
Diagnostics and Service (Hardware shipped for remote classes)	Diagnostics for machines (2 days)	SEM920.2	$1322 / seat
	Diagnostics with Automation Studio (3 days)	SEM920.3	$1983 / seat
Automation Studio Programming: Accelerated Basics	Project configuration and control (4 days)	SEM210.4A	$3569 / seat
	Integrated motion control single-axis (1 day)	SEM410.1A	$893 / seat
Visualization	Creating an HMI application with mapp View (5 half-days)	SEM611.3	$1983 / seat
	Creating an HMI application with VC4 (5 half-days)	SEM610.3	$1983 / seat
Automation Studio Programming: Intermediate (Hardware shipped for remote classes)	Working with mapp Services (2 days)	SEM270.2	$1190 / seat
	Electronic gears and cams (2 days)	SEM441.2A	$1785 / seat
	mappCNC (2 days)	SEM099.1	$3021/ day
SafeDESIGNER Programming (Hardware shipped for remote classes)	mapp safety logic (2 days)	SEM515.2	$1549 / seat
	Integrated safe motion control (2 days)	SEM540.2	$1549 / seat
Track Technology	ACOPOStrak programming (3 days)	SEM1415.3	$2625 / seat
	ACOPOStrak assembly and alignment (1 days)	SEM099.1	$3021 / day
	SuperTrak programming (1 day)	SEM1410.3	$2625 / seat
	SuperTrak diagnostics (1 day)	SEM099.1	$3021/ day
Vision (Hardware shipped for remote classes)	Integrated Machine Vision (2 days)	SEM1610.3	$2625 / seat
Advanced / Custom Training	Individual Training	SEM099.1	$3021/ day

Please provide the contact info of all participants (names, email addresses, and phone numbers) on your purchase order. Participants need to bring their own laptops.

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