



Training
Systems
Australia

Working with STEM Digital Library

Contents

Working with STEM Digital Library: Courses

Engineering

Materials Engineering	1
Engineering Drawing	1
Fluid Power	2
Manufacturing Engineering	2
Machine and Instrument Engineering	3
Inspection, Maintenance and Quality Management	4
Industrial Control Systems	4
Industrial Control PLCs	5

Electronics

Electronic Systems	7
DC Circuits	7
Electrical Networks	9
AC Circuits	10
Magnetism and Electromagnetism	10
Electrical Engineering	11
Linear Electronics	12
Semiconductors	12
Power Electronics	13
Digital Electronics	14
Telecommunications	16
Microprocessors	17
Circuit Construction and Testing	17
Electronic Principles (D3000 Practice)	19
Linear Electronics (D3000 Practice)	21
Semiconductors (D3000 Practice)	22
Power Electronics (D3000 Practice)	24
Digital Electronics (D3000 Practice)	25
Microprocessors (D3000 Practice)	27
Avionics (D3000 Practice)	28
Electronic Systems (Series 9 Practice)	29
Electronic Principles (Series 9 Practice)	29
Linear Electronics (Series 9 Practice)	30
Semiconductors (Series 9 Practice)	30
Digital Electronics (Series 9 Practice)	31
Microprocessors (Series 9 Practice)	32

Automotive

Engine Repair	33
Automatic Transmission and Transaxle	34
Manual Drive Train and Axles	34
Suspension	35
Steering	35
Brake Systems	36
Brake Components	37
Brake Servicing	37
Automotive Electrical Fundamentals	38
Automotive Starting and Charging	39
Automotive Lighting	39
Automotive Transducers	41
Ignition Systems	41
Engine Management and Control	42
Fuel and Emissions	43
Electric and Hybrid Vehicle Technology	44
Networked Systems	46
CAN Bus Lighting Systems	46
CAN Bus Auxiliary Systems	47
CAN Bus Starting and Charging Systems	47
Automotive Heating and Air Conditioning	48
Auto Shop	49
Passenger Safety Systems	50
Heavy Vehicle Systems	50
Motorcycle Lighting	52
Land Cruiser Complete Vehicle Systems	53
Dynamometers	53

Support

Engineering Mathematics	55
English Language Skills	56
Business Skills	57
Freight Logistics	59
Workplace Problem Solving	60

Engineering

LIB 3: 01 Materials Engineering

Materials

- Ceramic and Sintered Materials
- Classification of Materials
- Composite Materials
- Corrosion
- Iron and Steel
- Lubrication
- Non-Ferrous Metals
- Polymers

Properties of Materials

- Characteristics of Materials

Structure of Materials

- Interpretation of Test Results
- Materials Testing - Hardness and Non-Destructive Testing
- Materials Testing - Tensile and Impact Testing
- Microstructure of Alloys
- Microstructure of Metals
- Microstructures of Steel
- Solutions and Phases

LIB 3: 02 Engineering Drawing

Drawing Elements

- Drilling and Finishes
- Fluid Power Diagrams
- Machine Elements
- Permanent Connections
- Screws and Threaded Components

Engineering Drawing

- Basic Geometric Construction
- Co-ordinate Systems
- Dimensions
- Drawing Analysis
- Drawing Standards
- Roughness
- Sectional Views

Engineering

LIB 3: 03 Fluid Power

Fluid Power

- Calculations of Hydraulic Power
- Calculations of Pressure and Flow Rate
- Electropneumatics
- Fluid Power Cylinders
- Fluid Power Formulas
- Logic Controls
- Pneumatics Diagrams, Series and Parallel Circuits and Time Delays

LIB 3: 04 Manufacturing Engineering

Basics of CNC

- Preparatory Programming - Turning

CNC Programming

- A- and B-Axes
- C-Axis
- CNC and the Basics of Programming
- CNC Milling
- CNC Programming for Milling
- CNC Programming for Turning
- CNC Turning
- Cycle Programming - Milling
- Cycle Programming - Turning
- Multiple Axis Turning and Milling
- Preparatory Programming - Milling
- Programming Linear and Tangential Start-Up and Coast-Down - Milling

Information Technology

- Charting Data
- Planning and Organizing Work Processes
- Process Planning

Joining

- Forces in Threaded Joints
- Forces on Threads
- Formula and Calculation of Tightening Torque
- Joining Procedures
- Joining with Glues
- Joining with Keys and Splines
- Joining with Pins, Bolts and Rivets
- Joining with Soldering
- Joining with Threads
- Lapping
- Screw Connections
- Soldering Equipment and Safety

Engineering

Manufacturing Processes

- Bending
- Bending Operation Calculations
- Cutting and Angles of Cutting
- Cutting Metal
- Cutting Speed for Drilling
- Determining Data for Grinding
- Determining Data for Milling
- Determining Data for Turning
- Drilling
- Environmental Protection
- Erosive Manufacturing Processes
- Finishing Processes
- Forces on the Cutting Tool
- Forging
- Forming - Material Use and Scrap
- Forming Calculations
- Forming Procedures
- Grinding - Processes and Machines
- Hard Metal Cutting
- Honing
- Machine Tools and Terminology
- Manufacturing Processes
- Milling - Processes and Machines
- Primary Metal Shaping Processes
- Reading Machine Diagrams
- Safety and Protective Measures

Welding

- Arc Welding
- Gas Welding
- Gas-Shielded Welding
- Joining with Welding

LIB 3: 05 Machine and Instrument Engineering

Bearings

- Bearing Assemblies and Fit
- Bearings
- Calculation of Forces on Bearings
- Joining Hubs to Shafts
- Plain Bearings
- Rolling-Element Bearings
- Seals and Gaskets

Engineering

Electronics Test Equipment

- Signal and Pulse Generators

Engineering Science

- Calculating Work, Power and Efficiency
- Energy, Work and Efficiency
- Manufacturing Facilities
- Mass and Volume Flow Rate
- Material Conversion
- Mechanical Units

Gears

- Adjustable Speed Transmission
- Clutches
- Gear Calculations
- Gear Design Factors
- Gear Drives
- Simple and Compound Gears

LIB 3: 06 Inspection, Maintenance and Quality Management

Inspection Technology and Quality Management

- Accuracy
- Calculating Lengths
- Calculation of Clearances and Fits
- Clearances and Fits
- Measurement Tolerances
- Measuring Lengths
- Quality Management

Maintenance

- Diagnostics and Troubleshooting
- Fault Repair
- Maintenance and Accident Prevention
- Maintenance Documentation
- Maintenance Inspection
- Maintenance Principles
- Mechanical Breakdown

LIB 3: 07A Industrial Control Systems

Feedback Control Systems

- Characteristics of an Air Flow Transducer
- Characteristics of an Air Pressure Transducer
- Characteristics of an IC Temperature Sensor
- Characteristics of an NTC Thermistor
- Controller Responses

Engineering

- Effect of Loading on the Potentiometer Output Voltage
- Environmental Measurement
- Light Controlled System
- On/Off Control Systems
- ON/OFF Heater System
- Positional Resistance Transducers
- Proportional Control - Step Input Response

Number Systems

- Hexadecimal and Binary Number Systems

LIB 3: 07B Industrial Control PLCs

Fieldbus Systems

- Introduction to Fieldbus
- Profibus DP

Industrial Network Systems

- HMI Interactions
- HMI Panel Alarms
- HMI Panel Data Logging
- HMI Panel Monitoring and Supervising
- HMI Panel Process Control
- HMI Panel Real-time Data
- HMI Panel Recipes
- HMI Panel Sharing PLC Data
- HMI Panel Trend Analysis
- HMI Panel Trends
- Industrial Network Security
- Industrial Networks
- Introduction to SCADA
- Networking Industrial Control Devices
- PETRA II Fault Finding - Worksheet 1
- PETRA II Fault Finding - Worksheet 2
- PETRA II Fault Finding - Worksheet 3
- PETRA II Fault Finding - Worksheet 4
- PETRA II Fault Finding - Worksheet 5
- PETRA II Fault Finding - Worksheet 6
- PETRA II Fault Finding - Worksheet 7
- PETRA II Fault Finding - Worksheet 8
- PETRA II Plant Control Program (Two PLCs and HMI)
- Smart Sensors

Engineering

PLC Advanced Industrial Control

- Carrying Out Tests on the PETRA II Parts
- Complete PETRA II Control Program
- Configure STEP 7 PLC Tags
- Moving a Part Round the PETRA II
- PETRA II Plant Control Program (Single PLC)
- Programming the PETRA II Carriage
- Programming the PETRA II Transfer Arm

PLC Conveyor System Control

- Analogue Inputs
- Analogue Outputs
- Construction and Function of a PLC
- Counters
- Counting Parts
- Create a New Project
- Create a New STEP 7 Project
- Create a STEP 7 Project
- Enter a Ladder Program
- Enter a STEP 7 Ladder Program
- Flip-Flop Latches
- Global Variables
- Identifying the Requirements
- Introduction to PLCs
- Ladder Programming
- Latches
- Latching an Airlock
- Memory Stores
- Run a Ladder Program
- Run a STEP 7 Ladder Program
- Sequence Control System

PLC Part Sorting Control

- Creating a New Project
- Creating a STEP 7 Project
- Sorting Parts

Programmable Logic Control

- Basic Structure of a PLC
- Components of a Sequence Control System
- Connecting a PLC
- Converting Logical Circuit to Functional Plan
- GRAFCET Sequence Control Systems
- PLC Programming
- Programmable Logic Controllers (PLC)
- Programmable Logic Controllers (PLCs)

Electronics

LIB 3: 08 Electronic Systems

Alarm Systems

- Components of Intruder and Fire Alarms
- Installing Intruder Alarms and Fire Alarms

Closed Loop Control

- An Example On/Off Control System
- Automatic Temperature Control
- RC Circuit Responses

Components

- Alternative Components
- Characteristics of Non-Linear Components
- Maintenance Information and Component Selection
- Problem Solving - Identify Electronic Components
- Problem Solving - Recognize and Select Components

Energy and Power

- Extending System Life
- Small Energy Sources

Fault Finding Electronic Systems

- Electronic Systems Maintenance
- Fault Conditions
- Fault Location Techniques
- Faults and Fault Finding Aids
- Problem Solving - Testing and Fault Finding on Electronic Components

Signal Processing

- Analogue Signal Processing
- Electronic Systems
- Inputs, Outputs and Processes
- Measurement of Non-Electrical Quantities

LIB 3: 09 DC Circuits

Capacitor Circuits

- Calculating Total Capacitance
- Capacitance of Capacitors
- Capacitor Discharge Curve
- Capacitor Timing Circuits
- Capacitors
- Capacitors in Series and Parallel
- Charging and Discharging a Capacitor
- Interconnection of Capacitors
- Resistance and the Time Constant

Electronics

Electrical Energy and Power

- Calculating Electrical Power for a Load
- Calculation of Electrical Power
- Electrical Power

Inductor Circuits

- Inductors - Graphs and Equations

Resistance

- Applications of Ohm's Law
- Calculating Resistance Colour Code Values and Tolerance
- Calculating the Resistor Value for an LED Lamp Circuit
- Changing the Resistance in an LED Circuit
- Colour Code and Tolerance
- Electrical Power and Resistor Colour Coding
- Gradient of Linear Voltage-Current Graphs
- Investigating a Characteristic Graph for a Resistive Component
- Investigating Whether Resistors are in Tolerance
- Measuring Resistance
- Non-Linear Resistances
- Relationship between Voltage, Current and Resistance
- Resistance and Conductance
- Resistance and Conductance Reciprocal Calculations
- Resistance Characteristics
- Resistor Characteristics and Applications
- Resistors

Voltage and Current

- Basic Electrical Quantities in Circuits
- Circuit Diagrams
- Electric Current and Safety
- Electrical Principles
- Handling Voltage Calculations
- Introduction to Electric Current
- Measurement in Circuits
- Measuring Current in a Circuit
- Measuring Voltage
- Potential Difference and Voltage

Electronics

LIB 3: 10 Electrical Networks

Internal Resistance

- Internal Resistance
- Internal Resistance of Power Sources

Kirchhoff's Laws

- Calculations using Kirchhoff's First Law
- Calculations using Kirchhoff's Second Law
- Current Behaviour at a Node
- Kirchhoff's First Law
- Kirchhoff's Second Law

Measuring Instruments

- Absolute and Relative Measurement Errors
- Calculating the Extension of the Range of a Voltmeter
- Calculating the Extension of the Range of an Ammeter
- Extending the Range of a Voltmeter
- Handling Measurement Errors
- Measurement of Resistance using a Wheatstone Bridge
- Measurement of Voltage using a Wheatstone Bridge - Method 1
- Measurement of Voltage using a Wheatstone Bridge - Method 2
- Measuring Current and Extending Ammeter Range

Series and Parallel Lamps

- Parallel Circuits
- Series Circuits

Series and Parallel Resistors

- Calculation of Resistors in Parallel
- Calculation of Resistors in Series
- Characteristics of Series and Parallel Connections
- Mathematical Approach to Series and Parallel Circuit Simplification
- Parallel Circuit Calculations
- Parallel Resistor Circuits
- Resistors in Parallel
- Resistors in Series
- Series and Parallel Equivalent Resistance
- Series and Parallel Resistor Combinations
- Series Circuit Calculations

Superposition Principle

- Applying the Superposition Principle

Electronics

LIB 3: 11 AC Circuits

AC Principles

- Alternating Current Equations
- Amplitude and Timebase Settings of an Oscilloscope
- Calculating the Effective Values of Alternating Voltages and Currents
- Effective Values of Alternating Voltages and Currents
- Introduction to Alternating Current
- Measuring with an Oscilloscope
- Peak, Peak-to-Peak and RMS Values
- Period and Frequency

Capacitor Circuits

- Calculations on Capacitive Reactance with Graphical Representation
- Capacitors in AC Circuits
- Graphical Representation and Equations of RC Circuits
- RC Circuits

Inductor Circuits

- Calculations on Inductive Reactance with Graphical Representation
- Graphical Representations and Equations of RL Circuits
- Inductors in AC Circuits
- RL Circuits

RLC Circuits

- Calculating Power in RLC Circuits
- Calculating the Resonant Frequency of an LC Oscillator Circuit
- Graphical Representation and Equations of RLC Circuits
- Graphical Representation of Phase Difference and Power
- LC Oscillator Circuit
- Phase Difference and Power
- Power in RLC Circuits
- RLC Circuits

LIB 3: 12 Magnetism and Electromagnetism

DC Motor

- Characteristics of the DC Motor
- DC Motor Operation
- DC Motor-Generator

Fault Finding Electromagnetic Devices

- Fault Finding Electromagnetic Devices W1
- Fault Finding Electromagnetic Devices W2
- Fault Finding Electromagnetic Devices W3
- Fault Finding Electromagnetic Devices W4

Electronics

Magnetic and Electromagnetic Principles

- Electromagnetic Induction and the Solenoid
- Electromagnetism
- Field Shape and Direction for an Electromagnet
- Field Strength of an Electromagnet
- Hall Effect Sensor
- Magnetic Flux and Flux Density
- Magnetic Flux and Flux Density Calculations
- Magnetic Principles
- Reed Switch and Relay
- Self Inductance of Inductors

Microphones and Speakers

- Microphones and Speakers

LIB 3: 13 Electrical Engineering

Electrical Connections in Buildings

- Bus System
- Components of an Electrical Installation
- Electrical Installation in Residential Buildings
- Light and Lighting
- Planning Lighting Systems

Electrical Safety and Accident Prevention

- American Wire Gauge
- Cables and Wires
- Circuit Breakers
- Consumer Units
- Dangers of Electric Current for Humans
- Dealing with a Victim of an Electric Shock
- Designing for Safety
- Earthing Systems
- Effect of Electric Current on the Human Body
- Electrical Cables
- Grounding
- Ingress Protection and IP Codes
- Lockout and Tagging of Electrical and Mechanical Hazards
- Minimum Safe Cross-Sectional Area of Wires
- Re-Testing to Electrical Standards
- Safeguards against Electric Shock

Equipment Protection

- Line Surge Protection

Generating and Distributing Electric Energy

- Energy Distribution Calculations
- Production, Transmission and Distribution of Electrical Energy

Electronics

LIB 3: 14 Linear Electronics

Amplifiers

- Distortion and Signal Conflicts

Analogue ICs

- Analogue Switches
- IC Sensors

Fault Finding Linear Electronic Circuits

- Fault Finding Linear Electronic Circuits W1
- Fault Finding Linear Electronic Circuits W2
- Fault Finding Linear Electronic Circuits W3
- Fault Finding Linear Electronic Circuits W4
- Fault Finding Operational Amplifier Circuits W1
- Fault Finding Operational Amplifier Circuits W2
- Fault Finding Operational Amplifier Circuits W3
- Fault Finding Operational Amplifier Circuits W4
- Planning a Fault Location Strategy

Operational Amplifier Circuits

- Characteristics of a Differential Amplifier
- Characteristics of DC Amplifiers
- Comparator
- High Frequency Performance of an Operational Amplifier
- Inverting and Non-inverting Operational Amplifier Circuits
- Investigating Inverting Op-amp circuits
- Investigating Non-Inverting Op-amp Circuits
- Operational Amplifier with AC input
- Operational Amplifiers
- Signal Conditioning Amplifiers

Power Supplies

- A DC Power Supply
- Power Supply Filtering

LIB 3: 15 Semiconductors

Diodes

- Diode Characteristics
- Diode Operation
- Diode Rectifier Calculations
- Diode Rectifiers
- Light Emitting Diodes
- PN Junction Theory
- Rectifier Circuits
- Simple Rectifier Circuit

Electronics

Display Devices

- 7-Segment Display and Decoder
- A 7-Segment Display
- Optoelectronic Display Devices

Fault Finding Semiconductor Circuits

- Fault Finding Semiconductor Circuits W1
- Fault Finding Semiconductor Circuits W2
- Fault Finding Semiconductor Circuits W3
- Fault Finding Semiconductor Circuits W4
- Fault Finding Transistor Amplifiers W1
- Fault Finding Transistor Amplifiers W2
- Fault Finding Transistor Amplifiers W3
- Fault Finding Transistor Amplifiers W4

Integrated Circuits

- Integrated Circuit Packages

Optical Sensors

- Charge-Coupled Devices (CCD)

SCRs

- Characteristics of Thyristors
- Diacs and Triacs

Transistor Amplifiers

- Class A Transistor Amplifier
- Class B and AB Transistor Amplifiers
- Class C Transistor Amplifier
- Classes of Transistor Amplifiers
- Effects of Feedback in a Transistor Amplifier Circuit
- Gain, Loss and Noise

Transistors

- Analysing Transistor Characteristics
- Bipolar Transistor Characteristics
- Comparison of Electronic and Electromechanical Switches
- Field Effect Transistor Amplifier
- Field Effect Transistor Operation
- PNP Transistor Switch

LIB 3: 16 Power Electronics

Contactors

- Construction of a Contactor
- Controlling Contactors
- Current Flow in Latching Circuits
- Latching in Contactor Circuits
- Selection of Contactors

Electronics

Energy and Power

- Efficiency Formulas for Electric Motors
- Efficiency of Electric Motors

Frequency Converters

- Commissioning of Frequency Converters
- Connecting a Frequency Converter
- Construction and Function of Frequency Converters
- EMC
- Frequency Converter Parameters
- Frequency Filters

Motor Protection

- Interlock Systems
- Motor Drive Protection Circuit
- Motor Installations and Safety
- Motor Protection

Motors and Motor Control

- Analog Interfacing
- Characteristics of a DC Permanent Magnet Motor
- Characteristics of a DC Solenoid
- Characteristics of an Air Valve
- Characteristics of an Induction Motor
- Connecting a Motor
- Derivative Control Ramp Response
- Digital Control
- Integral Control Step Response
- Linear and Rotational Motion
- Motor Drive Connection Components
- Motor Starting and Speed Control
- PID Control Step Response
- Proportional Position Control
- Proportional Speed Control

Three-phase AC

- Delta Calculations
- Delta Connection
- Generation of Three-phase AC
- Representation of Three-phase AC

LIB 3: 17 Digital Electronics

Combinational Logic

- Basic Logic Functions and Their Algebra
- Boolean Algebra
- Boolean Algebra and De Morgan's Theorems
- Building EXOR Gates from Other Gates

Electronics

- Characteristics of a Schmitt Inverter Gate
- Characteristics of the EX-OR and EX-NOR Circuit
- Circuits involving Combinational Logic
- Combinational Logic
- Equivalent Logic Circuits
- Karnaugh Maps
- Logic Families
- Logic Gates

Digital Systems

- Analogue to Digital Conversion
- BCD UP/DOWN Counters and 7-Segment Decoder/Driver/Displays - Exercise 2.2
- Binary Counters and 7-Segment Displays
- Binary-Coded Decimal Counters
- Characteristics of an Analog Comparator
- Decoder Operation
- Demultiplexer Operation
- Digital to Analogue Conversion
- Encoder Operation
- Encoder-Decoder System
- Encoders and Decoders
- Glitches in Digital Systems
- Multiplexer Operation
- Multiplexer-Demultiplexer System
- Multiplexers and Demultiplexers
- Race Hazards
- Ramp Generator
- Signal Converters

Fault Finding Digital Circuits

- Calculating Expected Operating Conditions
- Fault Finding A/D and D/A Circuits W1
- Fault Finding A/D and D/A Circuits W2
- Fault Finding A/D and D/A Circuits W3
- Fault Finding A/D and D/A Circuits W4
- Fault Finding Aids
- Fault Finding Aids and Reporting
- Fault Finding Encoding/ Decoding Circuits W1
- Fault Finding Encoding/ Decoding Circuits W2
- Fault Finding Encoding/ Decoding Circuits W3
- Fault Finding Encoding/ Decoding Circuits W4
- Fault Finding Multiplexing/ Demultiplexing Circuits W1
- Fault Finding Multiplexing/ Demultiplexing Circuits W2
- Fault Finding Multiplexing/ Demultiplexing Circuits W3
- Fault Finding Multiplexing/ Demultiplexing Circuits W4
- Faults in Ring Counter Circuits
- Faults in Shift Register Circuits
- Signal Tracing Techniques

Electronics

Interfacing

- Bi-directional Line Drivers
- Industry Standards
- Interfacing in Digital Circuits

Number Systems

- Calculations in Binary
- Conversion Between Number Systems

Sequential Logic

- Asynchronous Counters
- Binary Counters
- Bistable Devices
- Characteristics of a D-Type 2-bit Shift Register
- Characteristics of a D-Type Flip-Flop
- Characteristics of a J-K Flip-Flop
- Counting with Bistables
- D-Type Flip-Flop
- Integrated Circuit Memory
- Shift Registers

Signal Processing

- Digital Signal Processing

LIB 3: 18 Telecommunications

Antennas

- Antenna and Broadband Options
- Installing Antenna and Broadband Connections

Digital Data Transmission

- Digital Data Transmission
- Flow Control

Electronic Communication Principles

- AM Transmission
- Electronic Communication Systems
- Optical Transmission
- Phase Locked Loops
- Simplex and Duplex Transmission

Fault Finding Telecommunication Circuits

- Fault Finding Telecommunication Circuits W1
- Fault Finding Telecommunication Circuits W2

Fiber Optics

- Fiber Optic Cables

Electronics

LIB 3: 19 Microprocessors

Architecture and Operation of a Microprocessor

- Architecture
- Principles of Operation

Developing PIC Programs

- Controlling a Motor
- Debugging Programs
- Full Washing Machine Sequence

Memory

- Embedded Computers and RAM/Flash Memory

Microprocessor System Applications

- Microprocessor System Applications

Number Systems, Instructions and Subroutines

- Instruction Groups
- Number Systems

Program Development

- Designing a Program
- Entering and Running a Program

LIB 3: 20 Circuit Construction and Testing

Automatic Light Circuit

- Building and Testing an Automatic Light Circuit

Baby Alarm

- Building a Baby Alarm

Building Circuits on Printed Circuit Boards

- Building Circuits on PCB
- Constructing the Continuity Tester on PCB

Building on Breadboard

- Breadboarding
- Building the Automatic Light Circuit on Breadboard
- Planning an Automatic Light Circuit on Breadboard

Building on Stripboard

- Building and Testing the Anti-Theft Device
- Building Circuits on Stripboard
- Planning an Anti-Theft Device

Electronics

Diagnosing Fault Conditions

- Fault Rectification

Electronic Problem Solving

- Problem Solving - Construct an Electronic Circuit
- Problem Solving - Plan, Construct and Test an Electronic Circuit
- Problem Solving - Produce an Electronic Circuit Diagram

Flashing Doorbell Circuit

- Building a Flashing Doorbell Circuit
- Flashing Doorbell Circuit

Freezer Temperature Warning Circuit

- Building the Freezer Temperature Warning Circuit on Breadboard

Improved Automatic Light Circuit

- Building and Testing an Improved Automatic Light Circuit

Intruder Alarm

- Intruder Alarm Circuit
- Latched Buzzer Circuit
- Simulated Latched Buzzer Circuit

Lamp Circuit

- Simple Lamp Circuit

LED Lamp Circuit

- Building an LED Lamp Circuit

Polarity Tester

- Building and Testing a Polarity Tester

Power Supplies

- A Simple AC to DC Converter
- AC to DC Concepts and Principles
- Circuit Breakers and Fuses

Road Crossing Controller

- Road Crossing Controller

Safety and Accident Prevention

- Risk Assessment of Electrical Dangers
- Safe Working Practices

Simulators

- Computer Based Design and Testing

Electronics

LIB 3: 21 Electronic Principles (D3000 Practice)

AC Principles

- Alternating Supply with Pure Resistance Loading
- Alternating Supply with Pure Resistance Loading - Exercise 2.1
- Alternating Supply with Pure Resistance Loading - Worksheet 1
- Ground Return Currents - Exercise 11.3
- Resistances in Parallel - Exercise 2.4
- Resistances in Series - Exercise 2.3
- Sinusoidal Alternating Waveforms - Exercise 1.1
- Sinusoidal Alternating Waveforms Peak and RMS Values - Exercise 1.2

Capacitor Circuits

- AC Supply with Pure Capacitive Loading - Exercise 4.1
- AC Supply with Pure Capacitive Loading - Worksheet 2
- Capacitor AC Voltage Divider Circuit - Exercise 4.5
- Capacitors in Parallel on an AC Supply - Exercise 4.3
- Capacitors in Series on an AC Supply - Exercise 4.4
- Resistance-Capacitance Circuits on AC Supplies - Parallel - Exercise 6.2
- Resistance-Capacitance Circuits on AC Supplies - Series - Exercise 6.1

Electrical Energy and Power

- Power Dissipated in a Lamp Circuit - Exercise 9.2
- Power in a Resistor - Exercise 3.1
- Power in a Resistor - Worksheet 1

Electrical Networks

- AC Applied to a Resistance Bridge - Exercise 6.2
- Characteristics of a Combined DC and AC Supply - Exercise 3.2
- Characteristics of a Dual Voltage DC Supply - Exercise 3.1
- Circuit Solution using Thevenin's and Norton's Theorems - Exercise 4.1
- DC and AC Bridges - Worksheet W7
- DC and AC Bridges - Worksheet W8
- Dual Voltage DC and Combined AC/DC Supplies - Worksheet W2
- Dual Voltage DC and Combined AC/DC Supplies - Worksheet W3
- Internal Resistance of a DC Source - Exercise 1.1
- Internal Resistance of an AC Source - Exercise 1.2
- Power Transfer to a Load from a DC Source - Exercise 2.1
- Power Transfer to a Resistive Load from an AC Source - Exercise 2.2
- Resistors Connected in Parallel - Exercise 6.1
- Resistors Connected in Series - Exercise 5.1
- Series-Parallel Circuit Exercise - Exercise 10.1
- Series-Parallel Circuit Exercise - Worksheet 10
- Series-Parallel Circuit Exercise - Worksheet 9
- Series-Parallel Connected Circuits - Exercise 7.1
- Series-Parallel Connected Circuits - Worksheet 4
- Series-Parallel Connected Circuits - Worksheet 5
- Series-Parallel Connected Circuits - Worksheet 6

Electronics

Electromagnetic Devices

- Back EMF - Exercise 8.2
- Core Materials - Exercise 1.2
- Current Ratio - Exercise 5.3
- Direction of Current - Exercise 6.2
- Economy Resistor Value - Exercise 7.3
- Effect of Core Material on Inductance - Exercise 4.2
- Effect of Frequency on Coil Impedance - Exercise 4.4
- Effect of the Number of Turns on Inductance - Exercise 4.3
- Electromagnet - Exercise 2.1
- Electromagnets - Worksheet W1
- Energizing the Solenoid - Exercise 6.1
- Examination of Permanent Magnets - Exercise 1.1
- Familiarization with the Hall Effect Probe - Exercise 1.4
- Force on a Conductor and the Motor Principle - Worksheet W7
- Force on a Conductor and the Motor Principle - Worksheet W8
- Frequency Response of Core Materials - Exercise 5.2
- Full-Step Sequence - Exercise 9.1
- Half-Step Sequence - Exercise 9.2
- Hold-on Contacts - Exercise 7.2
- Impedance of the Coil at Low Frequency - Exercise 4.5
- Induced EMF - Exercise 3.1
- Magnetic Field - Exercise 1.3
- Magnetic Field Plot - Exercise 2.3
- Magnetomotive Force - Exercise 2.2
- Motor Used as a DC Generator - Exercise 8.3
- Mutual Inductance - Exercise 5.1
- Reactance - Exercise 4.1
- Relay - Worksheet W4
- Relay - Worksheet W5
- Relay - Worksheet W6
- Self-Inductance - Exercise 3.2
- Simple DC Motor - Exercise 8.1
- Simple Relay Operation - Exercise 7.1
- Solenoid - Worksheet W3

Inductor Circuits

- AC Supply with Pure Inductive Loading - Exercise 5.1
- AC Supply with Pure Inductive Loading - Worksheet 3
- AC Supply with Pure Inductive Loading - Worksheet 4
- Inductance with Square Wave and Sinusoidal Voltage Input - Exercise 3.2
- Inductors in Parallel on an AC Supply - Exercise 5.3
- Inductors in Series on an AC Supply - Exercise 5.2
- Resistance - Inductance Parallel Circuits on an AC Supply - Exercise 7.2
- Resistance-Inductance Circuits on AC Supplies - Series - Exercise 7.1
- Resistance-Inductance Circuits on AC Supplies - Worksheet 5
- Resistance-Inductance Circuits on AC Supplies - Worksheet 6
- Resistance-Inductance Filters - Exercise 9.2

Electronics

Resistance

- Controlling a Lamp with a Variable Resistor - Exercise 9.1
- Controlling a Lamp with a Variable Resistor - Worksheet 7
- Controlling a Lamp with a Variable Resistor - Worksheet 8
- Ohm's Law - Exercise 2.1
- Resistance Measurement using a Wheatstone Bridge - Exercise 11.1
- Resistance Measurement using a Wheatstone Bridge - Worksheet 11
- Resistance Measurement using a Wheatstone Bridge - Worksheet 12
- Resistor Colour Coding for Low Power Resistors - Exercise 4.1
- Resistor Colour Coding for Low Power Resistors - Worksheet 2
- Resistor Colour Coding for Low Power Resistors - Worksheet 3

RLC Circuits

- Capacitance and Inductance fed from Square and Sinusoidal Inputs - Exercise 3.1
- Inductance-Capacitance Parallel Circuit on an AC Supply - Exercise 8.2
- Inductance-Capacitance Parallel Circuit on an AC Supply - Exercise 8.3
- Resistance-Inductance and Resistance-Capacitance Filter Circuits - Exercise 9.1
- Resistance-Inductance and Resistance-Capacitance Filter Circuits - Worksheet 10
- Resistance-Inductance-Capacitance Circuits on AC Supplies - Exercise 8.1
- RLC Circuits on AC Supplies - Worksheet 7
- RLC Circuits on AC Supplies - Worksheet 8
- RLC Circuits on AC Supplies - Worksheet 9

Transformer

- Application of Transformers to Impedance Matching - Exercise 10.3

LIB 3: 22 Linear Electronics (D3000 Practice)

Comparator Circuits

- Difference Amplifier - Worksheet W10
- Schmitt Trigger - Exercise 9.1
- Schmitt Trigger with Alternating Input - Exercise 9.2

Difference Amplifier

- Difference Amplifier - Worksheet W8
- Difference Amplifier - Worksheet W9
- Differential Mode - Exercise 8.3
- Inverting Mode - Exercise 8.1
- Non-Inverting Mode - Exercise 8.2

Integrator

- DC Input - Exercise 5.1
- Integrator - Worksheet W3

Electronics

Inverting Amplifier

- Gain and Saturation - Exercise 3.3
- Inverting Amplifier - Alternating Input - Worksheet W2
- Inverting Amplifier Gain and Bandwidth - Exercise 4.2
- Inverting Amplifier with Sinusoidal Input - Exercise 4.1

Non-Inverting Amplifier

- Alternating Signal Input - Exercise 6.2
- Direct Voltage Input and Offset Null Control - Exercise 6.1
- Non-Inverting Amplifier - Worksheet W4
- Non-Inverting Amplifier - Worksheet W5

Operational Amplifier

- Basic Operational Amplifier - Worksheet W1
- Closed-Loop Amplifier - Exercise 1.3
- Comparator - Exercise 1.2
- Referenced Comparator - Exercise 2.2

Oscillators

- LC Oscillator - Exercise 1.1
- RC Ladder Oscillator - Exercise 1.2

RC Filters

- High-Pass Filter - Exercise 2.2
- Low-Pass Filter - Exercise 2.1
- Simple RC Filters - Worksheet W1
- Simple RC Filters - Worksheet W2

Rectification

- Effect of Varying Load - Exercise 1.2
- Simple DC Power Supply - Exercise 1.1

Summing Amplifier

- Scaling - Exercise 7.2

LIB 3: 23 Semiconductors (D3000 Practice)

Diodes

- Bridge Rectifier - Exercise 3.1
- Bridge Rectifier - Worksheet 4
- Diode Forward Characteristic - Exercise 1.1
- Diode Reverse Characteristic - Exercise 1.2
- Effect of Reservoir Capacitor - Exercise 3.2
- Half-Wave Rectifier - Exercise 2.1
- Half-Wave Rectifier - Worksheet 3
- Negative Power Supply - Exercise 2.3
- P-N Junction Diode - Worksheet 1
- P-N Junction Diode - Worksheet 2
- Reservoir Capacitor - Exercise 2.2

Electronics

Display Devices

- Bar Graph Display - Exercise 2.1
- Display Devices - Worksheet W2
- Liquid Crystal (Seven Segment) Display - Exercise 2.2

Transistor Amplifiers

- Alternating Signal Applied - Exercise 8.2
- Alternating Signal Drive - Exercise 2.2
- Alternating Signal Drive - Exercise 4.2
- Alternating Signal Drive - Exercise 5.3
- Alternating Signal Drive - Exercise 7.3
- Alternating Signal Drive - Worksheet W7
- Analog Switch with Direct Voltage Applied - Exercise 8.1
- Base Potential Divider Biasing and Stabilizing - Exercise 1.4
- Base Potential Divider Stabilized Amplifier - Exercise 7.2
- Bias Stability - Exercise 7.2
- Bias Stabilization - Worksheet 7
- Bias Stabilization - Worksheet 8
- Channel and Junction Resistances - Exercise 6.1
- Collector Feedback Biasing and Stabilizing - Exercise 1.3
- Collector Feedback Stabilization - Exercise 7.1
- Common Collector Amplifier (Emitter Follower) - Exercise 8.1
- Complementary PNP/NPN Pair - Worksheet W2
- Constant Current Sink - Worksheet W3
- Darlington Pair Emitter Follower - Worksheet W1
- DC and Quiescent Conditions - Exercise 4.1
- DC Transfer Characteristic - Exercise 5.2
- Differential Amplifier - Worksheet W4
- Directly Coupled (DC) Amplifier - Worksheet W5
- Directly Coupled (DC) Amplifier - Worksheet W6
- Emitter Decoupling Capacitor - Exercise 7.3
- Fault Diagnosis - Preparatory Investigation 1
- Fault Diagnosis - Preparatory Investigation 2
- Frequency Response of a Two-Stage Amplifier - Exercise 9.2
- JFET Characteristics - Exercise 6.2
- JFET Common Source Amplifier - Worksheet W8
- JFET Common Source Amplifier - Worksheet W9
- Need for Bias - Exercise 6.2
- Output Characteristic - Exercise 3.2
- PNP Common Emitter Amplifier - Exercise 8.2
- Quiescent Conditions - Exercise 3.1
- Quiescent Conditions - Exercise 5.1
- Quiescent Conditions - Exercise 7.1
- Quiescent Conditions and DC Drive - Exercise 2.1
- Quiescent Voltages and Currents - Exercise 1.1
- Signal Operation - Exercise 1.2

Transistors

- Regenerative Switch - Exercise 10.2

Electronics

LIB 3: 24 Power Electronics (D3000 Practice)

AC Motors

- AC Motor Principles, and the Three-Phase Synchronous Motor - Exercise 6.1
- AC Motor Principles, and the Three-Phase Synchronous Motor - Worksheet 6
- Capacitor Offset - Exercise 7.2
- Delta Connection of a 3-Phase Synchronous Motor to Wye Supply - Exercise 6.3
- Other AC Motors - Exercise 9.1
- Power Factor Correction - Exercise 8.1
- Power Factor Correction - Worksheet 8
- Single-Phase Synchronous Motor - Exercise 7.1
- Single-Phase Synchronous Motor - Worksheet 7

Power Transistors

- Audio Amplifier - Power Output - Exercise 4.2
- Audio Amplifier - Waveforms - Exercise 4.1
- Audio Power Amplifier - Worksheet W5
- Audio Power Amplifier - Worksheet W6
- Comparison of FET to BJT - Exercise 5.2
- Controlling a Lamp - Exercise 1.1
- Current Booster - Alternating Drive - Exercise 3.2
- Current Booster - DC Drive - Exercise 3.1
- Current Booster - Worksheet W4
- Duty Cycle Controller - Worksheet W3
- Duty Cycle/Load Power - Exercise 2.2
- MOSFET Characteristics - Exercise 5.1
- Power Dissipated in the Transistor - Exercise 1.2
- Power MOSFET - Worksheet W7
- Power Transistor - Worksheet W1
- Power Transistor - Worksheet W2

SCR Bridge Circuits

- Commutating Effects of Load on a Bridge Circuit - Exercise 2.6
- Effect of a Commutating Diode on a Half Controlled SCR Bridge Circuit - Ex 2.7
- Fully Controlled SCR Bridge with Capacitive/Resistive Load - Exercise 2.5
- Fully Controlled SCR Bridge with Inductive/Resistive Load - Exercise 2.4
- Fully Controlled SCR Bridge with Resistive Load - Exercise 2.2
- Half Controlled SCR Bridge with Resistive Load - Exercise 2.3
- SCR Bridge Circuits - Worksheet W2

SCR, Diac, Triac and UJT

- Controlled Angle Firing of a Thyristor - Exercise 7.2
- Lamp Dimmer - Exercise 9.2
- Optocoupler - Exercise 8.2
- Pulse Transformer - Exercise 8.1
- Silicon Controlled Rectifier - Worksheet W8

Electronics

Single and Bi-phase Control

- Effect of Differing Loads on a Full-wave Bi-phase Rectification Circuit - Ex 1.5
- Effect of Differing Loads on an SCR Circuit - Exercise 1.3
- Full-wave Bi-phase Rectification Power Limiting Control - Exercise 1.4
- Operation of an SCR Firing Circuit - Exercise 1.2
- Single and Bi-phase Control - Worksheet W1

Three-Phase Rectifiers and Inverters

- Dual-Polarity Supplies - Exercise 10.4
- Full-Wave Rectifier - Exercise 10.3
- Half-Wave Rectifier - Exercise 10.1
- Negative DC Supply - Exercise 10.2
- Over-Current Protection - Exercise 11.2

Three-Phase Supplies

- 3-Wire Connection of a 3-Phase Supply (Delta/Delta Connection) - Ex. 2.2
- 3-Wire Connection of a 3-Phase Supply (Delta/Delta Connection) - Exercise 2.2
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Exercise 2.1
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Worksheet 1
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Worksheet 2
- Delta/Wye Connection - Exercise 3.1
- Delta/Wye Connection - Worksheet 3

LIB 3: 25 Digital Electronics (D3000 Practice)

Combinational Logic

- Characteristics of a Schmitt Inverter Gate - Exercise 9.1
- Characteristics of the EX-OR and EX-NOR Circuit - Exercise 1.1
- Characteristics of the Half Adder Circuit - Exercise 1.2
- Characteristics of the Wired-AND Circuit - Exercise 10.1
- Characteristics of the Wired-NOR Circuit - Exercise 10.2
- Diode AND and OR Gate Characteristics - Exercise 3.1
- Diode Logic - Worksheet 4
- Diode-Transistor Logic (DTL) - Worksheet 5
- Diode-Transistor Logic (DTL) - Worksheet 6
- Diode-Transistor Logic Gate Characteristics - Exercise 4.2
- Equivalent Logic Circuits 1 - Exercise 6.1
- Equivalent Logic Circuits 2 - Exercise 6.2
- Equivalent Logic Circuits 3 - Exercise 6.3
- EX-OR and EX-NOR Gates - Worksheet 1
- EX-OR and EX-NOR Gates - Worksheet 2
- EX-OR and EX-NOR Gates - Worksheet 3
- EX-OR and EX-NOR Gates - Worksheet 4
- Four-Variable Karnaugh Maps - Exercise 7.3
- Karnaugh Maps - Exercise 7.1
- Open Collector Gates - Worksheet 10
- Open Collector Gates - Worksheet 9
- Series and Parallel Connection of Switches - Exercise 2.1

Electronics

Digital Systems

- 2-bit Equal-Input Magnitude Comparator Circuit - Exercise 5.1
- Binary/BCD Counters and 7-Segment Decoder/Driver/Displays - Exercise 2.1
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 6
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 7
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 8
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 9
- Characteristics of a 1 to 1-of-4-line Demultiplexer Circuit - Exercise 3.2
- Characteristics of a 2-1 Multiplexer Using Three State Logic - Exercise 7.2
- Characteristics of a 2-4 Line Decoder Circuit - Exercise 2.2
- Characteristics of a 4-2 Line Encoder Circuit - Exercise 2.1
- Characteristics of a 4-bit Magnitude Comparator IC - Exercise 5.3
- Characteristics of a 4-input Multiplexer Circuit - Exercise 3.1
- Characteristics of a 4-input Priority Encoder Circuit - Exercise 4.1
- Characteristics of a Frequency Counter System - Exercise 5.2
- Characteristics of a Monostable IC (74LS123) - Exercise 1.4
- Characteristics of a Multiplexer/Demultiplexer Circuit - Exercise 3.3
- Characteristics of a Single-Bit Magnitude Comparator Circuit - Exercise 5.2
- Characteristics of a Three State Logic Bi-Directional Switch - Exercise 7.3
- Characteristics of a Three State Logic Circuit - Exercise 7.1
- Characteristics of a Timer/Counter System - Exercise 5.3
- Characteristics of a Triangular Waveform Generator System - Exercise 5.4
- Characteristics of an Analog Comparator IC (311) - Exercise 3.1
- Characteristics of an Analog Integrator IC (3140) - Exercise 3.2
- Characteristics of an Analog Switch IC (211) - Exercise 1.1
- Characteristics of an Analog Switch, S - R Bistable System - Exercise 1.5
- Characteristics of an Astable IC (4047) - Exercise 1.3
- Characteristics of an Incremental A-D Converter System - Exercise 4.2
- Characteristics of an S - R Latch IC (74LS00) - Exercise 1.2
- D-A Converter IC and an A-D Converter Circuit - Worksheet 11
- Determination of a 4-Bit Code Using a Magnitude Comparator - Exercise 5.4
- Encoder and Decoder Circuits - Worksheet 5
- Encoder and Decoder Circuits - Worksheet 6
- Encoder and Decoder Circuits - Worksheet 7
- Fault Diagnosis - Triangle Waveform Generator Circuit - Worksheet 12
- Full Adder Circuits - Exercise 6.1
- Full Adder Circuits - Exercise 6.2
- Full Adder Circuits - Worksheet 13
- Magnitude Comparator Circuits - Worksheet 12
- Multiplexer and Demultiplexer Circuits - Worksheet 8
- Multiplexer and Demultiplexer Circuits - Worksheet 9
- Priority Encoder Circuits - Worksheet 10
- Priority Encoder Circuits - Worksheet 11
- Signal Converters - Exercise 4.1

Interfacing

- CMOS Input and Output Characteristics - Exercise 8.2

Electronics

Number Systems

- Number Systems - Measurement of Voltage Levels - Exercise 1.1
- Number Systems - Worksheet 1
- Number Systems - Worksheet 2

Sequential Logic

- Binary Counters - Exercise 5.1
- Binary Counters - Worksheet 11
- Binary Counters - Worksheet 12
- Characteristics of a Binary Up Counter with Reduced Count - Exercise 5.3
- Characteristics of a Binary Up Counter with Reduced Count 2 - Exercise 5.4
- Characteristics of a D-Type 2-bit Shift Register - Exercise 4.1
- Characteristics of a D-Type Flip-Flop - Exercise 2.1
- Characteristics of a D-Type with D Connected to Q - Exercise 2.2
- Characteristics of a J-K 4-bit Binary Counter - Exercise 5.2
- Characteristics of a J-K 4-bit Shift Register - Exercise 4.2
- Characteristics of a J-K Flip-Flop - Exercise 3.1
- Characteristics of a J-K Flip-Flop Connected as a D-Type - Exercise 3.2
- Characteristics of a J-K Flip-Flop Connected as a T-Type - Exercise 3.3
- Characteristics of a NAND Gate S-R Latch - Exercise 1.1
- Characteristics of an S-R Latch IC - Exercise 1.2

LIB 3: 26 Microprocessors (D3000 Practice)

Developing PIC Programs

- Analog to Digital Conversion - Exercise 15
- Digital to Analog Conversion - Exercise 16
- EEPROM Programming - Exercise 14
- Interrupts - Exercise 10
- Keyboard Scanning - Exercise 12
- Logic Systems - Exercise 8
- Simple Closed Loop Process Control - Exercise 17

Programming Applications

- Basic Input/Output - Exercise 7
- Program Development - Exercise 6

The PIC Development System

- Interfacing - Exercise 5
- PIC Software - Exercise 4

The PIC Microcontroller

- Microprocessors, Microcomputers and Microcontrollers - Exercise 1
- Number Systems - Exercise 3
- Overview of PIC Microcontrollers - Exercise 2

Electronics

LIB 3: 27 Avionics (D3000 Practice)

Single Engine Aircraft Battery Power System

- Electronics/Avionics Busbar Isolation - Exercise 2.2
- Power Distribution - Exercise 2.1
- Single Engine Aircraft Electrical Systems - Worksheet W1
- Single Engine Aircraft Electrical Systems - Worksheet W2
- Single Engine Power Distribution Systems - Worksheet W3
- Single Engine Power Distribution Systems - Worksheet W4

Single Engine Aircraft Fuel Flow Measurement

- Fuel Measurement Using a Tank Resistor - Exercise 7.1
- Fuel Quantity and Fuel Flow Measurement - Worksheet W10
- Fuel Quantity and Fuel Flow Measurement - Worksheet W9
- Optical Rotor Fuel Flow Measurement and Digital Display - Exercise 7.2

Single Engine Aircraft Fuel Quantity Measurement

- Fuel Measurement Using a Capacitor Bridge - Exercise 6.1
- Fuel Measurement Using a Capacitor Bridge, Displayed Digitally - Exercise 6.2
- Fuel Quantity Measurement Using a Capacitor Bridge - Worksheet W8

Single Engine Aircraft Power Consuming Circuits

- Early Internal Lighting Systems - Exercise 5.1
- Electrical Landing Gear Control and Indication Systems - Exercise 7.2
- Flap Control Systems - Exercise 8.1
- Flap Control Systems - Worksheet W13
- Hydraulic Landing Gear Control and Indication Systems - Exercise 7.1
- Landing Gear Control and Indication Systems - Worksheet W12
- Landing, Taxi and Anti-Collision Lights - Exercise 6.3
- Single Engine Auxiliary Power Supply Systems - Exercise 3.2
- Single Engine External Lighting Systems - Worksheet W10
- Single Engine External Lighting Systems - Worksheet W11
- Single Engine Internal Lighting Systems - Worksheet W9

Single Engine Aircraft Power Generation System

- A Typical 1979 Alternator System - Exercise 4.2
- A Typical Alternator System From 1963 To 1968/69 - Exercise 4.1
- Cessna Single Engine Electrical Power Systems - Worksheet W7
- Cessna Single Engine Electrical Power Systems - Worksheet W8
- Single Engine Power Supply Systems - Worksheet W5
- Single Engine Power Supply Systems - Worksheet W6

Single Engine Aircraft Stall Warning Systems

- A Stall Warning System using a Vane Switch - Exercise 1.1
- Single Engine Aircraft Stall Warning Systems - Worksheet W1

Electronics

Single Engine Aircraft Take-Off Warning Systems

- Basic Logic Gates - Exercise 2.1

Single Engine Aircraft Temperature Measurement

- Nickel Wire Sensor Temperature Systems - Worksheet W4
- Nickel Wire Sensor Temperature Systems - Worksheet W5
- Nickel Wire Temp Sensor - Ratiometer and Analog Display - Exercise 4.3
- Nickel Wire Temp Sensor - Wheatstone Bridge and Analog Display - Exercise 4.1
- Nickel Wire Temp Sensor - Wheatstone Bridge and Digital Display - Exercise 4.2

LIB 3: 28 Electronic Systems (Series 9 Practice)

Components

- Amplifier and Loudspeaker
- Applying Power to a Device
- DC Operated Buzzer
- Light Dependent Resistor - LDR
- Logic Source Switches
- Output Driver
- Relay
- Seven Segment Display (Digital Signals)

Signal Processing

- Analog Signals
- Automatic Light Switch System
- Combined Analog/Digital Signals
- Creating a Reference Voltage
- Digital Signals
- Fire Detector (Sprinkler) System
- Latching Switch System
- Lighting/Temperature Failure Warning System
- Sensor Voltage Divider

LIB 3: 29 Electronic Principles (Series 9 Practice)

AC Circuits

- Alternating Current - AC
- Alternating Voltage Values
- Capacitor on an AC Supply
- Capacitors in Parallel
- Capacitors in Series
- Capacitors with AC Applied
- Inductors with AC Applied
- Plotting Frequency Responses of RC and RL Circuits
- Capacitor Charge Time
- Capacitor on a DC Supply
- CR Integrator

Electronics

- Investigation of a Wheatstone Bridge
- Kirchhoff's Current Law
- Kirchhoff's Voltage Law
- Other Ways to Calculate Power
- Resistor Measurements
- Series-Parallel Combinations

Magnetism and Electromagnetism

- Attraction and Repulsion
- Electromagnet Field Plot
- Electromagnetic Induction
- Investigating Change-Over and Latching Circuits
- Investigation of a Basic Transformer
- Other Magnetic Materials

LIB 3: 30 Linear Electronics (Series 9 Practice)

Current Amplifier Circuits

- Improving the performance of Push-pull Amplifier (1)
- Improving the performance of Push-pull Amplifier (2)
- Measuring Power in Single-ended and Push-pull Amplifiers
- Operation of a Current Amplifier

Operational Amplifier Circuits

- AC Comparator
- Feedback Amplifier
- Gain-Bandwidth Product in Practice
- Investigation of an Integrator
- Non-Inverting Amplifier
- Regenerative Comparator Under AC Conditions
- Regenerative Comparator Under DC Conditions
- Slew Rate Limitation of an Amplifier

LIB 3: 31 Semiconductors (Series 9 Practice)

Diodes

- Half-Wave Rectifier

SCRs

- Capacitor Commutation
- CR Phase Shift Control Circuit
- DC Control of an SCR with AC Applied
- Silicon Controlled Rectifier - SCR

Transistor Amplifiers

- Common Collector Amplifier - Emitter Follower
- Differential Amplifier Under AC Conditions
- Differential Amplifier Under DC Conditions

Electronics

- Elimination of Crossover Distortion
- Emitter Decoupling Capacitor
- Emitter Follower Circuits
- Investigation of the Amplifier with an Applied Signal
- JFET Common Source Amplifier Investigation
- Loading a Voltage Divider
- Measurement of Quiescent Voltages
- Simple Current Biasing

Transistors

- Current Gain Characteristic
- Darlington Pair Switch Circuit
- Investigation of an N-channel JFET
- NPN Transistor Switch
- Output Characteristic
- Regenerative NPN/PNP Switch

LIB 3: 32 Digital Electronics (Series 9 Practice)

Combinational Logic

- AND Gate From NAND Gates
- Boolean Expressions From Logic Circuits
- Combinational Logic Circuits
- Diode Logic
- Diode Transistor Logic (DTL)
- Logic Gate Switches
- NOR Gate From NAND Gates
- NOT Gate From a NAND Gate
- Operation of the Schmitt NOT Gate
- OR Gate From NAND Gates

Digital Systems

- 1-4 Line Demultiplexer
- 2-1 Multiplexer
- 2-4 Line Decoder
- 4-1 Line Multiplexer
- 4-2 Line Encoder
- 4-Bit Binary Full Adder
- 4-Bit Magnitude Comparator
- Analog Switch
- Analog to Digital Converter
- Astable IC Circuit
- BCD Counter and 7-Segment Decoder
- Bi-Directional Switch
- Digital to Analog Converter
- Encoder-Decoder Circuit
- Full Adder
- Half Adder
- Monostable IC Circuit

Electronics

- Multiplexer-Demultiplexer Circuit
- Seven-Segment Display

Number Systems

- Practical Investigation of Number Systems

Sequential Logic

- 3-Bit Down-Counter
- 3-Bit Up-Counter
- Binary Counter IC
- D-Type (Data) Flip-Flop
- Modulo-N Counter

LIB 3: 33 Microprocessors (Series 9 Practice)

Developing PIC Programs

- Defining Device Type and Clock Speed
- Introduction to Interrupts
- Loops and Conditional Branching
- Programming Fundamentals

PIC Microcontroller

- Arithmetic and Logic Operations
- Commands to set up an Interrupt on Portb
- Creating Delays

The PIC Development System

- Introduction to the PIC Basic Software
- Introduction to the PICShell Software
- Introduction to the Software and Hardware

The PIC Microcontroller

- Features of a PIC
- Introduction to PICs

Automotive

LIB 3: 34 Engine Repair

Cylinder Head and Valve Trains

- Camshafts and Valve Lifters
- Components of the Top End
- Engine Cycles, Valve and Ignition Timing

Engine Block

- Bottom End Component Identification
- CI Engine Size
- Components of the Bottom End
- Crankshaft and Piston Operation
- Engine Blocks and Liners
- Engine Size
- Pistons
- Pressure and Volume

Engine Fundamentals

- Common Rail Diesel Engine Component Identification
- Common Rail Diesel Engine Operation
- Four Stroke Cycle
- Front End Component Identification
- Introduction to Engine Systems
- Position and Mounting of Engine Components
- Sectioned (CI) Engine Component Identification

Engine Servicing

- Adjustment of Valve Clearances on an OHC Engine
- Basic Engine Service Procedures
- Camshaft Timing Verification
- Cooling System Inspection, Test and Repair
- Cylinder Compression Test
- Cylinder Leakage Test
- Cylinder Power Balance Test
- Engine Removal and Replacement
- Inspect and Repair Threads
- Manifold Vacuum Test

Lubrication and Cooling Systems

- Adjusting Drive Belt Tension
- Cooling Systems
- Engine Oil Pressure
- Lubrication System Inspection
- Lubrication Systems

Automotive

LIB 3: 35 Automatic Transmission and Transaxle

Automatic Transmission Components

- Automatic Transmission Gears
- Electrical and Electronic Controls
- Gears and Planetary Gear Sets
- Planetary Gears, Clutches, and Bands

Automatic Transmission Servicing

- Automatic Transmission Diagnostic Checks

Final Drives

- Drivetrain and Driveline
- Front Wheel Final Drive Systems
- Locating Driveline Components
- Rear Wheel Final Drive Systems

Transmission System Fundamentals

- Automatic Transmission Operation
- Automatic Transmission Systems
- Introduction to Automatic Transmissions

LIB 3: 36 Manual Drive Train and Axles

Manual Transmission and Driveline Servicing

- Clutch Removal, Inspection, and Refitting
- Clutch System - Symptoms and Faults
- Drive Shaft Servicing Procedures
- Inspecting FWD Shafts and Joints
- Inspecting the Complete Transmission System of a Vehicle

Manual Transmission Components and Operation

- Clutch Construction and Operation
- Clutch Design
- Differential
- Front Wheel Drive Shafts
- Gears and Speed
- Manual Transaxles
- Manual Transmission Construction
- Rear Wheel Drive Shafts
- Selector Lever and Selector Forks

Manual Transmission System Fundamentals

- Clutch and Manual Transmission Systems
- Gears and Gear Ratios
- Manual Transmission Introduction
- Manual Transmissions

Automotive

LIB 3: 37 Suspension

Inspection and Repair

- Geometry Adjustments
- How to Check Shock Absorbers for Leaks
- Inspect, Remove, and Replace Shock Absorbers
- Leaf Spring Removal, Inspection, and Reinstallation Procedures
- MacPherson Strut Coil Spring Removal and Inspection
- MacPherson Strut Removal, Inspection, and Reinstallation Procedures
- Removal, Inspection and Installation of Coils Springs and Insulators
- Remove, Inspect and Install Ball Joints on Suspension Systems
- Remove, Inspect and Install Stabilizer Bushings, Brackets and Links
- Remove, Inspect, and Install Transverse Links and Strut Rods
- Remove, Inspect, and Install Upper and Lower Control Arms
- Remove, Inspect, Install and Adjust Torsion Bars
- Remove, Inspect, Install, and Adjust Strut Rods and Bushings

Suspension Components and Operation

- Coil Springs
- Control Arms
- Leaf and Rubber Springs
- MacPherson Struts

Suspension System Fundamentals

- Geometry Fundamentals

LIB 3: 38 Steering

Inspection and Repair

- Adjusting Wheel Height
- Adjustment of Steering Box Pre-Load
- Check and Top-Up Power Steering Fluid
- Check Front Cradle (Subframe) Alignment
- Check Power Steering System
- Diagnose Power Steering Problems
- Flushing and Bleeding the Power Steering System
- Rack and Pinion Gear Service
- Remove and Inspect Conventional Steering Components
- Remove, Inspect, and Replace Conventional Steering Components
- Removing Rack and Pinion Steering Gear

Steering System Components and Operation

- Conventional Steering System Components
- Electronic Steering Systems
- Introduction to the Steering and Suspension Trainer
- Power Steering Systems

Automotive

Wheel and Tire Servicing

- Balance Wheel and Tire Assembly
- Caster, Camber, Toe, and Setback Checks and Adjustment
- Check Steering Axis Inclination and Toe-out on Turns
- Measure Wheel, Tire, Axle and Hub Runout
- Perform Prealignment Inspection
- Road Wheel Removal and Installation
- Sealed Wheel Bearing Replacement Procedure

Wheels and Tires

- Road Wheels

LIB 3: 39 Brake Systems

Advanced Brake Systems

- Diagnosing Faults in ESP Systems
- Electronic Brake Systems Introduction

Anti-lock Braking Systems

- ABS Braking Cycle
- ABS ECU Circuits and Signals
- ABS Relay
- ABS Warning Lamp and Diode
- Anti-Lock Brake Systems
- Anti-Lock Brake Trainer
- Brake Fluid Level Switch
- Brake Pedal Switch
- Brake Pedal Travel Sensor
- Hall Effect Sensor Investigation
- Hydraulic Control Unit
- Hydraulic Pump and Motor
- Hydraulic Pump Motor Speed Sensor
- Inductive Sensor Investigation
- Sensors and Switches

Brake System Fundamentals

- Brake Systems 1
- Brake Systems 2
- Friction

Hydraulic Control

- Basic Fluid Power Engineering
- Fluid Power Concepts

Warning Systems

- Brake Fluid Warning System
- Brake Warning Systems

Automotive

LIB 3: 40 Brake Components

Brake System Fundamentals

- Introduction to the Brake Systems Trainer

Disc Brakes

- Brake Callipers
- Brake Pads
- Brake Rotors
- Integral Calliper Parking Brake

Drum Brakes

- Brake Drums
- Brake Shoes
- Parking Brakes

Hydraulic Control

- Basic Control Valves
- Brake Fluid
- Brake Lines and Hoses
- Hydraulics
- Pressure Control Valves

Power Assistance

- Hydraulic Brake Boosters

LIB 3: 41 Brake Servicing

Brake Line Servicing

- Brake Line Fabrication
- Brake Line Inspection
- Fabricating Brake Lines

Brake System Fundamentals

- Braking Calculations
- Braking Forces

Brake System Servicing

- ABS Servicing Procedure
- Bleed Brake System (Manual Bleed)
- Bleeding a Pressurized Anti-lock Braking System
- Brake Pedal Height
- Checking Pedal Heights and Adjusting Push Rod Length
- De-pressurize High-pressure Components of the Anti-lock Brake System
- Flush Brake System
- Master Cylinder Inspection
- Master Cylinder Removal, Bench Bleed, and Reinstall
- Parking Brake Cable Replacement
- Replacing ABS Component Procedure

Automotive

Disc Brake System Servicing

- Brake Calliper Inspection
- Brake Pad Removal and Brake Assembly Inspection
- Brake Pad Replacement
- Brake Pad Wear Indicator Inspection
- Brake Rotor Replacement
- Integral Calliper Parking Brake Service
- Machining a Rotor
- Measuring Brake Rotors

Drum Brake System Servicing

- Adjusting the Parking Brake
- Brake Shoe Replacement
- Drum Brake Removal and Inspection
- Drum Brake Removal, Disassembly and Inspection
- Machining a Drum

LIB 3: 42 Automotive Electrical Fundamentals

Electrical Components and Operation

- Capacitor Types and Applications
- Diode Types and Applications
- Relays
- Sensors
- Signal Processing

Electrical Fundamentals

- Changeover Switches
- Circuit Faults
- Common Ground Circuits
- Common Ground Circuits and Wiring Diagrams
- Continuity
- Continuity and Circuit Faults
- Control Examples
- Control Principles
- Controlling and Protecting Simple Circuits
- Current Flow in a Simple Circuit
- DC and AC Current
- Electrical Circuits
- Electrical Safety and Circuit Checks
- Electricity
- Electromagnetic Principles
- Information Flow
- Introduction to Wiring Diagrams
- Ohm's Law
- Physical Environment to Electrical Transformation
- Power

Automotive

- Pushbutton Switches
- Pushbutton Switches and Switch Circuits
- Resistance
- Resistance and Ohm's Law
- Simple Battery and Lamp Circuit
- Simple Battery, Lamp, and Switch Circuit
- Simple Battery, Lamp, Switch and Fuse Circuit
- Simple Circuits

Electrical Measurement

- Calculating and Adjusting Permitted Voltage Drop
- Electrical Circuit Testing
- Electrical Test Equipment
- Measuring Current
- Reading Wiring Diagrams

Electrical Supply

- Batteries
- Battery and Fuse Circuit Fault Investigation 1
- Battery and Fuse Circuit Fault Investigation 2
- Battery and Fuse Investigation

LIB 3: 43 Automotive Starting and Charging

Charging System Fundamentals

- Alternator Construction
- Charging Principles
- Charging Systems
- Magnetism and Electromagnetism

Charging System Inspection and Test

- Alternator Fault Investigation 1
- Alternator Fault Investigation 2
- Alternator Output Tests
- Alternator Output Waveforms
- Alternator Service Procedure
- Charging System Fault Diagnosis
- Replacing an Alternator and Drive Belt
- Performing Voltage Drop and Current Draw Tests

LIB 3: 44 Automotive Lighting

Hazard Warning Lighting Circuit

- Hazard Warning Circuit
- Hazard Warning Lamps

Automotive

Headlight Circuits

- Automatic Lighting
- Four-Pin Relay Headlamp Circuit
- Headlamp Flash Circuit
- Headlamps
- Headlamps 1
- Headlamps 2
- Headlights
- High Beam Flash Circuit
- Low and High Beam Circuits
- Relay and Spot Lamp Circuit

Internal Lighting Circuits

- Internal Lamp Circuit Investigation
- Internal Lamp Circuits
- Internal Lighting

Lighting Circuit Fault Diagnosis

- Backup Lamp Circuit Fault
- Fault-Finding Example
- Four Pin Relay Headlamp Circuit Problem Solving
- Hazard Warning Circuit Fault
- Headlamp Lighting Fault 1
- Headlamp Lighting Fault 2
- Headlamp Lighting Fault 3
- High Beam Flash Circuit Fault
- Interior Lamp Circuit Fault
- Introduction to Fault-Finding
- Lighting Circuit Fault Investigation 1
- Lighting Circuit Fault Investigation 2
- Lighting Circuit Fault Investigation 3
- Lighting Fault Diagnosis
- Lighting Systems Fault Diagnosis 1
- Lighting Systems Fault Diagnosis 2
- Lighting Systems Fault Diagnosis 3
- Low and High Beam Circuit Fault
- Park and Tail Lamp Circuit Fault
- Park and Tail Lighting Fault
- Park, Tail, and Headlamp Circuit Fault 1
- Park, Tail, and Headlamp Circuit Fault 2
- Park, Tail, and Headlamp Circuit Problem Solving

Lighting Circuit Fundamentals

- Identical Lamps in Parallel
- Identical Lamps in Series
- Lighting Systems
- Non-Identical Lamps in Parallel
- Non-Identical Lamps in Series
- Parallel Lamp Circuits

Automotive

- Power in a Simple Lamp Circuit
- Series Lamp Circuits

Park and Tail Light Circuits

- Park and Tail Lamp Circuits
- Park and Tail Lighting
- Park and Tail Lights
- Park, Tail, and Headlamp Circuits 1
- Park, Tail, and Headlamp Circuits 2

Stop and Backup Light Circuits

- Backup Lamp Circuit Investigation

LIB 3: 45 Automotive Transducers

Transducer Circuits and Components

- Air Flow Sensor
- Coolant Temperature Sensor
- Crankshaft Position Sensor
- Engine Coolant Temperature Sensor
- Intake Air Temperature Sensor
- Mass Airflow Sensor
- Oxygen Sensor
- Performing a Gauge Circuit Test

Transducer Fault Diagnosis

- Fault Investigation 1
- Fault Investigation 2
- Fault Investigation 4

LIB 3: 46 Ignition Systems

Distributor Electronic Ignition Systems

- Hall Effect Electronic Ignition Systems
- Inductive Reluctance Electronic Ignition Systems
- DIS Trainer Crankshaft Sensor
- DIS Trainer Features
- DIS Trainer Operation
- DIS Trainer Temperature Sensor
- DIS Trainer Waveforms
- Distributorless Ignition Systems

Ignition System Diagnosis

- Extremely Rough Idle Problem 1
- Extremely Rough Idle Problem 2
- Lack of Power Problem

Automotive

- No Start Problem 1
- No Start Problem 2
- No Start Problem 3

Ignition System Fundamentals

- Breaker Point Ignition Systems
- Ignition Coil Investigation
- Introduction to Ignition Systems

Ignition System Servicing

- Distributor Testing
- Ignition Secondary Circuit Inspection
- Ignition System Wavepattern Investigation
- Ignition Timing Check and Adjustment
- Inspection and Testing of an Ignition Coil
- Inspection and Testing of the Ignition Primary Circuit

LIB 3: 47 Engine Management and Control

Actuators

- Actuator Components

Engine Inspection

- Coolant Servicing
- Evaporative Emissions Control Systems - Inspection and Test
- Positive Crankcase Ventilation System - Inspection and Test
- Pulse Air Injection System - Inspection and Test
- Retrieval and Clearing of OBD I Trouble codes
- Retrieval and Clearing of OBD II Trouble codes

Engine Management Fault Investigation

- Diesel Engine Fault Diagnosis
- Engine Fault Diagnosis 1
- Engine Fault Diagnosis 10
- Engine Fault Diagnosis 2
- Engine Fault Diagnosis 3
- Engine Fault Diagnosis 4
- Engine Fault Diagnosis 5
- Engine Fault Diagnosis 6
- Engine Fault Diagnosis 7
- Engine Fault Diagnosis 8
- Engine Fault Diagnosis 9
- Engine Management System Fault Diagnosis
- Fault Investigation 5
- Fault Investigation 6

Automotive

Engine Management System Fundamentals

- Air Management in a Diesel Engine
- Decision Making Processes
- Electronic Control Unit
- Engine Management System
- Engine Management System Fundamentals
- Fuel Injection System Decisions
- Ignition System Decisions
- On Board Diagnostics Two (OBDII) Systems

Sensors

- Engine Coolant Temperature
- Engine Sensor Fault Diagnosis 1
- Engine Sensor Fault Diagnosis 2
- Sensor Components
- Sensors and Actuators

LIB 3: 48 Fuel and Emissions

Air Induction Components and Operation

- Air Management
- Idle Air Control Valve
- Sensor Circuits and Components

Diesel Engine Management

- Common Rail Diesel Engine
- Exhaust Management System
- Fuel in a Diesel Engine
- Fuel Injection Management in a Diesel Engine

Emission Control Systems

- Air Injection Systems
- Catalytic Converter
- Exhaust Emission Control Components
- Exhaust Gas Recirculation Systems

Fuel and Emissions System Servicing

- Catalytic Converter Inspection and Efficiency Testing
- Checking the Operation of Solenoid Operated Fuel Injectors
- Cold Enrichment System Inspection and Test
- Early Exhaust Recirculation System - Inspection and Test
- EFI Demonstrator Fault Diagnosis 1
- EFI Demonstrator Fault Diagnosis 10
- EFI Demonstrator Fault Diagnosis 2
- EFI Demonstrator Fault Diagnosis 3
- EFI Demonstrator Fault Diagnosis 4
- EFI Demonstrator Fault Diagnosis 5
- EFI Demonstrator Fault Diagnosis 6

Automotive

- EFI Demonstrator Fault Diagnosis 7
- EFI Demonstrator Fault Diagnosis 8
- EFI Demonstrator Fault Diagnosis 9
- Exhaust Gas Analyser
- Exhaust System Inspection and Testing
- Fuel Filter Inspection
- Fuel Injection System Fault Diagnosis
- Fuel Injector - Inspection, Testing, and Cleaning
- Fuel Pressure on an Electronic Fuel Injection System
- Fuel Pump Inspection & Pressure Testing
- Fuel System Inspection
- Fuel Trim and Exhaust Emissions Monitoring
- Idle Speed and Fuel Mixture Adjustment
- Inspecting and Draining a Fuel System
- Intake Air System Inspection
- Investigation of Exhaust Emission Levels
- Mixture Control Solenoid Duty Cycle Investigation

Fuel Components and Operation

- Actuator Circuits and Components
- EFI Fuel Injector Pulse Frequency
- EFI Fuel Injector Pulse Timing
- EFI Fuel Injector Pulse Width
- EFI Pressurized Fuel Systems
- Electric Fuel Pump
- Electronic Multipoint Fuel Injection Systems
- Fuel Injection Components
- Fuel Injection Fundamentals
- Fuel Injector Pulse Frequency
- Fuel Injector Pulse Timing
- Fuel Injector Pulse Width
- Fuel Injectors
- Introduction to the EFI Demonstrator
- Pressurized Fuel Systems

LIB 3: 49 Electric and Hybrid Vehicle Technology

Electric Vehicles

- Definition of Electric Vehicles
- Electric Motors
- Features of Electric Vehicles
- Fuel Cells
- Range Extenders

Automotive

High Voltage Electric Vehicles

- High Voltage Vehicles
- High Voltage Wiring and Connectors
- Legal Regulations
- Lithium-ion Batteries
- NiMH Batteries
- Principles of Lithium-ion Batteries
- Principles of NiMH Batteries
- Qualifications for Working on High Voltage Vehicles
- Reasons for the Development of High Voltage Vehicles
- Safety in High Voltage Vehicles
- Safety with Batteries

Hybrid and Electric Vehicle Systems

- AC Motors and Generators
- Battery Packs
- Brake Systems
- Cables and Connectors
- Cables, Connectors and Protection Devices
- Disabling Hybrid Vehicle Systems
- Disabling the High Voltage System
- Electronic Circuits and Modules
- Fuel and Emissions
- Hybrid Electric Motors
- Hybrid Engines
- Hybrid Safety Issues and Concerns
- Hybrid Vehicle Trainer Controls
- Introduction to Electrical Storage Devices
- Introduction to Hybrid and Electric Vehicles
- Introduction to the Hybrid Vehicle Trainer
- Lead Acid Batteries
- Nickel Metal Hydride Batteries
- Parallel Hybrid Systems
- Plug-in Electric Vehicles
- Plug-in Hybrid Vehicles
- Practical Series Parallel Hybrid Systems
- Series Hybrid Systems
- Series Parallel Hybrid Systems and Components
- Series Parallel Systems and Components

Hybrid Vehicles

- Classification of Hybrid Vehicles by Engine Arrangement
- Classification of Hybrid Vehicles by Power Source
- Diagnose Equipotential Faults
- Diagnose Insulation Measurement Faults
- Features of Hybrid Vehicles

Automotive

LIB 3: 50 Networked Systems

Networked Systems Data

- CAN Bus Data Processing
- CAN Bus Fault Diagnosis
- CAN Bus Fault Diagnosis - 2
- CAN Bus Fault Diagnosis - 3
- CAN Bus Fault Diagnosis - 4
- CAN Bus Fault Diagnosis - 5
- CAN Bus Fault Diagnosis - 6
- CAN Signal Response

LIB 3: 51 CAN Bus Lighting Systems

Lighting Systems Diagnosis

- CAN Bus Lighting Control Fault 1
- CAN Bus Lighting Control Fault 2
- CAN Bus Lighting Fault 1
- CAN Bus Lighting Fault 2
- CAN Bus Lighting Fault 3
- CAN Bus Lighting Fault 4
- CAN Bus Lighting Fault 5
- CAN Bus Lighting Fault 6
- CAN Bus Lighting Fault 7
- CAN Bus Lighting Fault 8
- CAN Bus Lighting Faults

Lighting Systems Measurement

- CAN Bus Fog Light System Measurement
- CAN Bus Headlight System Measurement
- CAN Bus Lighting Systems Measurement
- CAN Bus Park and Tail Light System Measurement
- CAN Bus Stop and Backup Light System Measurement
- CAN Bus Turn Signal and Hazard Warning System Measurement

Lighting Systems Operation

- CAN Bus Fog Light Systems
- CAN Bus Lighting Control
- CAN Bus Lighting Systems
- CAN Bus Park, Tail, and Headlight Systems
- CAN Bus Stop and Backup Light Systems
- CAN Bus Turn Signal and Hazard Warning Systems

Automotive

LIB 3: 52 CAN Bus Auxiliary Systems

Auxiliary Systems Diagnosis

- Auxiliary CAN Bus Fault Tolerance
- CAN Bus Auxiliary Fault 1
- CAN Bus Auxiliary Fault 2
- CAN Bus Auxiliary Fault 3
- CAN Bus Auxiliary Fault 4
- CAN Bus Auxiliary Fault 5
- CAN Bus Auxiliary Fault 6
- CAN Bus Auxiliary Fault 7
- CAN Bus Auxiliary Faults
- Faults in Auxiliary CAN Bus Systems
- Open Circuit Auxiliary CAN Bus Faults
- Short Circuit Auxiliary CAN Bus Faults

Auxiliary Systems Measurement

- Analyser Tests on an Auxiliary CAN Bus System
- CAN Bus Mirror System Measurement
- CAN Bus Power Door Locking System Measurement
- CAN Bus Seat System Measurement
- CAN Bus Window System Measurement
- CAN Bus Window, Mirror, and Seat Systems Measurement
- CAN Data Bus Measurement
- Multimeter Tests on an Auxiliary CAN Bus System
- Oscilloscope Tests on an Auxiliary CAN Bus System

Auxiliary Systems Operation

- Auxiliary CAN Bus Door Mirror Control Systems
- Auxiliary CAN Bus Safety Systems
- Auxiliary CAN Bus Security Systems
- Auxiliary CAN Bus Systems
- Auxiliary CAN Bus Window Control Systems
- CAN Bus Power Door Locking System
- CAN Bus Window, Mirror, and Seat Systems
- Effect of a Disconnected CAN Bus Control Module

LIB 3: 53 CAN Bus Starting and Charging Systems

Starting and Charging Systems Diagnosis

- CAN Bus Starting and Charging Fault 1
- CAN Bus Starting and Charging Fault 2
- CAN Bus Starting and Charging Fault 3
- CAN Bus Starting and Charging Fault 4
- CAN Bus Starting and Charging Fault 5
- CAN Bus Starting and Charging Fault 6
- CAN Bus Starting and Charging Fault 7
- CAN Bus Starting and Charging Fault 8

Automotive

- CAN Bus Starting and Charging Faults

Starting and Charging Systems Measurement

- Automatic Stop-Start System Measurement
- CAN Bus Advanced Starting and Charging System Measurement
- CAN Bus Conventional Charging System Measurement
- CAN Bus Conventional Starting System Measurement
- CAN Bus Power Consumers Measurement
- CAN Bus Starting and Charging Systems Measurement

Starting and Charging Systems Operation

- Automatic Stop-Start System
- CAN Bus Advanced Starting and Charging System
- CAN Bus Conventional Starting and Charging System
- CAN Bus Starting and Charging Systems

LIB 3: 54 Automotive Heating and Air Conditioning

Heating and Air Conditioning Fundamentals

- Air Conditioning Principles
- Air Conditioning Systems
- Air Conditioning Trainer
- Air Conditioning Trainer Operation
- Refrigerant Leak Detection
- Refrigeration Cycle

HVAC Components and Operation

- A/C Electrical System Fault Investigation
- Air Distribution Control System Investigation
- Air Distribution Control System Troubleshooting 1
- Air Distribution Control System Troubleshooting 2
- Air Distribution Control System Troubleshooting 3
- Blower Motor Fault Investigation 1
- Blower Motor Fault Investigation 2
- Climate Control System Operation
- Compressor Fault Investigation
- Compressors
- Condensers
- HVAC Electrical Controls Investigation
- Lines and Hoses

HVAC Servicing

- A/C Compressor Clutch Removal
- A/C System Troubleshooting 1
- A/C System Troubleshooting 2
- Air Conditioning Practical
- Air Conditioning System Performance Test
- Airflow Restrictions and Components

Automotive

- Control Head and Component Servicing
- Cooling System Inspection
- Discharging and Recharging an A/C System
- Duratec Engine Air-conditioning System Servicing
- Filter Inspection and Installation
- FOTCC System Troubleshooting
- Heater and Air Management Service Procedure
- Inspect Airflow Components on a Workshop Vehicle
- Inspection and Testing of Airflow Components
- Inspection of A/C Evaporator Drain
- Investigation of a FOTCC System
- Removal, Inspection, and Replacement of A/C Compressor Clutch
- Remove, Inspect, and Install A/C System Hose and Fittings
- Removing and Replacing the A/C Compressor
- Replacement and Inspection of Accumulator/Receiver-drier
- Servicing the FOT and TXV

LIB 3: 55 Auto Shop

Automotive Technology

- Automotive Terminology

Preparing Vehicle for Service

- Door Panel Removal and Replacement
- Logical Fault Diagnosis
- Repair Orders

Shop and Personal Safety

- Fire Fighting
- Fire Safety Equipment
- First Aid 1
- First Aid 2
- High Voltage Circuits
- Marked Safety Areas and Evacuation Routes
- Material Safety Data Sheets
- Personal Protective Equipment
- Personal Protective Equipment 1
- Rules and Procedures
- Rules and Procedures 1

Tools and Equipment

- Handling Tools and Equipment
- Lifting Equipment
- Measuring with a Calliper, Micrometer, or Dial Gauge

Automotive

LIB 3: 56 Passenger Safety Systems

Restraint Systems

- Air Bags

SRS Components and Operation

- Airbag Safety
- Airbags
- Introduction to SRS
- Seat Belts

SRS Inspection and Diagnosis

- Disabling and Enabling the Air Bag System

LIB 3: 57 Heavy Vehicle Systems

Actuators

- Engine Management Actuators - Exercise 18.1
- Engine Management Actuators - Worksheet 24
- Engine Management Actuators - Worksheet 25
- Engine Management Actuators - Worksheet 26
- Engine Management Actuators - Worksheet 27
- Engine Management Actuators - Worksheet 28
- Engine Management Actuators - Worksheet 29
- Engine Management Actuators - Worksheet 30
- Engine Management Actuators - Worksheet 31
- Engine Management Actuators - Worksheet 32

Auxiliary Electrical Systems

- Battery and Fuses - Exercise 3.1
- Battery and Fuses - Worksheet 1
- Battery and Fuses - Worksheet 2
- HGV Windshield Wiper System - Exercise 19.1
- HGV Windshield Wiper System - Worksheet 13
- Horn and Relays - Exercise 7.1
- Horn and Relays - Worksheet 6
- Horn and Relays - Worksheet 7

CI Engine Components

- HGV Diesel Engine Component Identification
- HGV Diesel Engine Cylinder Head and Valves
- HGV Diesel Engine Cylinders
- HGV Diesel Engine Pistons
- HGV Diesel Engine Systems

Diesel Engine Management

- Engine Exhaust Emissions - Exercise 6.1
- Fuel Injection

Automotive

- Fuel Injection - Exercise 18.3
- Idle Speed Adjustment - Exercise 18.6
- Injector Pulse Width - Exercise 18.4
- Injector Timing - Exercise 18.5

Electronic Controlled Air Suspension

- Electronic Controlled Air Suspension Fault Diagnosis 1
- Electronic Controlled Air Suspension Fault Diagnosis 10
- Electronic Controlled Air Suspension Fault Diagnosis 2
- Electronic Controlled Air Suspension Fault Diagnosis 3
- Electronic Controlled Air Suspension Fault Diagnosis 4
- Electronic Controlled Air Suspension Fault Diagnosis 5
- Electronic Controlled Air Suspension Fault Diagnosis 6
- Electronic Controlled Air Suspension Fault Diagnosis 7
- Electronic Controlled Air Suspension Fault Diagnosis 8
- Electronic Controlled Air Suspension Fault Diagnosis 9
- Electronically Controlled Air Suspension
- Electro-pneumatics
- Height Sensor
- Remote Control Unit
- Solenoid Valve Unit

Engine Management System Fundamentals

- Cruise Control - Exercise 15.1
- Cruise Control - Worksheet 22
- Cruise Control - Worksheet 23
- Electronic Control Module - Exercise 2.1

Gearbox Components and Operation

- HGV Gearbox Operation
- HGV Gears and Gear Ratios
- Selector Lever, Rail, and Synchronizers

Lighting Systems

- HGV Auxiliary Lighting - Exercise 15.1
- HGV Auxiliary Lighting - Worksheet 11
- HGV Brake and Backup Lights - Exercise 13.1
- HGV Brake and Backup Lights - Worksheet 10
- HGV Park, Tail and Headlights - Exercise 9.1
- HGV Park, Tail and Headlights - Worksheet 8
- HGV Turn Signal and Hazard Warning Lights - Exercise 11.1
- HGV Turn Signal and Hazard Warning Lights - Exercise 11.2
- HGV Turn Signal and Hazard Warning Lights - Worksheet 9

Sensors

- Ambient Air Sensor - Exercise 8.5
- Engine Management Active Sensors - Exercise 12.1
- Engine Management Active Sensors - Worksheet 19
- Engine Management Active Sensors - Worksheet 20

Automotive

- Engine Management Active Sensors - Worksheet 21
- Engine Management Analog Sensors - Exercise 8.1
- Engine Management Analog Sensors - Worksheet 1
- Engine Management Analog Sensors - Worksheet 10
- Engine Management Analog Sensors - Worksheet 11
- Engine Management Analog Sensors - Worksheet 12
- Engine Management Analog Sensors - Worksheet 13
- Engine Management Analog Sensors - Worksheet 2
- Engine Management Analog Sensors - Worksheet 3
- Engine Management Analog Sensors - Worksheet 4
- Engine Management Analog Sensors - Worksheet 5
- Engine Management Analog Sensors - Worksheet 6
- Engine Management Analog Sensors - Worksheet 7
- Engine Management Analog Sensors - Worksheet 8
- Engine Management Analog Sensors - Worksheet 9
- Engine Management Digital Sensors and Switches - Exercise 10.1
- Engine Management Digital Sensors and Switches - Worksheet 14
- Engine Management Digital Sensors and Switches - Worksheet 15
- Engine Management Digital Sensors and Switches - Worksheet 16
- Engine Management Digital Sensors and Switches - Worksheet 17
- Engine Management Digital Sensors and Switches - Worksheet 18
- Engine Protection - Exercise 4.1
- Manifold Air Temperature Sensor - Exercise 8.3
- Oil Pressure Sensor - Exercise 8.4
- Oil Temperature Sensor - Exercise 8.2

Starting and Charging

- HGV Alternator Charging Systems - Exercise 17.1
- HGV Alternator Charging Systems - Worksheet 12
- HGV Cold Starting Systems - Exercise 21.1
- HGV Cold Starting Systems - Worksheet 14

LIB 3: 58 Motorcycle Lighting

Fault Finding

- Fault Finding
- Four Pin Relay Headlamp Circuit Fault
- Park / Tail Lamp and Headlamp Circuit Fault
- Park / Tail Lamp and Relay Controlled Headlamp Fault
- Park / Tail Lamps Circuit Fault
- Relay-Controlled Headlamp Flash Circuit Fault

Lamp Circuits

- Instrument Panel Lighting Circuit
- Low and High Beam Headlamps
- Park / Tail Lamp and Headlamp Circuit Assignment
- Park / Tail Lamp Circuits
- Park / Tail Lamps and Headlamps
- Park / Tail Lamps and Relay Controlled Headlamps

Automotive

Relay Circuits

- Four Pin Relay Headlamp Circuit Assignment
- Four Pin Relays and Headlamps
- Relay-Controlled Headlamp Circuit
- Relay-Controlled Headlamp Flash Circuit

LIB 3: 59 Land Cruiser Complete Vehicle Systems

Land Cruiser Faults

- Land Cruiser Fault Diagnosis 1
- Land Cruiser Fault Diagnosis 10
- Land Cruiser Fault Diagnosis 2
- Land Cruiser Fault Diagnosis 3
- Land Cruiser Fault Diagnosis 4
- Land Cruiser Fault Diagnosis 5
- Land Cruiser Fault Diagnosis 6
- Land Cruiser Fault Diagnosis 7
- Land Cruiser Fault Diagnosis 8
- Land Cruiser Fault Diagnosis 9

Land Cruiser Fuel Injection

- Land Cruiser Fuel Injector Pulse Frequency
- Land Cruiser Fuel Injector Pulse Timing
- Land Cruiser Fuel Injector Pulse Width

Land Cruiser Systems

- Brake System Inspection
- EVAP System Investigation
- Investigating the Door Mirror
- Investigating the Power Windows
- Land Cruiser Driveline Investigation
- Military Body Panel Materials
- Ride Height Measurement

LIB 3: 60 Dynamometers

Dynamometer Software Analysis

- Analysing Air Flow with Variable RPM (CI Engine)
- Analysing Air Flow with Variable RPM (SI Engine)
- Analysing Power with Variable RPM (CI Engine)
- Analysing Power with Variable RPM (SI Engine)
- Analysing Torque with Variable RPM (CI Engine)
- Analysing Torque with Variable RPM (SI Engine)
- Introduction to Dynamometer Software

Automotive

Engine Dynamometer Measurements

- Calculating Power with Variable RPM (CI Engine)
- Calculating Power with Variable RPM (SI Engine)
- Introduction to Dynamometers
- Measuring Air Flow with Variable RPM (CI Engine)
- Measuring Air Flow with Variable RPM (SI Engine)
- Measuring Cylinder Pressure with Variable RPM (CI Engine)
- Measuring Cylinder Pressure with Variable RPM (SI Engine)
- Measuring Fuel Use with Variable RPM (CI Engine)
- Measuring Fuel Use with Variable RPM (SI Engine)
- Measuring Oil Pressure with Variable RPM (CI Engine)
- Measuring Oil Pressure with Variable RPM (SI Engine)
- Measuring the Effect of Load on Torque (CI Engine)
- Measuring the Effect of Load on Torque (SI Engine)
- Measuring Torque with Variable RPM (CI Engine)
- Measuring Torque with Variable RPM (SI Engine)

Support

LIB 3: 61 Engineering Mathematics

Algebra

- Algebra - Simple Formula
- First, Second, and Third Order Brackets
- Rule of Three (Direct Proportion)
- Rule of Three (Inverse Proportion)

Angles

- Angular Measure
- Calculating with Angles
- Measuring Angles

Approximation

- Approximations

Arithmetic

- Adding and Subtracting
- Multiplication and Division of Decimal Numbers
- Multiply Sums

Equations

- Addition Method for Solving Simultaneous Equations
- Calculate the Unknown Variable in an Equation
- Distributive Law
- Equating Method for Solving Simultaneous Equations
- Multiply Out Brackets
- Performing Calculations
- Sign Rules for Mathematical Operations

Factorization

- Simple Factorization

Fractions

- Add and Subtract Fractions with Different Denominators
- Add and Subtract Fractions with the Same Denominator
- Convert Decimal Numbers to Fractions
- Convert Fractions to Decimal Numbers
- Convert Improper Fractions into Mixed Numbers
- Convert Mixed Numbers into Improper Fractions
- Expand Fractions
- Fractions - Addition and Subtraction
- Fractions - Multiplication and Division
- Simplify Fractions

Graphs and Charts

- Graphs - Pie Chart
- Graphs - Square Law
- Graphs - Straight Line Graphs

Support

Indices

- Indices
- Indices - Addition and Subtraction
- Indices - Letter Notation
- Indices - Multiplication and Division
- Indices - Powers of 10
- Powers

Length, Area and Volume

- Calculate the Area of a Complex Shape
- Calculate the Area of a Rectangle
- Calculate the Perimeter of a Rectangle
- Calculate Volume
- Lengths, Surface Area and Volume
- Lengths, Surface Area, and Volume
- Lengths, Units and Prefixes

Number Systems

- Binary and Decimal Conversions

Percentages

- Calculate Percentage Increases
- Calculate Percentage Reductions
- Calculate Percentages of Values
- Parts per Thousand
- Percentages

Phasors

- Phase Angles
- Phasor Diagrams

Trigonometry

- Basic Trigonometry
- Lengths and Pythagoras' Theorem
- Pythagoras' Theorem

LIB 3: 62 English Language Skills

Language

- Language Acquisition

Reading

- Citing Strong and Thorough Evidence
- Determining a Writer's Perspective
- Evaluating Arguments and Specific Claims Made in a Text
- Identifying and Analysing Ideas in a Text

Support

Speaking and Listening

- Discussing Different Perspectives
- Engage in a Two-Way Conversation
- Engaging in Group Discussions
- How to Introduce Yourself
- Justifying Decisions with Reasoning
- Listening and Understanding
- Planning, Writing, Presenting, and Evaluating
- Presenting a Perspective to an Audience

Writing

- Arguing a Perspective
- Creating an Informative Text
- Formal Letters with a Perspective
- Informing an Audience
- Presenting a Persuasive Perspective

LIB 3: 63 Business Skills

Cost Accounting

- Marginal Cost Calculations

Economics

- Economic Flow Models
- Economic Measures
- Economic Systems
- Location Factors
- Monetary Policy and Price Level Stability
- Needs, Wants and Demand
- Pricing and Types of Markets
- Production Factors

Financial Accounting and Bookkeeping

- Accounting - Valuation Principles
- Accruals and Pre-Payments
- Balance Sheet Accounting
- Balance Sheet Changes
- Inventory Accounting: The Periodic Method
- Inventory Accounting: The Perpetual Method
- List Price Determination
- Profit and Loss Accounts
- Purchase Cost Calculations

Fundamentals of Business Organization

- Business Organizational Structure
- Business Process Optimization
- Corporate Mission and Goals
- Quality and Environmental Management

Support

Investing and Financing

- External Financing
- Financing Rules
- Internal Financing
- Investment Analysis
- Investment Planning
- Profit and Loss Analysis

Legal Framework

- Breach of Contract
- Contracts and UN Law
- Process Chains and Networks

Procurement

- Controlling Procurement
- International Commercial Terms and Contracts
- Management of Hazardous Substances
- Material Procurement
- Material Requirements Planning (MRP)
- Monitoring Purchasing
- Organizing Procurement
- Purchasing Calculations

Production

- Analytical Techniques
- Controlling Production
- Improving Production
- Product Range
- Product Range Development
- Production Management
- Production Planning
- Production Process Control
- Production Process Planning
- Quality Control

Sales and Marketing

- Advertising and the Marketing Mix
- Communications and the Marketing Mix
- Control of the Customer's Order
- Distribution and the Marketing Mix
- Marketing Planning
- Pricing Strategies
- Product and the Marketing Mix
- Product Promotion
- Sales and Marketing Measures

Social Skills

- Common Courtesy
- Dress Code

Support

- Handle Collective Property
- Personal Space
- Punctuality

LIB 3: 64 Freight Logistics

Efficiency and Optimization of the Warehouse

- Quality Management in the Warehouse

Event Driven Process Chains

- EPC Diagrams

Human Resources

- Accident Prevention in the Warehouse
- Handling of Hazardous Materials

Information Processing

- Privacy Policy

Internal Transport and Loading

- Conveying
- Internal Transport and Loading Overview
- Loading Systems
- Picking Vehicles and Lifting Equipment
- Securing Loads

Loading

- Loading Goods Overview

Packaged Goods

- Packaging
- Packaging Aids
- Packaging of Goods

Picking Stock

- Key Figures of Picking
- Organization of Picking

Route Planning

- Accompanying Documents
- Event Driven Process Chain for Route Planning
- Freight Costs
- Legal Regulations for Shipping

Stowage Planning

- Planning for Stowage

Support

LIB 3: 65 Workplace Problem Solving

Construction

- Car Park Construction - Calculating Materials
- Installing a Flag Pole
- Perimeter Fencing - Calculating Materials

Customer Service

- Handling a Telephone Call

Distribution

- Calculating Shipping Costs
- Planning Logistics

Finance

- Calculating Costs for a Building Project
- Calculating Stationery Costs
- Calculating VAT Rates
- Comparing Crane Hire Costs
- Phone Contracts - Comparing Deals

Human Resources

- Attending a Meeting
- Choosing a Computer Monitor
- Improving the Workplace

Production

- Calculating Costs in a Food Factory
- Choosing Packaging for Parts
- Comparing Machine Productivities
- Machine Productivity for Cutting Metal Shapes
- Mass Production - Calculating Quantities
- Paint Mixing - Calculating Materials
- Programming a Drinks Bottling Plant
- Running a Bicycle Parts Production Line
- Running Two Production Lines for Bicycle Parts
- Setting Up a Paint Filling Machine

Sales and Marketing

- Calculating Sales Discounts
- Sales Conversion - Calculating Rates



Working with STEM Digital Library

For more information on our range of learning resources, please contact:

p +61 3 9557 7993
e info@pullmangroup.com.au
w www.pullmangroup.com.au
a 300 Centre Road, Bentleigh, VIC, 3204



Training Systems Australia
First in Vocational Training Equipment
A Division of Pullman Learning Group