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# Automotive Digital Library

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# Contents



## Automotive Digital Library: Courses

### Automotive

Engine Repair	1
Automatic Transmission and Transaxle	2
Manual Drive Train and Axles	2
Suspension	3
Steering	3
Brake Systems	4
Brake Components	5
Brake Servicing	5
Automotive Electrical Fundamentals	6
Automotive Starting and Charging	7
Automotive Lighting	7
Automotive Transducers	9
Ignition Systems	9
Engine Management and Control	10
Fuel and Emissions	11
Electric and Hybrid Vehicle Technology	12
Networked Systems	14
CAN Bus Lighting Systems	14
CAN Bus Auxiliary Systems	15
CAN Bus Starting and Charging Systems	15
Automotive Heating and Air Conditioning	16
Auto Shop	17
Passenger Safety Systems	18
Heavy Vehicle Systems	18
Motorcycle Lighting	20
Land Cruiser Complete Vehicle Systems	21
Dynamometers	21

### Support

Engineering Mathematics	23
English Language Skills	24
Business Skills	25
Freight Logistics	27
Workplace Problem Solving	28

## 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

## 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



## 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

## 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

## 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

## 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

## 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



## 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

## 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

## 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

## 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

## 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)

## 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

## 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

## 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

## 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

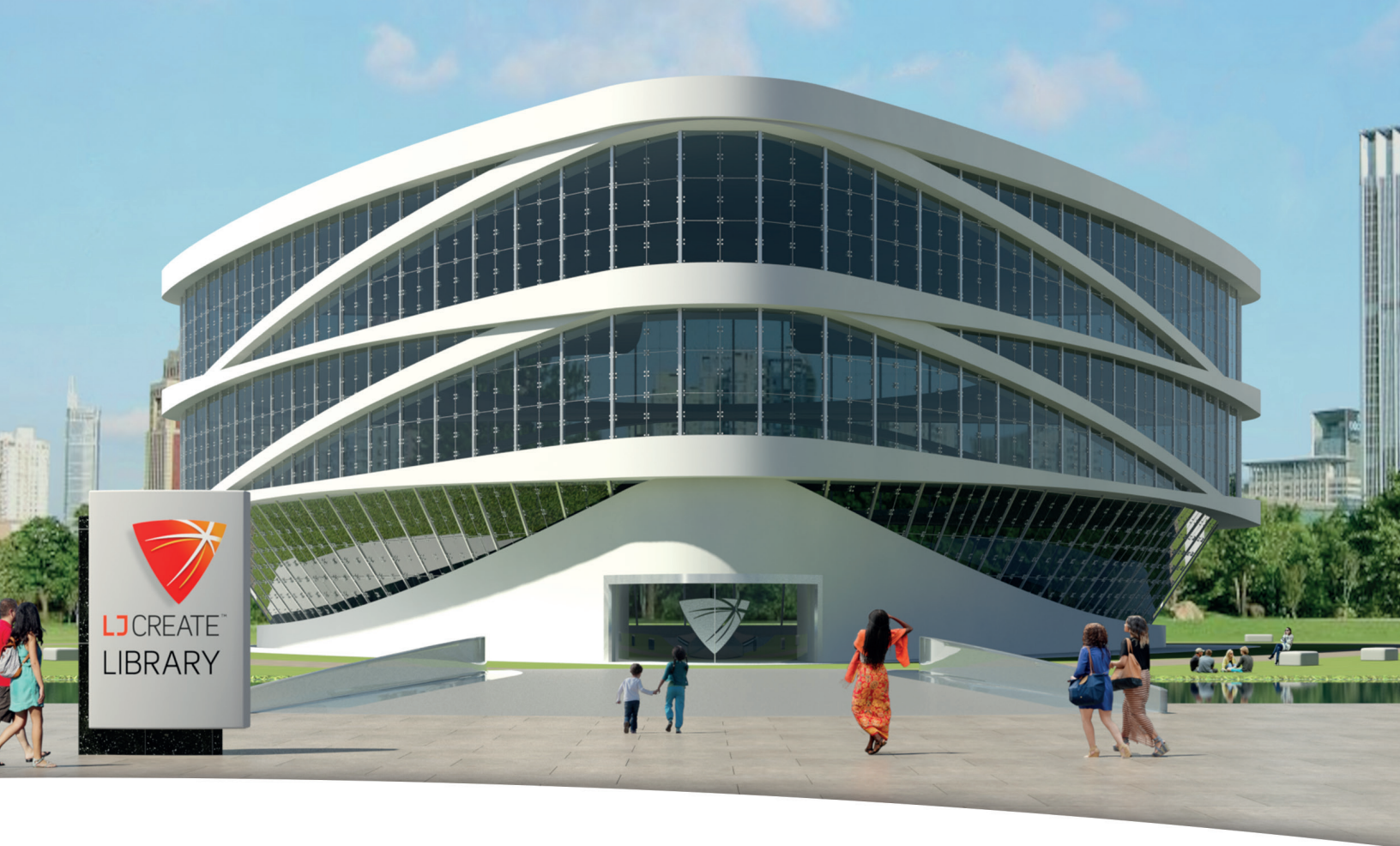
- Attending a Meeting
- Choosing a Computer Monitor
- Improving the Workplace

### 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



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

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