

Course name:	ELECTRONIC DRIVES 1
Short name:	ED1
Length:	80 hrs
Prerequisites:	ES1

Purpose

This course provides knowledge of industrial electronics and its application to motor controls. Setup and programming skills are included.

Description

This course provides an introduction to electronic components and their application in common drive technologies. This drive technology is then applied to the drives that are selected for this course.

Topics include:

- Introduction to electronic components – capacitors, diodes, zener diodes, transistors, op-amps, SCRs
- AC motor theory
- Operation/application symbols, testing, and ratings of electronic components
- AC drive theory and system block
- Feedback devices
- Drive applications
- Power Supplies (halfwave, fullwave, zener and series pass power supplies)
- DC motor theory
- DC drive theory and system block diagrams
- Drive set-up
- Drive analysis

Drive Equipment:

Drives selected will be from the accompanying list. Generally 4-6 drives will be selected for the course. The customer may select alternative drives based on available equipment.

- | | |
|---|--|
| • Cutler Hammer 210 | • Altivar Digital Drive |
| • Reliance Flex Pack 104 | • Allen-Bradley 1334 |
| • Allen-Bradley 1333 | • Allen-Bradley 1305 |
| • Akron Standard | • Control Techniques Mentor II Digital Drive |
| • Control Techniques Unidrive | • Allen-Bradley 1336 |
| • Allen-Bradley 160 | • Control Techniques Quantum III Digital Drive |
| • Control Techniques Mentor Digital Drive | • Siemens 6AR24 Digital Drive |
| • Avtron Digital Drive | • Siemens 6AR70 Digital Drive |
| • Fincor | • Reliance MinPack |

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying electronic components, and analyzing their functions in electronic circuit and drives.
- Identifying and analyzing AC & DC drive interface circuits.
- Setting-up and configuring their basic parameters.
- Finding basic AC & DC Drive faults.

Course name:	ELECTRONIC DRIVES 2
Short name:	ED2
Length:	40 hrs
Prerequisites:	ES1 ED1

Purpose

This course is an AC/DC drives course with 16 – 20 hours of hands-on training with specific drives.

Description

This course provides instruction on various AC/DC drives using software and manual configuration and set-up. The course will also provide the opportunity for extensive hands-on drive analysis exercises.

Topics include:

- Basic AC/DC drive theory
- Drive set-up
- Feedback devices
- Parameters
- Drive configuration
- Drive analysis

Drive Equipment:

Drives selected will be from the following list. Generally 4-6 drives will be selected for the course. The customer may select alternative drives based on available equipment.

- AB 1336
- Altivar 16
- AB 1305
- Reliance MinPak
- AB 160SS
- Toshiba G2+
- Mentor
- Vicker
- Mentor II
- Avtron
- Quantum III
- Akron Standard AIFI
- Siemens Simoreg 6RA24
- Cutler Hammer 210 DC Drive

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the interface components of both AC and DC drives and their functions.
- Performing basic and in-depth drive set-ups for both AC and DC drive systems.
- Interpreting faults associated with AC and DC drive systems.

Course name:	AC DRIVES
Short name:	ACD (Allen-Bradley)
Length:	24 hrs
Prerequisites:	ES1

Purpose

This course provides knowledge of control systems that incorporate Allen Bradley AC drives.

Description

This course provides generic AC Motor/Drive theory reinforced by application to common drive units used in manufacturing. Hands-on experience is gained through the analysis and set-up of the drives used in the course.

Topics include:

- AC motor theory
- AC drive theory
- Parameter details
- Drive set-up
- Drive programming
- Drive analysis

Drive Equipment:

Drives selected will be from the accompanying list. The customer may select alternative drives based on available equipment.

- Allen-Bradley 160
- Allen-Bradley 1305
- Allen-Bradley 1333
- Allen-Bradley 1334
- Allen-Bradley 1336

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- The theory of AC Drive operation.
- Identifying and analyzing AC Drive interface circuitry.
- Configuring, setting-up, and programming an AC Drive using the manufacture's documentation.
- Finding basic faults associated with AC drive systems.

Course name:	SIEMENS DC DRIVE 1
Short name:	SDCD1 (Siemens 6RA24)
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Siemens 6RA24 DC Drive.

Description

This course is designed to use a Siemens Drive in open and closed loop modes. Configuration exercises are used in both manual and program mode using the Simovis 6RA24 software.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive programming
- Parameter details
- Drive analysis

Drive Equipment:

- Siemens 6RA24 DC drive
- Simovis 6RA24 software

Course Objective:

Upon successful completion this course, the trainee will be competent in:

- Identifying and analyzing drive's interface circuits. (input power, permissives, speed reference, feedback, motor, etc.)
- Configuring and setting-up the drive using the manufacture's documentation.
- Interpreting the drive's faults.
- Interpreting the drive's function block diagrams.
- Using Simovis software for downloading, uploading, and changing parameters, analyzing the drive.

Course name:	SIEMENS DC DRIVE 2
Short name:	SDCD2 (Siemens 6RA70)
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Siemens 6RA70 DC Drive.

Description

This course is designed to use a Siemens Drive in open and closed loop modes. Configuration exercises are used in both manual and program mode using the Simovis 6RA70 software.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive programming
- Parameter details
- Drive analysis

Drive Equipment:

- Siemens 6RA70 DC drive
- Simovis 6RA70 software

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying and analyzing drive's interface circuits. (input power, permissives, speed reference, feedback, motor, etc.)
- Configuring and setting-up the drive using the manufacture's documentation.
- Interpreting the drive's faults.
- Interpreting the drive's function block diagrams.
- Using Simovis software for downloading, uploading, and changing parameters, analyzing the drive.

Course name:	AVTRON DIGITAL DRIVE
Short name:	AVDC
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Avtron Digital Drive.

Description

This course is designed to use an Avtron drive in open and closed loop modes. Configuration exercises are used both in manual mode and program mode using Avtron software.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Real time screens
- Parameter details
- Screen designer
- Drive analysis

Drive Equipment:

- Avtron drive
- Avtron software (ADDAPT)

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying and analyzing drive's interface circuits. (in put power, permissives, speed reference, feedback, motor, etc.)
- Configuring and setting-up the drive using the manufacture's documentation.
- Interpreting the drive's faults.
- Interpreting the drive's function block diagrams.
- Using ADDAPT software for downloading, uploading, and changing parameters, analyzing the drive.

Course name:	MENTOR DC DRIVE
Short name:	MENT
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Mentor DC Drives by Control Techniques.

Description

This course is designed to use a Mentor in open and closed loop modes. Configuration exercises are used both in manual and in program mode (MentorSoft).

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive programming
- Parameter details
- Drive analysis

Drive Equipment:

The customer may select alternative drives from the list below based on available equipment.

- Mentor
- Mentor II
- Quantum III
- MentorSoft Windows software

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the Mentor's interface components and their functions.
- Configuring, modifying and analyzing the drive's parameters using Mentorsoft.
- Interpreting faults associated with the Mentor drive.

Course name:	EMERSON FX DRIVE
Short name:	EMFX
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Emerson FX Servo Drive.

Description

This course is designed to use a FX Drive using the PCX software.

Topics include:

- Basic servo theory
- PCX programming
- Servo motors
- Drive tuning
- Drive description
- Axis programming
- Drive configuration
- Drive analysis

Drive Equipment:

- Emerson FX Servo drive
- PCM 15 option Module
- PCX software

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the drive's interface components and their functions.
- Configuring the Servo drive and Motion control parameters with PCX software.
- Programming motion control sequences.
- Interpreting faults associated with the Emerson FX Servo system.

Course name:	UNIDRIVE AC DRIVE
Short name:	UNIDR
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Unidrive AC Drive by Control Techniques.

Description

This course is designed to use a Unidrive in open and closed loop modes. Configuration exercises are extensively used in manual and in program mode (Unisoft).

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive programming
- Parameter details
- Drive analysis

Drive Equipment:

- Unidrive 1401 drive
- Unisoft Windows software

Course Objective:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the Unidrive's interface components and their functions.
- Configuring, modifying and analyzing the drive's parameters using Unisoft or CTsoft.
- Identifying and replacing the option modules.
- Interpreting faults associated with the Unidrive drive.

Course name:	CUTLER HAMMER 210 DC DRIVE
Short name:	CHDCD
Length:	16 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Cutler Hammer DC Drive.

Description

This course uses the block diagram method of analysis. The trainee will exercise component level circuit analysis within each functional block. Although this course is based on the CH-210 drive, the block diagram method allows the concepts learned to be applied to other analog drive systems. Practical exercises are developed to reinforce the setting up of the drives and practical analysis to the component level.

SCR systems will be discussed including the full wave bridge and the six SCR three phase bridge. The need for protective devices will be explained and all such devices examined.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive analysis
- Feedback set-up
- Repair

Drive Equipment:

- Cutler Hammer 210 DC drive

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying and analyzing the drive's interface circuits.
- Interpreting faults associated with the drive.
- Configuring and setting-up the drive using the manufacture's documentation.
- Analyzing the drive to component level.

Course name: AKRON STANDARD AIFI DC DRIVE

Short name: AKDCD

Length: 16 hrs

Prerequisites: ED1

Purpose

This course provides knowledge of control systems that incorporate the Akron Standard AIFI DC Drive.

Description

DC drive concepts are presented utilizing the block diagram approach, however component level circuit analysis is exercised within each block. Practical exercises are dedicated to motor exercises, observing proper drive operations, and practical analyzing to the component level.

SCR systems will be discussed including the full wave bridge and the six SCR three phase bridge. The need for protective devices will be explained and all such devices examined.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Repair
- Feedback set-up
- Drive analysis

Drive Equipment:

- Akron Standard AIFI DC drive

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying and troubleshooting the drive's interface circuits.
- Configuring and setting-up the drive using the manufacture's documentation.
- Interpreting faults associated with the drive.
- Analyzing the drive to a component level.

Course name:	RELIANCE MINPAK DC DRIVE
Short name:	REMDCD
Length:	16 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Reliance Minpak DC Drive.

Description

DC drive concepts are presented utilizing the block diagram approach, however component level circuit analysis is exercised within each block. Although specific drives are used throughout the course, the block diagram approach allows the concepts taught to be extended to other DC drive systems. Practical exercises are dedicated to motor exercises, observing proper drive operations, and practical analyzing to the component level.

SCR systems will be discussed including the power cube bridge and the six SCR three phase bridge. The need for protective devices will be explained and all such devices will be examined.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Repair
- Drive analysis

Drive Equipment:

- Reliance MinPak DC drive

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the Minpak drive's interface components and their functions.
- Configuring the drive using the Manufacturer's documentation.
- Interpreting faults associated with the Minpak drive.

Course name:	DC and AC Drives
Short name:	DC&ACD
Length:	80 hrs
Prerequisites:	ECOM

Purpose

This course provides the knowledge and skills necessary to isolate and repair problems occurring within AC and DC Drive systems.

Description

This course provides the common drive technologies used in industry including AC and DC Drives. This is accomplished through extensive hands-on exercises and system level analyzing using necessary test equipment.

Topics include:

- DC motor theory
- DC drive theory and system block diagrams
- Component level circuit analysis of analog drives
- AC motor theory
- AC drive theory and system block diagrams
- Feedback devices
- Drive applications
- Drive set-up
- Drive analysis

Drive Equipment:

Drives selected will be from the following list. Generally 4-6 drives will be selected for the course. The customer may select alternative drives based on available equipment.

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|---------------------------|------------------------|---------------|
| • Cutler Hammer 210 | • Flex Pack 104 | • AB 1333 |
| • Akron Reliance | • Unidrive | • AB 160 |
| • Mentor Digital Drive | • Avtron Digital Drive | • Fincor |
| • Mentor II Digital Drive | • Toshiba | • AB 1305 |
| • Altivar | • AB 1334 | • Quantum III |
| • Simoreg Digital Drive | • AB 1336 | |
| • 6RA22 | | |
| • 6RA24 | | |
| • 6RA70 | | |

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Identifying and analyzing AC & DC Drive interface circuits.
- Analyzing analog drives to component level.
- Setting-up, programming, and configuring basic, and in-depth parameters of AC & DC drives.
- Finding faults associated with AC and DC drives.

Course name:	MOTION CONTROLLERS 1
Short name:	MC1
Length:	40 hrs
Prerequisites:	ED1 PLC Advanced

Purpose

This course provides the knowledge and skills necessary to configure, program, and analyze the Allen-Bradley 1394 servo drive system or IMCS Class Motion Controller.

Description

This course provides a working knowledge of motion control systems and their components including servo drive operation, Brushless Motor theory, Feedback Devices and Programming of Motion Controllers. The course is based on the Allen-Bradley 1394 Servo Controller and the GML Commander Programming Language. This course can also be applied to the IMCS Class Motion Controller.

Topics include:

- Brushless motor theory
- Brushless drive theory
- Feedback devices
- System set-up
- GML programming (using GML Commander)
- Drive configuration
- Drive tuning
- Axis programming
- Remote I/O communications with PLCs
- Discrete and block transfers via remote I/O
- Axis link (transfer of data between motion controllers)
- Drive analysis

Course Objectives:

Upon successful completion of this course, the trainee will be competent in:

- Analyzing the components associated with the 1394 Motion controller system.
- Configuring the Motion Controller system using GML Commander software.
- Programming motion control sequences.
- Interpreting faults associated with the Motion Controller System.

Course name:	POWER FLEX 40 & 70 AC DRIVE
Short name:	PFX
Length:	24 hrs
Prerequisites:	ED1

Purpose

This course provides knowledge of control systems that incorporate the Power Flex 40 & 70 AC Drives by Allen-Bradley

Description

This course is designed to use a Power Flex 40 in open loop, and Power Flex 70 in open and closed loop modes. Students configure and program the drives using the keypad (HIM) and the Drive Tools software.

Topics include:

- Drive description
- Drive set-up
- Drive configuration
- Drive programming
- Parameter details
- Drive analysis

Drive Equipment:

- Power Flex 40 & 70 AC drives
- Drive Tools software

Course Objective:

Upon successful completion of this course, the trainee will be competent in:

- Identifying the Power Flex 40 & 70's interface components and their functions.
- Install/Replace and start-up drive system.
- Configuring, modifying and analyzing the drive's parameters using Drive Tools.
- Interpreting faults associated with the Power Flex 40 & 70 drive.