

"Outlines"

(1): INTRODUCTION TO SYSTEMS AUTOMATION

1.1 CONCEPT OF AUTOMATION

- 1.1.1 Human
- 1.1.2 Command Devices
- 1.1.3 Information Devices
- 1.1.4 Sensing Devices
- 1.1.5 Actuating Devices
- 1.1.6 Controller Devices
- 1.1.7 Plant

1.2 TYPES OF CONTROL STRATEGIES

- 1.2.1 Monitoring Subsystems
- 1.2.2 Sequencing Subsystems
- 1.2.3 Closed Loop Control Subsystems

1.3 ADVANTAGES AND DISADVANTAGES OF AUTOMATED SYSTEMS

(2): MOTOR CONTROL CENTER (MCC)

2.1 MAIN FUNCTIONS OF MOTOR CONTROL CENTER

- 2.1.1 Protection
- 2.1.2 Operation
- 2.1.3 Control
- 2.1.4 Automation

2.2 PRACTICAL CONSIDERATIONS TO DEAL WITH MOTORS

- 2.2.1 Types
- 2.2.2 Ratings
- 2.2.3 Connections
- 2.2.4 Standards and Classifications

(3): RELAY LOGIC FOR MOTORS OPERATION

- 3.1 COMPONENTS AND SYMBOL DEFINITIONS
- 3.2 DIRECT ON-LINE AC INDUCTION MOTOR STARTER
- 3.3 REVERSING MOTOR DIRECTION
- 3.4 STAR / DELTA STARTER
- 3.5 SPEED CONTROL OF DC MOTOR THROUGH RESISTANCES
- 3.6 SEQUENCE OPERATION OF MULTI MOTORS
- 3.7 SOLID STATE SOFT STARTERS
- 3.8 INVERTERS OR VARIABLE FREQUENCY DRIVES (VFD'S)
- 3.9 DC MOTOR VARIABLE SPEED DRIVES

(4): PROGRAMMABLE LOGIC CONTROLLER (HARDWARE)

- 4.1 INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER (PLC)
- 4.2 RELAY LOGIC VERSUS PLC
- 4.3 MAIN COMPONENTS OF A TYPICAL PLC SYSTEM
 - 4.3.1 Power Supply
 - 4.3.2 Central Processor Unit (CPU)
 - 4.3.3 Memory
 - 4.3.4 Programming Unit
 - 4.3.5 Input / Output Devices
 - 4.3.6 Input / Output Modules
 - 4.3.7 Special Function Modules
- 4.4 COMMERCIAL TYPES OF PLC
- 4.5 WIRING TECHNIQUES
- 4.6 ADVANTAGES AND DISADVANTAGES OF PLC SYSTEM

(5): PLC SOFTWARE PROGRAMMING TECHNIQUES

- 5.1 TRANSFERRING FROM HARDWIRING TO PLC
- 5.2 PLC ADDRESSING

- 5.3 PLC SCAN CYCLE
- 5.4 PLC MOST COMMON LANGUAGES
- 5.6 LOGIC OPERATION
- 5.6 TIMER OPERATION
- 5.7 COUNTER OPERATION
- 5.8 DEALING WITH ANALOG SIGNALS
- 5.9 DEALING WITH TABLES

(6): PLC APPLICATION EXAMPLES

- 6.1 EXAMPLE (6.1) (*Sequencing operation of motors pump station*)
- 6.2 EXAMPLE (6.2) (*Count number of cans in boxes*)
- 6.3 EXAMPLE (6.3) (*Filing machine operation*)
- 6.4 EXAMPLE (6.4) (*Fun train operating patterns*)
- 6.5 EXAMPLE (6.5) (*Combinational table*)
- 6.6 EXAMPLE (6.6) (*Sequential table*)
- 6.7 EXAMPLE (6.7) (*Operation of CNC machine*)
- 6.8 EXAMPLE (6.8) (*Analog temperature control*)

(7): APPLICATION CASE STUDY (BACKUP SOURCES)

- 7.1 OVERVIEW
- 7.2 GENERAL CONCEPTS
- 7.3 PRACTICAL CONSIDERATIONS
- 7.4 REALIZATION STEPS
 - 7.4.1 System Requirements
 - 7.4.2 Sensors and Actuator
 - 7.4.3 System Circuit Connections
 - 7.4.4 Software Programming
 - 7.4.5 Experimental Tests