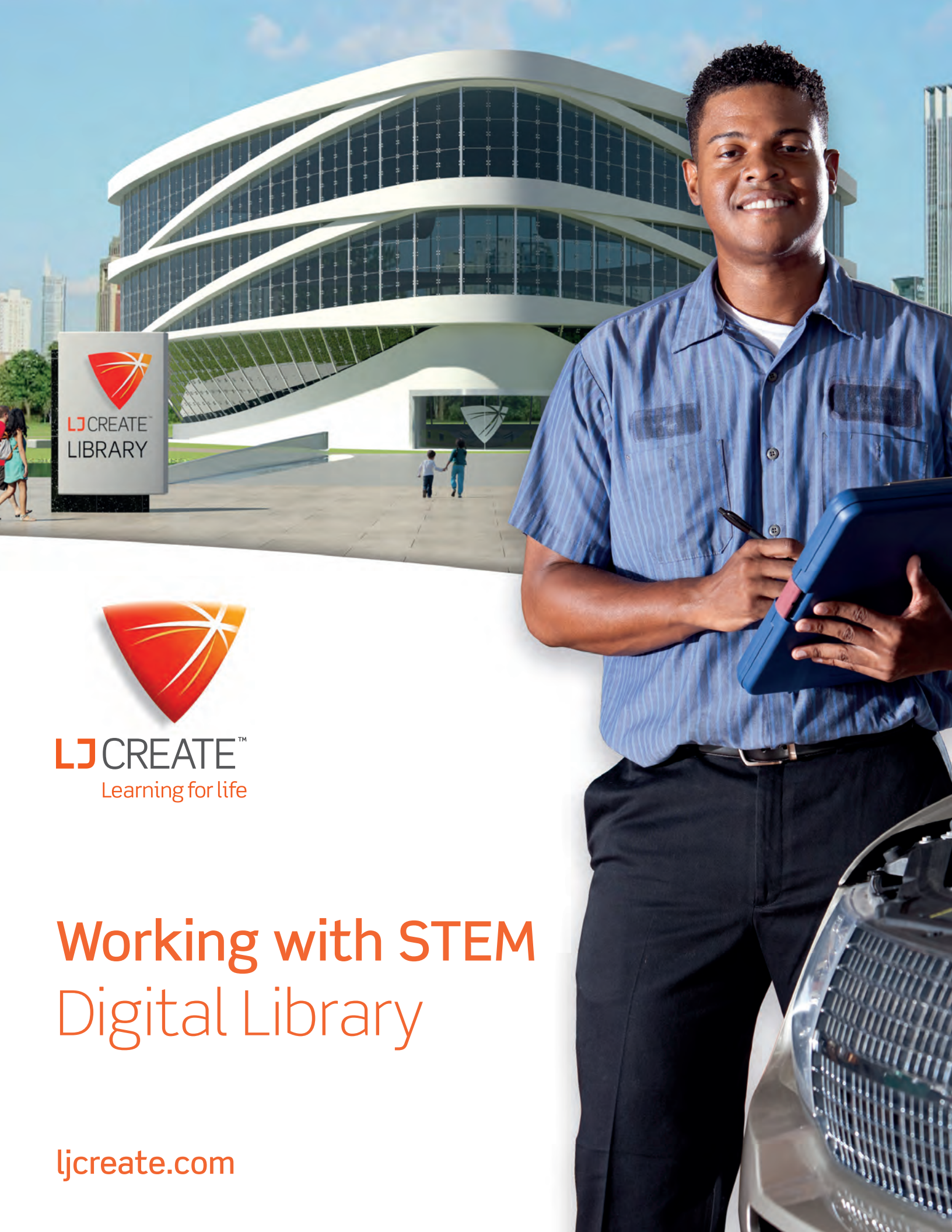

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- Gain and Saturation - Exercise 3.3
- Inverting Amplifier - Alternating Input - Worksheet W2
- Inverting Amplifier Gain and Bandwidth - Exercise 4.2
- Inverting Amplifier with Sinusoidal Input - Exercise 4.1

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
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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
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- Liquid Crystal (Seven Segment) Display - Exercise 2.2

Transistor Amplifiers

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- Alternating Signal Drive - Exercise 2.2
- Alternating Signal Drive - Exercise 4.2
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- 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
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- 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
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- 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

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

- 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

- 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

- 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 Calipers
- Brake Pads
- Brake Rotors
- Integral Caliper 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

Disc Brake System Servicing

- Brake Caliper Inspection
- Brake Pad Removal and Brake Assembly Inspection
- Brake Pad Replacement
- Brake Pad Wear Indicator Inspection
- Brake Rotor Replacement
- Integral Caliper 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

- 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

- 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

- 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

- EFI Demonstrator Fault Diagnosis 7
- EFI Demonstrator Fault Diagnosis 8
- EFI Demonstrator Fault Diagnosis 9
- Exhaust Gas Analyzer
- 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

- Analyzer 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

- 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

- 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 Caliper, 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

- 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

- 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

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

- Analyzing Air Flow with Variable RPM (CI Engine)
- Analyzing Air Flow with Variable RPM (SI Engine)
- Analyzing Power with Variable RPM (CI Engine)
- Analyzing Power with Variable RPM (SI Engine)
- Analyzing Torque with Variable RPM (CI Engine)
- Analyzing 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 Analyzing Ideas in a Text

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

- 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

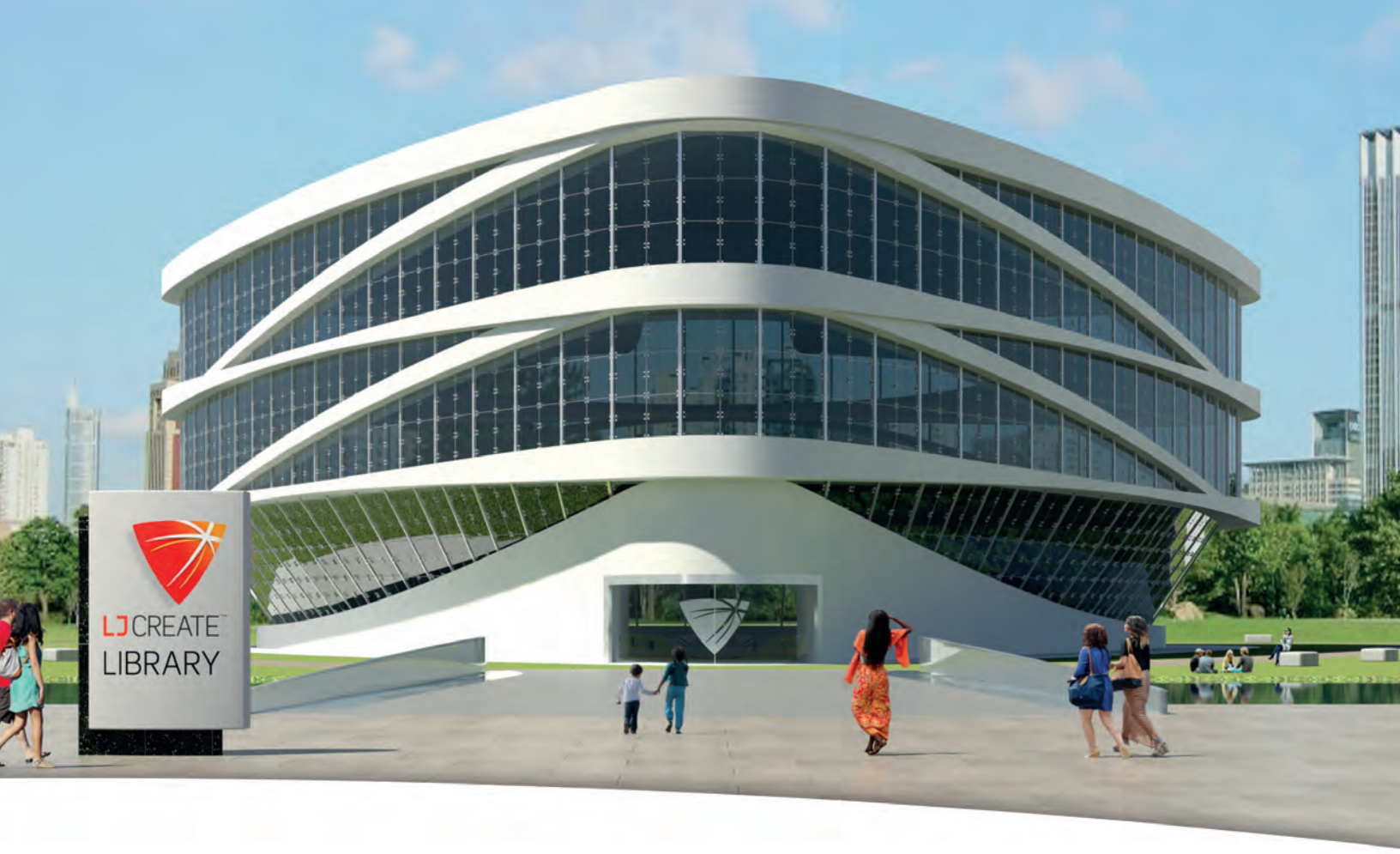
- Attending a Meeting
- Choosing a Computer Monitor
- Improving the Workplace

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



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