Fitzgerald AUTO MALLS

Apprentice PROGRAM

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Apprentice Development
INTRODUCTION

We at the Fitzgerald Auto Malls understand this is an exciting time for you yet a little unsettling as you prepare to enter the full-time workforce. You are reading this as you have chosen to explore a career in the automotive service and repair field. Becoming a Master Technician comes with many perks, great pay, the opportunity to earn trips and monetary incentives from manufacturers, and lifelong stability in an industry that is essential to our daily lives.

The road to becoming a master technician is not too different from becoming a doctor. Completing your classwork is only a part of the journey as you need on-the-job training where you initially watch a seasoned technician perform a service task. You will then perform this same task yourself under the supervision and guidance of a trained technician. You will also be attending instructional training that will continue for your entire career. This booklet was created to give you an idea of how the first few years of your development will unfold until you reach the point where you can perform most tasks without direct supervision.

Our primary technician apprenticeship development program is built around the Washington Area New Automobile Dealers Association's (WANADA) Automobile Dealer Education Institute (ADEI) training program. This is a two-year training program in conjunction with Montgomery Community College, where you attend classes one day per week for 8 hours. There you will receive classroom instruction on the theories of automotive repair. This booklet lists the curriculum for the two-year course and a list of the specific tasks you will complete and in what order. As you complete the classroom lessons, we will have you perform the learned functions under the direct supervision of a master technician. After two years, you should have taken and passed four ASE modules and will be ready to elevate to the team; more on that later.

The Fitzgerald Auto Malls are different from many automotive dealer groups. Mr. Jack Fitzgerald entered the automobile business in 1966 and purchased an interest in his first dealership ten years later. He decided he would sell cars differently with fair, transparent pricing and excellent customer service centered around honesty and hard work. That philosophy is what drives us today. As an associate of the Fitzgerald Auto Malls, you represent the company when you wear the Fitzgerald logo on your uniform. We expect you to exhibit pride in your work, treat all customers and fellow associates with courtesy and respect, and be a good teammate to your peers.

The following: "Our Culture" is straight off the Fitzgerald Auto Mall website and sums up what it means to the company when you are chosen to join our team.

Our Culture

We boast a diverse, energetic, dedicated, and fast-paced culture in which teamwork and ingenuity thrive. We strive to create an environment that is entrepreneurial, nurtures personal development and builds on unique talents. Team member passion and commitment to excellence have helped make FitzMall a leader in the industry.

It's why FitzMall stands out as a category leader and why people want to work with us, organizations want to partner with us and why clients come to us time and again as a leading resource for for all of their vehicle needs. Above all else, it makes FitzMall a special company, one that can attribute its success to its products, clients, and most importantly, its team members.

These are not just words. We have numerous associates with 20, 30, 40 even 50 years of service with the company. We intend to support you in your desire to become a master technician and a future 20-plus-year associate.

What makes Fitzgerald Auto Malls different from the rest when developing talent? Our Culture explains several reasons, but we mentioned Team earlier. The team is what we believe sets us apart from all others when it comes to helping you develop from a student starting in the lube bays to a team technician and then a Master Technician.

There has been a shortage of mechanical technicians for years while high school and secondary level programs were fully attended. So why were so many students who wanted to become technicians not in the industry five years later? We feel it is because there is too much luck involved! There are far too many reasons an apprentice technician may leave the business.

Let's explore some of the common ones:

- The apprentice technician is put on flat rate too soon. That helps the shop, but you cannot make a good living on a flat rate until you reach a point where you can complete most jobs without supervision and promptly. Many new technicians do not consistently make enough money at a flat rate early in their development, becoming disenchanted and leaving the industry.

- You are paired with a mentor who may be nice but not a very good technician. This happens more than you would hope. Not every technician is motivated to a high-quality level or may have lacked a nurturing environment in their training that leaves them unqualified to develop you. If their diagnostic and repair skills are poor, you can bet your diagnostic and repair skills will be lacking also.

- You are in a shop with other flat-rate technicians who view you as competition. This happens in many shops. You may be stuck on a diagnostic procedure or

repair or need an extra set of hands, and no one is willing to help you. This may be based on the other technicians wanting you to fail, so they can get more of the repair hours in the shop.

- You get a little lucky and paired with a sound technician, but he holds you back as you develop. Typically, a good shop will start you on an hourly wage and pay you for the actual hours you work. This is fair to you. Your mentor gets the billable hours you can provide. Initially, your mentor will lose money as they will have to spend a lot of time with you until your skills progress, meaning they will be working less on their work. As you become more proficient, your mentor can tell you to perform a task and then come and get them once completed. For example, the mentor may say take the front of the engine down to the timing case cover and get me... All the while, the mentor is working on another vehicle making his money in addition to what you are turning. As you become close to completing most jobs independently without supervision, the technician may not want to lose you as he is now making money off the hours you can turn alone. Many will hold you back or try to convince you that you are not ready to graduate to a flat rate even though your skills have developed. He is looking out for his best interest even though it is not in your best interest.

Here is why the Fitzway is the best way. We run service teams, yes, real teams. Everyone pools hours, and the shares are distributed based on skill level, attendance, and production. You will start on an hourly wage, but once you can complete most tasks, you will be moved to a flat rate and promoted to the team. This is a big deal and should be celebrated. In a team environment, you may have multiple mentors. Every Master Technician is not an expert in every automotive diagnostic and repair area. We all have some tasks we like and naturally gravitate to, and some we do not feel as confident performing. At Fitzgerald, your mentor in electrical diagnostic will be one of the best in the shop at electrical diagnosis, the same for suspension, brakes, etc. You may have several mentors based on their proficiency in that particular area. And finally, in a team system, it is in the team's best interest to elevate your skillset as quickly as possible. If you are stuck on something, there will be several technicians who will be able to help you, and it is in their best interest to do so. If you need an extra set of hands or multiple sets of hands, the other techs will help you as you are all in this together. There is an adage: a rising tide lifts all boats. By raising your skills or helping you complete a job more efficiently, you and your team make more money, and our customer gets their car back faster.

It is not easy becoming a Master Technician, and if you are willing to invest in yourself, work hard and exhibit integrity and pride in your work, Fitzgerald will invest in you. We pay for your entire college education through the WANADA ADEI program*, offer you tool credits as you complete and pass your ASE exams, and place you in an environment where a whole team is rooting for you to be successful.

That is the Fitzway. There is just no better way!

*Service time restrictions apply. See the Apprentice Agreement for complete details.

Apprentice Technician Training and Development Plan

Apprentice technicians are initially hired on a temporary, part-time basis for the first 90 days. The apprentice will start as support staff in the service lane, the lube bay, or a combination of both. Service management, writers, and technicians will monitor the apprentice to see if the characteristics outlined in our Apprentice Technician Attribute Guidelines are exhibited. If, after 90 days, the management and staff deem the candidate qualified, they will be reclassified as a permanent hire. Once the student exhibits they are proficient at the tasks required in the lube bay, the apprentice will be enrolled in the WANADA Automobile Dealer Education Institute (ADEI) technician training program*.

The student will be registered with an Original Equipment Manufacturer (OEM) to commence factory online training. For a student to work in the lube bay, they may need to complete any/all OEM-required initial online training to gain the certifications deemed necessary to perform essential maintenance and new car pre-delivery inspections (PDIs).

Initial compensation will be at an hourly rate as the student will be paid to learn the trade. At various performance milestones, the student will earn increases in their hourly compensation per the Apprentice Wage Escalation Guide. The student will continue to be paid an hourly wage based on the number of hours actually spent working until the student promotes to the team.

Upon completing the first semester of year one in the WANADA ADEI program, the student will be awarded a $500.00 voucher from WANADA to purchase tools. Fitzgerald Auto Malls will also provide the student with a $500.00 credit toward purchasing tools after passing the first ASE module tests for that semester. (Terms and Conditions Apply). Registered students are also eligible for substantial discounts on tools through Snap-On and Matco Tools. Once the student passes the ASE tests associated with all modules completed by the end of the first semester of year two, the Fitzgerald Auto Malls will provide an additional $500.00 credit for additional tool purchases (Terms and Conditions Apply).

As part of the WANADA ADEI program, the student will travel to and attend a full day of classroom and on-site training on the ADEI campus. As part of the program, the student will be removed from the lube bay to perform a lesson-related repair in the main shop under the mentorship of a certified trained technician. The student will be expected to take the four ASE modules that will be studied over the two years and pass the ASE Exam. (Issuance of the ASE certification is contingent on employment duration, but both criteria are congruent)

As the student elevates their skill set and can consistently deliver quality workmanship and timeliness, which customers of the Fitzgerald Auto Malls have come to expect, they will be eligible to move to an Express II apprentice (if that location has Express II) or to the Team. Before elevating to the next level, it will be the apprentice's responsibility to train replacement personnel to perform the essential duties of the lube bay. Once the new trainee can perform the lube bay's primary responsibilities, the apprentice will elevate to the next level.

*The WANADA ADEI program is an ASE accredited training program taught at Montgomery Community College. The State of Maryland also recognizes this program as meeting the State's requirements for the Apprenticeship Program. In addition to the potential $1,000.00 in tool credits the Fitzgerald Auto Malls will extend to the student, the Company will also fully pay the tuition in the WANADA program provided the student remains an associate in good standing with the company for a minimum of four years after graduating from the WANADA program. See the Apprentice Technician Development Program Agreement for details.

Fitzgerald Apprentice Plan
SECONDARY OPTIONS

The primary apprentice development plan for the Fitzgerald Auto Malls is the ADEI program taught at Montgomery College.

There are two additional options a student can choose:

CCBC

A student who wishes to enter the manufacturer-backed training program at the Community College of Baltimore County (CCBC) can enroll in programs through General Motors, Chrysler, Dodge, Jeep, Ram, or Nissan. These two-year courses require 8-weeks of school followed by 8-weeks of on-the-job learning. The OEM-backed programs will teach the subject matter using the OEM training and support systems and repair/diagnostic equipment. This program follows a similar curriculum as the WANADA ADEI program but also includes the Automatic Transmission training for that specific make. The Fitzgerald Auto Mall will assist with tuition expenses on a reimbursement basis; however, there will be some cost to the student who enters this program. Once the student graduates from the class, education may be continued under the Factory Training schedule for the remainder of their career.

In-House Factory Training Only

There is an OEM option for students who do not wish to make the financial investment in the CCBC program and do not wish to travel to Montgomery College one day per week. The student will be given access to the OEM training portal for the manufacturer of the associated Fitzgerald dealership. The student can take the online courses at his/her pace after work hours following the manufacturer's levels of training. Once students have passed all pre-requisite courses, they will be eligible for in-person factory training. The Fitzgerald Auto Mall will cover the expense of lodging, food, and the activity itself for the student in accordance with the Apprentice Technician Development Program Agreement. Your learning never stops as new technology constantly evolves and requires ongoing training throughout your career. The course materials are similar to the WANADA and CCBC subject matter but at a pace set by the student. Typically, this training would take 2-5 years to complete.

Apprentice Technician Attribute Guidelines

Apprentice students will be hired on a part-time, temporary basis for the first 90 days. During that time, the apprentice will be accessed on the following attributes:

Attendance:

Is the student onsite and ready to start work at the scheduled time?

Does the student miss days or fail to call in?

Does the student disappear from the work area?

Ability to stay on task:

Does the student pay attention to the task at hand or is easily distracted?

Does the student often look at his/her cell phone?

Does the student wear earbuds while working?

Does the student exhibit the ability to retain the process and follow the process consistently?

Ability to take direction:

Is the student open to instruction?

Does the student constantly make the same mistakes or do they learn from them?

Initiative:

Is the student engaged in instruction and showing the desire to attempt the learned skill?

Does the student start online training or assignments independently or need to be reminded?

When the student completes a task, does he/she come to their mentor looking for another task?

Integrity:

Does the student exhibit pride in the work or are they satisfied to say it is good enough?

Does the student try to cover mistakes or blame others for errors?

Does the student treat the property of others with respect?

Is the damage reported immediately if the student damages a customer's vehicle?

Apprentice Wage Escalation Guide

When students start the program, they will be paid by the clock hour at a set hourly rate. Their hourly pay rate will increase at various speeds as they achieve certain milestones.

Examples:

Each semester if a student earns an A grade in the ADEI program, their hourly rate increases by 75 cents per hour. If the student makes a B grade, their rate will increase by 50 cents per hour. Students who pass with a C grade will earn an additional 25 cents per hour. Earning less than a C grade will not increase hourly pay and may result in removal from the program. This is per semester, so a student who earns an A in all four semesters will increase their hourly wage by $3.00 just for learning your trade!

Each semester students will be expected to take the ASE exams for the courses studied in the semester. Each ASE test passed will earn the student another 25 cents per hour after graduation from the WANADA ADEI program.

Students who wish to become Maryland State Inspectors and pass the tests will earn another $1.50 per hour wage increase.

Additionally, students can earn productivity bonuses based on the billable hours of work he/she produces. As your skill develops, you will be able to complete jobs faster without sacrificing quality. We track your hours to measure how your ability is improving. You will earn bonus money as you get to a point where you generate billable hours in excess of clock hours.

As you can see, there is a significant opportunity to increase your hourly wage, and it is based on milestones you can control.

Apprentice Technician Development Program Agreement

In exchange for the Fitzgerald Auto Malls advancing payments for tool credits, tuition in the WANADA ADEI program, GM ASEP program tuition assistance, reimbursement of ASE test fees, and any associated costs of OEM in-person training, or any other training-related expenses, I agree to the following terms and conditions:

I will remain an active full-time associate of a Fitzgerald Auto Mall location (transfers between locations will not affect employment time) for a minimum of four years after WANADA graduation. At that time, the apprentice becomes fully vetted. All related educational debt incurred on behalf of the apprentice by Fitzgerald Auto Malls shall be deemed satisfied on the part of the apprentice.

In the event I, _____ drop out of the program or leave the Company before four years after graduation of the WANADA program, I will be responsible for reimbursement of all above costs paid by the Company on my behalf.

A student who drops out and does not graduate from the WANADA program or is no longer an active associate of the Company within the employment tenure listed below shall be responsible for the percentage of expenses incurred by the company per the following table:

Student Exits the Program within	% of expenses payable
Year 1	100%
Year 2	75%
Year 3	50%
Year 4	25%

I authorize Fitzgerald Auto Malls to withhold any unpaid wages from my pay to satisfy any debt incurred as part of this agreement to the extent my debt becomes fully satisfied. I further acknowledge I am responsible for any remaining debt my unpaid wages will not cover. Based on the above schedule, I understand the Company may use legal action to recover the remaining debt owed. Fitzgerald Auto Malls shall present me with an itemized account of the debt and amounts that Fitzgerald Auto Malls has paid on my behalf if I am no longer an active associate for the Company before working four years after Graduation from the WANADA program. I further agree to give the Company two weeks' notice of my intention to leave the company voluntarily. In the event I leave the Company within four years of graduating from the WANADA ADEI program and without giving my department manager or HR Department two weeks advance notice of my intention to sever my employment with the Company, I agree to be responsible for 100% of the total cost of my educational and tool expenses paid by the Company on my behalf no matter my year of tenure in the above chart.

Typical Timeline for Apprentice Technicians

The first 90 days of employment consist of the probationary period where we monitor the apprentice to determine if the apprentice has passed the initial company standards to make the team as outlined in the Apprentice Technician Attribute Guidelines. Common review areas are attendance, punctuality, ability to follow directions, knowledge of and ability to perform basic-level tasks, and quality of work.

The student will be enrolled in the factory training for the franchise assigned. The student will be expected to complete the first online training module within the suggested schedule of the OEM, but no longer than 30 days.

The apprentice technician should be able to perform all operations in the Express Bays in addition to Pre-Delivery Inspections (PDI) and Certified Pre-Owned (CPO) vehicle inspections within the first 30 days of employment. Once the apprentice exhibits mastery of the tasks required for the lube bay, the apprentice becomes eligible for the ADEI program. The apprentice will be enrolled in the WANADA ADEI program at Montgomery College. Once admitted by the college, the apprentice will be expected to attend instructional classes one day per week during the semester. The apprentice must pass the course and associated ASE tests with a passing grade to continue to the next module the following semester.

Typical Timeline and course hours of instruction:

First Year Semester 1:	Vehicle Service and Safety *(6 hours)* Brake Systems *(105 hours)* Steering and Suspension *(95 hours)*
First Year Semester 2:	Electrical/Electronic Systems *(230 hours)*
Year Two Semester 2:	Engine Performance *(220 hours)*
Year Two Semester 2:	Engine Repair *(120 hours)* Heating and Air Conditioning *(90 hours)*

Classes are one day per week for eight hours each day. One hour will be dedicated to OEM online training. The apprentice can take the ASE test for each module once the lessons are complete. We encourage you to do so while the subject matter is fresh. Additional company-paid training such as Maryland State Inspector Training and the OEM in-person training, are available once your prerequisites are met. There are alternative options to the WANADA ADEI program that will run a similar timeline. The average time for an apprentice technician to develop into a capable flat-rate technician is 3 to 5 years.

Apprentice Theory and Task Details

Students often ask what will I be doing in school and when will we learn about...?

The following pages include the Montgomery College Curriculum for the WANADA ADEI program. This curriculum will give you the exact order of the lessons you will be taught and the subject matter to which you will be introduced. This Master Automotive Technician Program Curriculum will help you understand what is involved in becoming a technician and what you can expect to learn. Module 5 on transmissions will not be taught in the WANADA ADEI program as manufacturers' transmission designs vary significantly between manufacturers. Your transmission training will consist of OEM online pre-requisite classes followed by detailed hands-on training at the manufacturer training center of the OEM you are registered with.

Following the curriculum is a copy of the Master Automotive Service Technology Task List. This task list will give you insight into the hands-on tasks you will be exposed. As you can see by the long list of tasks, a technician must learn and develop many skills to become a flat-rate technician. This information gives you the road map to becoming a technician and how you will get there. We hope you find this information helpful as you embark on your new career.

WASHINGTON AREA NEW AUTOMOBILE DEALERS ASSOCIATION

Master Automotive TECHNICIAN PROGRAM CURRICULUM

WASHINGTON AREA NEW AUTOMOBILE DEALERS ASSOCIATION

WANADA Master Automotive Technician Program

The Washington Area New Automobile Dealers Association (WANADA) has developed a comprehensive automotive training program designed to prepare students for a rewarding career in the automotive industry. The program is currently offered at the Rockville campus of Montgomery College in Maryland, Marshall Academy in Falls Church, Virginia, and at Hayfield Secondary in Alexandria, Virginia.

The automotive education program is aligned with the National Automotive Technicians Education Foundation (NATEF) standards. The standards were developed by master automobile technicians in cooperation with educators and offer a means by which educational programs can ensure a rigorous educational program while ensuring alignment with the automotive industry.

The following describes the scope and sequence of instruction:

First Year	Unit(s)
Module 1	Vehicle Service and Safety (6) Brakes (105) Steering and Suspension (95)
Module 2	Electrical/ Electronic Systems (230)
Second Year	**Unit(s)**
Module 3	Engine Performance (220)
Module 4	Engine Repair (120) Heating and Air Conditioning (90)
Second Year	**Unit(s)**
Module 5	Automatic Transmissions & Transaxles (220) Manual Drive Train & Axles (100)

NATEF required hours are listed in parenthesis next to the module description. The required NATEF hours are achieved through a combination of classroom instruction that is provided eight hours per week over a 15 week semester. The instruction is reinforced with the requirement that students also demonstrate proficiency in specific tasks while they work at a sponsoring dealership. In addition to NATEF standards, students will be introduced to one hour of manufacturer specific training that utilizes distant learning activities and manufacturer online training programs.

Module 1

INTRODUCTION TO AUTOMOTIVE TECHNOLOGY: VEHICLE SERVICE AND SAFETY

UNIT I **Careers in the Automotive Field**
Lesson 1: Automotive Service Excellence (ASE) Areas
Lesson 2: Work in the Field

UNIT II **Chemicals and Their Use**
Lesson 1: Solvents
Lesson 2: Soaps and Cleaning Solutions
Lesson 3: Lubricants
Lesson 4: Gasses and Dust

UNIT III **Basic Hand Tools**
Lesson 1: Types of Wrenches and Sockets
Lesson 2: Types of Screwdrivers and Pliers
Lesson 3: Types of Hammers, Punches, and Chisels

UNIT IV **Specialty Tools, Fasteners, and Measuring Tools**
Lesson 1: Types of Wrenches and Sockets
Lesson 2: Types of Screwdrivers and Pliers
Lesson 3: Types of Hammers, Punches, and Chisels

UNIT V **Power Tools and Equipment**
Lesson 1: Power Tools
Lesson 2: Shop Equipment

UNIT VI **Safety Clothing and Equipment**
Lesson 1: Personal Protective Clothing and Equipment
Lesson 2: Fires and Fire Extinguishers
Lesson 3: Federal and State Agency Regulations

UNIT VII **Shop Operation**
Lesson 1: Personal Protective Clothing and Equipment
Lesson 2: Fires and Fire Extinguishers
Lesson 3: Federal and State Agency Regulations

Module 1 (cont.)

BRAKES

UNIT I **Introduction to Brake Systems**
Lesson 1: Fundamental Principles of Brake Systems

UNIT II **Disc and Drum Brake System Components and How They Operate**
Lesson 1: Hydraulic System Components
Lesson 2: Operating Principles of Disc and Drum Brakes

UNIT III **Properties of Brake Fluid and Brake System Bleeding Procedures**
Lesson 1: The Selection and Handling of Brake Fluid
Lesson 2: Bleeding Brake Systems

UNIT IV **Diagnosing and Determining Needed Repairs on Automotive Brake Systems**
Lesson 1: Troubleshooting Various Brake System Problems
Lesson 2: Brake Diagnosis Procedures
Lesson 3: Wheel Bearing Service and Adjustment

UNIT V **Repairing, Replacing and Adjusting Hydraulic System Components**
Lesson 1: Servicing the Master Cylinder
Lesson 2: Servicing Hydraulic Brake Plumbing
Lesson 3: Servicing Brake System Switches and Valves

UNIT VI **Repairing, Replacing and Adjusting Disc Brake Components**
Lesson 1: Removing, Repairing and Replacing Disc Brake Calipers
Lesson 2: Servicing Disc Brake Rotors

UNIT VII **Drum Brake Service and Repair**
Lesson 1: Servicing Drum Brake Systems
Lesson 2: Servicing Brake Drums

UNIT VIII **Diagnosing and Repairing Power-Assisted and Anti-Lock Brake Systems**
Lesson 1: Identifying Power Brake and Repair Components
Lesson 2: Overview of Anti-Lock Brake Systems
Lesson 3: Service Procedures for Anti-Lock Brake Systems

Module 1 (cont.)

STEERING AND SUSPENSION SYSTEMS

UNIT I **General Steering and Suspension System Diagnosis**
- Lesson 1: Steering and Suspension Systems Overview
- Lesson 2: Work Orders and General Diagnosis

UNIT II **Steering System Design and Fluid Service**
- Lesson 1: Introduction to Steering Systems
- Lesson 2: Conventional Steering System Components and Operation
- Lesson 3: Rack-and-Pinion Steering System Components and Operation
- Lesson 4: Servicing Steering Fluids and Diagnosing Leaks

UNIT III **Steering Gear and Linkage Diagnosis and Repair**
- Lesson 1: Diagnosing the Steering Gear
- Lesson 2: Repairing a Manual Steering Gear
- Lesson 3: Repairing an Integrated Power Steering Gear
- Lesson 4: Inspecting and Replacing Linkages

UNIT IV **Rack-and-Pinion Steering Diagnosis and Repair**
- Lesson 1: Diagnosing and Repairing a Manual Rack-and-Pinion Steering Gear
- Lesson 2: Diagnosing and Repairing a Power Rack-and-Pinion Steering Gear
- Lesson 3: Repairing Rack-and-Pinion Steering External Components

UNIT V **Power Steering System Diagnosis and Repair**
- Lesson 1: Pressure Testing Power Steering Systems
- Lesson 2: Replacing and Servicing Power Steering Components

UNIT VI **Steering Column Diagnosis and Repair**
- Lesson 1: Energy-Absorbing Steering Column Design and Operation
- Lesson 2: Air Bag System Design and Operation
- Lesson 3: Steering Column Diagnosis and Repair

UNIT VII **Suspension System Designs**
- Lesson 1: Introduction to Suspension Systems
- Lesson 2: Front Suspension System Types and Components
- Lesson 3: Rear Suspension System Types and Components

UNIT VIII **Front Suspension Diagnosis and Repair**

Lesson 1: Diagnosing and Servicing a Front Suspension System

Lesson 2: Inspecting and Replacing Front Suspension Control Components

Lesson 3: Inspecting and Replacing Front Suspension Springs, Ball Joints, and Control Arms

Lesson 4: Servicing Front Strut Suspensions

UNIT IX **Rear Suspension Diagnosis and Repair**

Lesson 1: Diagnosing and Repairing Rear Suspension Systems

UNIT X **Electronic Suspension Control Systems Diagnosis and Repair**

Lesson 1: Electronic Suspension Control Systems Design

Lesson 2: Diagnosing and Repairing Electronic Suspension Control Systems

UNIT XI **Wheel Bearing and Spindle Diagnosis and Repair**

Lesson 1: Wheel Bearing and Spindle Design

Lesson 2: Diagnosing and Repairing Wheel Bearings and Spindles

UNIT XII **Wheel and Tire Design**

Lesson 1: Wheel Design

Lesson 2: Tire Design

UNIT XIII **Wheel and Tire Diagnosis and Repair**

Lesson 1: Inspecting and Rotating Tires

Lesson 2: Mounting Tires and Repairing Punctures

Lesson 3: Principles of Wheel Balance and Runout

Lesson 4: Testing for and Correcting Wheel-and-Tire Assembly Runout and Imbalance

UNIT XIV **Wheel Alignment Diagnosis, Adjustment, and Repair**

Lesson 1: Diagnosing Various Steering, Suspension, and Wheel Alignment Concerns

Lesson 2: Principles of Wheel Alignment

Lesson 3: Measuring and Correcting Wheel Alignment

Module 2
ELECTRICAL SYSTEMS

UNIT I **Principles of Electricity**
Lesson 1: Electrons and Electrical Theory
Lesson 2: Electrical Measurement and Ohm's Law

UNIT II **Electrical Circuit Design**
Lesson 1: Electrical Circuit Components

UNIT III **Test and Service of Electrical Circuits**
Lesson 1: Safety in Testing Electrical Systems
Lesson 2: Use of Electrical Manuals
Lesson 3: Wire and Connector Repairs
Lesson 4: Test Equipment and Test Procedures

UNIT IV **Batteries**
Lesson 1: The Basics of the Battery
Lesson 2: Battery Condition Tests
Lesson 3: Charge and Install a Battery and Jump Start a Vehicle

UNIT V **Starting Systems**
Lesson 1: Starting System Components
Lesson 2: Test the Starting System
Lesson 3: Service the Starter

UNIT VI **Charging Systems**
Lesson 1: The Basics of the Charging System
Lesson 2: Inspect and Test the Charging System
Lesson 3: Service the Charge System

UNIT VII **Lighting Systems**
Lesson 1: Identify the Lighting System and Components
Lesson 2: Test and Diagnosis of the Lighting System
Lesson 3: Service the Lighting System

Module 3
ENGINE PERFORMANCE: IGNITION SYSTEMS

UNIT I **Introduction to Ignition Systems**
Lesson 1: Overview of Ignition Systems

UNIT II **General Engine Diagnosis**
Lesson 1: Performing Preliminary Engine Diagnosis
Lesson 2: Performing Engine Diagnostic Tests
Lesson 3: Performing Engine System Diagnostic Tests

UNIT III **Computerized Engine Controls Diagnosis and Repair**
Lesson 1: Introduction to Computerized Engine Controls
Lesson 2: On-Board Diagnostics and Driveability
Lesson 3: Test and Service Computerized Engine Control Components

UNIT IV **Distributor Ignition (DI) Systems**
Lesson 1: Overview and Theory of Distributor Ignition Systems
Lesson 2: Diagnosing and Servicing Distributor Ignition Systems

UNIT V **Electronic Ignition (EI) Systems**
Lesson 1: Overview and Theory of Electronic Ignition Systems
Lesson 2: Diagnosing and Servicing Electronic Ignition Systems

UNIT VI **Engine Related Service**
Lesson 1: Engine Related Service
Lesson 2: Oxyfuel Heating and Cutting

Module 3 (cont.)
ENGINE PERFORMANCE: FUEL AND EXHAUST SYSTEMS

UNIT I **Introduction to Fuels**
Lesson 1: Fuels and Fuel Specifications

UNIT II **General Engine Diagnosis**

Lesson 1: Performing Preliminary Engine Diagnosis

Lesson 2: Performing Engine Diagnostic Tests

Lesson 3: Performing Engine System Diagnostic Tests

UNIT III **Computerized Engine Controls Diagnosis and Repair**

Lesson 1: Introduction to Computerized Engine Controls

Lesson 2: On-Board Diagnostics and Driveability

Lesson 3: Test and Service Computerized Engine Control Components

UNIT IV **Fuel Supply Systems**

Lesson 1: Overview of Fuel Supply Systems

Lesson 2: Test and Service Fuel Supply Systems

UNIT V **Electronic Fuel Injection Systems**

Lesson 1: Overview of Electronic Fuel Injection Systems

Lesson 2: Diagnose and Service Electronic Fuel Injection Systems

UNIT VI **Turbochargers and Superchargers**

Lesson 1: Turbochargers and Superchargers

UNIT VII **Exhaust Systems**

Lesson 1: Diagnose and Service the Exhaust System

UNIT VIII **Engine Related Service**

Lesson 1: Engine Related Service

Lesson 2: Oxyfuel Heating and Cutting

Module 3

ENGINE PERFORMANCE: EMISSION CONTROL SYSTEMS

UNIT I **Introduction to Emission Control Systems**
Lesson 1: Overview of Emission Control Systems

UNIT II **General Engine Diagnosis**
Lesson 1: Performing Preliminary Engine Diagnosis
Lesson 2: Performing Engine Diagnostic Tests
Lesson 3: Performing Engine System Diagnostic Tests

UNIT III **Computerized Engine Controls Diagnosis and Repair**
Lesson 1: Introduction to Computerized Engine Controls
Lesson 2: On-Board Diagnostics and Driveability
Lesson 3: Test and Service Computerized Engine Control Components

UNIT IV **Positive Crankcase Ventilation System**
Lesson 1: Diagnose and Service the Positive Crankcase Ventilation System

UNIT V **Exhaust Gas Recirculation**
Lesson 1: Diagnose and Service the Exhaust Gas Recirculation System

UNIT VI **Exhaust Gas Treatment**
Lesson 1: Diagnose and Service Secondary Air Injection Systems
Lesson 2: Diagnose and Service the Catalytic Converter

UNIT VII **Evaporative Emissions Controls**
Lesson 1: Diagnose and Service Evaporative Emissions Controls

UNIT VIII **Engine Related Service**
Lesson 1: Engine Related Service
Lesson 2: Oxyfuel Heating and Cutting

Module 4
ENGINE REPAIR

UNIT I **Engine Design**
Lesson 1: Principles of Engine Design

UNIT II **Engine Diagnosis, Removal, and Installation**
Lesson 1: General Engine Diagnosis
Lesson 2: Engine Diagnostic Tests
Lesson 3: Engine Removal and Installation

UNIT III **Cylinder Head and Valve Train Diagnosis and Repair**
Lesson 1: Cylinder Head and Valve Train Function and Construction
Lesson 2: Cylinder Head Diagnosis and Repair
Lesson 3: Valve Train Diagnosis and Repair

UNIT IV **Engine Block Assembly Diagnosis and Repair**
Lesson 1: Engine Disassembly and Assembly

UNIT V **Lubrication and Cooling Systems Diagnosis and Repair**
Lesson 1: Lubrication System Function and Components
Lesson 2: Lubrication System Diagnosis and Repair
Lesson 3: Cooling System Function and Components
Lesson 4: Cooling System Diagnosis and Repair

Module 4 (cont.)

HEATING AND AIR CONDITIONING

UNIT I **Principles of Automotive Air Conditioning**

Lesson 1: Principles of Refrigeration

Lesson 2: Operating Principles of Air Conditioning Systems

UNIT II **Automotive Air Conditioning System Design**

Lesson 1: Components of the Air Conditioning System and How They Function

Lesson 2: Typical Air Conditioning System Designs

UNIT III **Equipment and Refrigerants for Automotive Air Conditioning System Service**

Lesson 1: Equipment and Refrigerants for Servicing the Air Conditioning System

Lesson 2: Alternate Refrigerants

UNIT IV **Air Conditioning System Diagnosis, Repair, and Service**

Lesson 1: Diagnosing, Repairing, and Servicing the Air Conditioning System

UNIT V **Compressor and Clutch Diagnosis and Repair**

Lesson 1: Diagnosing and Repairing the Compressor and Clutch

UNIT VI **Condenser, Evaporator, and Related Components Diagnosis and Repair**

Lesson 1: Diagnosing and Repairing the Condenser, Evaporator, and Related Components

UNIT VII **Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair**

Lesson 1: Operation of the Heating and Cooling Systems

Lesson 2: Diagnosing and Repairing the Heating and Cooling Systems

UNIT VIII **Operating Systems and Related Controls Diagnosis and Repair**

Lesson 1: Electrical Components

Lesson 2: Heating and Air Conditioning Control Devices

Lesson 3: Operation of Automatic and Semiautomatic Heating and Cooling Control Systems

Lesson 4: Diagnosing Automatic and Semiautomatic Control Systems

UNIT IX **Air Conditioning System Retrofits**

Lesson 1: Retrofitting the Air Conditioning System

Module 5

MANUAL DRIVE TRAIN AND AXLES

UNIT I **Introduction to Manual Drive Train and Axle Design**

Lesson 1: Manual Drive Train and Axle Design

UNIT II **Manual Transmission Components and Operation**

Lesson 1: Manual Transmission Gear Components and Operation

Lesson 2: Manual Transmission Design and Operation

UNIT III **Manual Transmission Diagnosis and Repair**

Lesson 1: Diagnose and Performance Test a Manual Transmission

Lesson 2: Remove, Disassemble, Inspect, and Clean a Manual Transmission

Lesson 3: Reassemble and Reinstall a Manual Transmission

UNIT IV **Clutch Assembly Components and Operation**

Lesson 1: Clutch Assembly Components and Operation

UNIT V **Clutch Assembly, Diagnosis, and Repair**

Lesson 1: Clutch Assembly Diagnosis

Lesson 2: Clutch Assembly Repair

UNIT VI **Drive Shaft Diagnosis and Repair**

Lesson 1: Drive Shaft Components

Lesson 2: Drive Shaft Diagnosis and Removal

Lesson 3: Drive Shaft Inspection and Repair

UNIT VII **Differential Components and Operation**

Lesson 1: Differential Component Design

UNIT VIII **Differential Diagnosis and Removal**

Lesson 1: Differential Diagnosis

Lesson 2: Differential Repair

Lesson 3: Operation of Automatic and Semiautomatic Heating and Cooling Control Systems

Lesson 4: Diagnosing Automatic and Semiautomatic Control Systems

UNIT IX **Differential Repair, Installation, and Performance Test**

Lesson 1: Differential Disassembly, Clean and Inspect

Lesson 2: Differential Assembly, Adjustment, Installation, and Performance Test

UNIT X **Manual Transaxle Operation and Diagnosis**

Lesson 1: Manual Transaxle Operation

Lesson 2: Manual Transaxle Diagnosis

UNIT XI **Manual Transaxle Repair, Installation, and Performance Test**

Lesson 1: Transaxle Removal and Disassembly

Lesson 2: Clean, Inspect, and Transaxle Assembly

Lesson 3: Transaxle Installation and Performance Test

UNIT XII **Four-Wheel-Drive Operation, Diagnosis, and Repair**

Lesson 1: Four-Wheel-Drive Components and Operation

Lesson 2: Four-Wheel-Drive Diagnosis and Repair

UNIT XIII **Transfer Case Diagnosis and Repair**

Lesson 1: Transfer Case Components and Operation

Lesson 2: Transfer Case Diagnosis and Removal

Lesson 3: Disassemble, Clean, Adjust, and Reassemble a Transfer Case

Lesson 4: Transfer Case Installation and Performance Test

The above listed curriculum plan was adopted and based on the Instructional Materials Laboratory (IML) nationally recognized curriculum package and is aligned with NATEF standards.

WANADA ADEI Technician Training Program
MASTER AUTOMOBILE SERVICE TECHNOLOGY
TASK LIST

ENGINE REPAIR

General: Engine Diagnosis; Removal and Reinstallation (R & R)

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
2. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.
3. Verify the operation of the instrument panel engine warning indicators.
4. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
5. Install engine covers using gaskets, seals, and sealers as required.
6. Remove and replace timing belt; verify correct camshaft timing.
7. Perform standard fastener and a thread repair, including removing broken bolts, restoring internal and external threads, and repairing internal lines with thread insert.
8. Inspect, remove and replace engine mounts.
9. Identify hybrid vehicle internal combustion engine service precautions.

ENGINE REPAIR

Cylinder Head and Valve Train Diagnosis and Repair

1. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.
2. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.
3. Inspect pushrods, rocker arms, pivots, and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
4. Adjust valves (mechanical or hydraulic lifters).
5. Inspect and replace camshaft and drive belt/chain; includes checking drive

gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/ tone-wheel, and valve timing components; verify correct camshaft timing.

6. Establish camshaft position sensor indexing.

ENGINE REPAIR

Engine Block Assembly Diagnosis and Repair

1. Remove, inspect, or replace the crankshaft vibration damper (harmonic balancer.)

ENGINE REPAIR

Lubrication and Cooling Systems Diagnosis and Repair

1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action.
2. I identify the causes of engine overheating.
3. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
5. Inspect, remove, and replace the water pump.
6. Remove and replace the radiator.
7. Remove, inspect, and replace the thermostat and gasket/seal.
8. Inspect and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
9. Perform oil pressure tests; determine necessary action.
10. Perform engine oil and filter change.
11. Inspect auxiliary coolers; determine necessary action.
12. Inspect, test, and replace oil temperature, pressure switches, and sensors.

AUTOMATIC TRANSMISSION AND TRANSAXLE

General: Transmission and Transaxle Diagnosis

1. Identify and interpret transmission/transaxle concerns, differentiate between engine performance and transmission/transaxle concerns, and determine necessary action.
2. Research applicable vehicle and service information fluid type, vehicle service history, service precautions, and technical service bulletins.
3. Diagnose fluid loss and condition concerns; determine necessary action.
4. Check fluid level in transmission or a transaxle with a dip-stick.
5. Check fluid level in transmission or a transaxle not equipped with a dip-stick.
6. Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.
7. Diagnose noise and vibration concerns; determine necessary action.
8. Perform stall test; determine necessary action.
9. Perform lock-up converter system tests; determine necessary action.
10. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.
11. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.
12. Diagnose pressure concerns in transmission using hydraulic principles (Pascal's Law).

AUTOMATIC TRANSMISSION AND TRANSAXLE

In-Vehicle Transmission/Transaxle Maintenance and Repair

1. Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.
2. Inspect for leakage; replace external seals, gaskets, and bushings.
3. Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.
4. Drain and replace fluid and filter(s).
5. Inspect powertrain mounts.

AUTOMATIC TRANSMISSION AND TRANSAXLE

Off-Vehicle Transmission and Transaxle Repair

1. Remove and reinstall transmission/transaxle and the torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces.
2. Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.
3. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.
4. Describe the operational characteristics of a continuously variable transmission (CVT).
5. Describe the operational characteristics of a hybrid vehicle drive train.

MANUAL DRIVE TRAIN AND AXLES

General: Drive Train Diagnosis

1. Identify and interpret drive train concerns; determine necessary action.
2. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.
3. Check fluid condition; check for leaks; determine necessary action.
4. Drain and refill manual transmission/transaxle and final drive unit.

MANUAL DRIVE TRAIN AND AXLES

Clutch Diagnosis and Repair

1. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.
2. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.
3. Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).
4. Bleed clutch hydraulic system.
5. Check and adjust clutch master cylinder fluid level; check for leaks.
6. Inspect flywheel and ring gear for wear and cracks; determine necessary action.
7. Measure flywheel runout and crankshaft end play; determine necessary action.

MANUAL DRIVE TRAIN AND AXLES

Transmission/Transaxle Diagnosis and Repair

1. Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.
2. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.
3. Diagnose noise concerns by applying transmission/transaxle powerflow principles.
4. Diagnose hard shifting and jumping out of gear concerns; determine necessary action.
5. Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.

MANUAL DRIVE TRAIN AND AXLES

Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair

1. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.
2. Diagnose universal joint noise and vibration concerns; perform necessary action.
3. Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.
4. Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
5. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.

MANUAL DRIVE TRAIN AND AXLES

Drive Axle Diagnosis and Repair Ring and Pinion Gears and Differential Case Assembly

1. Clean and inspect differential housing; check for leaks; inspect housing vent.
2. Check and adjust differential housing fluid level.
3. Drain and refill differential housing.
4. Diagnose noise and vibration concerns; determine necessary action.
5. Inspect and replace companion flange and pinion seal.

6. Measure companion flange runout.

Limited Slip Differential

1. Diagnose noise, slippage, and chatter concerns; determine necessary action.

Drive Axles

1. Inspect and replace drive axle wheel studs.
2. Remove and replace drive axle shafts.
3. Inspect and replace drive axle shaft seals, bearings, and retainers.
4. Measure drive axle flange runout and shaft end play; determine necessary action.
5. Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.

MANUAL DRIVE TRAIN AND AXLES

Four-wheel Drive/All-wheel Drive Component Diagnosis and Repair

1. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
2. Inspect front-wheel bearings and locking hubs; perform necessary action(s).
3. Check for leaks at drive assembly seals; check vents; check lube level.
4. Identify concerns related to variations in tire circumference and final drive ratios.
5. Diagnose noise, vibration, and unique steering concerns; determine necessary action.
6. Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.

SUSPENSION AND STEERING

General: Suspension and Steering Systems

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
2. Identify and interpret suspension and steering system concerns; determine necessary action.

SUSPENSION AND STEERING

Steering Systems Diagnosis and Repair

1. Disable and enable supplemental restraint system (SRS).
2. Remove and replace the steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
3. Diagnose steering column noises, looseness, and urgent concerns (including tilt mechanisms); determine necessary action.
4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard stiff steering, and noise concerns; determine necessary action.
5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, stiff steering, and noise concerns; determine necessary action.
6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.
7. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
8. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.
9. Determine proper power steering fluid type; inspect the fluid level and condition.
10. Flush, fill, and bleed power steering system.
11. Inspect for power steering fluid leakage; determine necessary action.
12. Remove, inspect, replace, and adjust the power steering pump drive belt.
13. Remove and reinstall the power steering pump.
14. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
15. Inspect and replace power steering hoses and fittings.
16. Replace power steering pump filter(s).
17. Inspect and replace pitman arm, relay (Centrelink/intermediate) rod, idler arm and mountings, and steering linkage damper.
18. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
19. Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.

20. Identify hybrid vehicle power steering system electrical circuits and safety precautions.

SUSPENSION AND STEERING

Suspension Systems Diagnosis and Repair

1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
2. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
3.
4. Inspect, remove and install upper and lower control arms, bushings, shafts, and rebound bumpers.
5. Inspect, remove and install strut rods and bushings.
6. Inspect, remove and install upper and lower ball joints (with or without wear indicators).
7. Inspect, remove and install steering knuckle assemblies.
8. Inspect, remove and install short and long arm suspension system coil springs and spring insulators.
9. Inspect, remove and install torsion bars and mounts
10. Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links.
11. Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
12. Inspect, remove and install track bar, strut rods/radius arms, and related mounts and bushings.
13. Inspect rear suspension system leaf spring(s), bushings, center pins/bolts, and mounts.
14. Inspect electric power-assisted steering.

SUSPENSION AND STEERING

Related Suspension and Steering Service

1. Inspect, remove, and replace shock absorbers; inspect mounts and bushings.
2. Remove, inspect, and service or replace front and rear wheel bearings.
3. Describe the function of the power steering pressure switch.

SUSPENSION AND STEERING

Wheel Alignment Diagnosis, Adjustment, and Repair

1. Diagnose vehicle wander, drift, pull, stiff steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
2. Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.
3. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.
4. Check toe-out-on-turns (turning radius); determine necessary action.
5. Check SAI (steering axis inclination) and included angle; determine necessary action.
6. Check rear wheel thrust angle; determine necessary action.
7. Check for front wheel setback; determine necessary action.
8. Check front and rear cradle (subframe) alignment; determine necessary action.

SUSPENSION AND STEERING

Wheels and Tires Diagnosis and Repair

1. Inspect tire condition; identify tire wear patterns; check for correct tire size and application (load and speed ratings) and adjust air pressure; determine necessary action.
2. Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
3. Rotate tires according to the manufacturer's recommendations.
4. Measure wheel, tire, axle flange, and hub runout; determine necessary action.

5. Diagnose tire pull problems; determine necessary action.
6. Dismount, inspect, and remount tire on the wheel; balance wheel and tire assembly (static and dynamic).
7. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
8. Inspect tire and wheel assembly for air loss; perform necessary action.
9. Repair the tire using the internal patch.
10. Identify and test tire pressure monitoring system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lamps.
11. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.

BRAKES

General: Brake Systems Diagnosis

1. Identify and interpret brake system concerns; determine necessary action.
2. Research vehicle and service information, history, precautions, and technical service bulletins.
3. Describe the procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).

BRAKES

Hydraulic System Diagnosis and Repair

1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).
2. Measure brake pedal height, travel, and free play (as applicable); determine necessary action.
3. Check master cylinder for internal/external leaks and proper operation; determine necessary action.
4. Remove, bench bleed, and reinstall the master cylinder.
5. Diagnose poor stopping, pulling, or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.
6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, and wear; check for loose fittings and supports; determine necessary action.
7. Replace brake lines, hoses, fittings, and supports.

8. Fabricate brake lines using appropriate material and flaring procedures (double flare and ISO types).
9. Select, handle, store, and fill brake fluids to the proper level.
10. Inspect, test, and replace brake warning light system components.
11. Identify components of the brake warning light system.
12. Bleed and flushed the brake system.
13. Test brake fluid for contamination.

BRAKES

Drum Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation concerns; determine necessary action.
2. Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
3. Refinish brake drum and measure final drum diameter; compare with specifications.
4. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjustersself-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
5. Inspect wheel cylinders for leaks and proper operation; remove and replace them.
6. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.
7. Install wheel and torque lug nuts.

BRAKES

Disc Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine necessary action.
2. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.
3. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
4. Remove, inspect, and replace pads and retaining hardware; determine necessary action.

5. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
6. Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
7. Remove and reinstall rotor.
8. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
9. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
10. Retract and re-adjust caliper piston on an integrated parking brake system.
11. Check brake pad wear indicator; determine necessary action.
12. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

BRAKES

Power-Assist Units Diagnosis and Repair

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation.
2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
3. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine necessary action.
4. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine necessary action.
5. Measure and adjust master cylinder pushrod length.

BRAKES

Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair

1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
2. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
3. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
4. Check parking brake operation and parking brake indicator light system operation; determine necessary action.
5. Check operation of brake stop light system.
6. Replace wheel bearing and race.
7. Remove and reinstall sealed wheel bearing assembly.

BRAKES

Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair

1. Identify and inspect electronic brake control system components; determine necessary action.
2. Identify traction control/vehicle stability control system components.
3. Describe the operation of a regenerative braking system.
4. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine necessary action.
5. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.
6. Depressurize high-pressure components of an electronic brake control system.
7. Bleed the electronic brake control system hydraulic circuits.
8. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
9. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).

ELECTRICAL/ELECTRONIC SYSTEMS

General: Electrical System Diagnosis

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance.
4. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
5. Check operation of electrical circuits with a test light.
6. Check operation of electrical circuits with fused jumper wires.
7. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.
8. Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
10. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.
11. Replace electrical connectors and terminal ends.
12. Repair wiring harness.
13. Perform solder repair of electrical wiring.
14. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.
15. Repair wiring harness (including CAN/BUS systems)

ELECTRICAL/ELECTRONIC SYSTEMS

Battery Diagnosis and Service

1. Perform battery state-of-charge test; determine necessary action.
2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
3. Maintain or restore electronic memory functions.
4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
5. Perform slow/fast battery charge according to manufacturer's recommendations.
6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.
8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.
9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

ELECTRICAL/ELECTRONIC SYSTEMS

Starting System Diagnosis and Repair

1. Perform starter current draw tests; determine necessary action.
2. Perform starter circuit voltage drop tests; determine necessary action.
3. Inspect and test starter relays and solenoids; determine necessary action.
4. Remove and install starter in a vehicle.
5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.
6. Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.

ELECTRICAL/ELECTRONIC SYSTEMS

Charging System Diagnosis and Repair

1. Perform charging system output test; determine necessary action.
2. Diagnose (troubleshoot) charging system for causes of undercharge, no-charge, or overcharge conditions.
3. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
4. Remove, inspect, and re-install generator (alternator).
5. Perform charging circuit voltage drop tests; determine necessary action.

ELECTRICAL/ELECTRONIC SYSTEMS

Lighting Systems Diagnosis and Repair

1. Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine necessary action.
2. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
3. Aim headlights.
4. Identify system voltage and safety precautions associated with high-intensity discharge headlights.

ELECTRICAL/ELECTRONIC SYSTEMS

Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair

1. Inspect and test gauges and gauge sending units for causes of abnormal gauge readings; determine necessary action.
2. Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine necessary action.

ELECTRICAL/ELECTRONIC SYSTEMS

Horn and Wiper/Washer Diagnosis and Repair

1. Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.
2. Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
3. Diagnose (troubleshoot) windshield washer problems; perform necessary action.

ELECTRICAL/ELECTRONIC SYSTEMS

Accessories Diagnosis and Repair

1. Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.
2. Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.
3. Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action.
4. Diagnose (troubleshoot) supplemental restraint system (SRS) problems; determine necessary action.
5. Disable and enable an airbag system for vehicle service; verify indicator lamp operation.
6. Remove and reinstall door panel.
7. Check for module communication errors (including CAN/BUS systems) using a scan tool.
8. Describe the operation of keyless entry/remote-start systems.
9. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
10. Verify windshield wiper and washer operation, replace wiper blades.
11. Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception; determine necessary action.
12. Diagnose (troubleshoot) body electronic system circuits using a scan tool; determine necessary action.
13. Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.

14. Perform software transfers, software updates, or flash reprogramming on electronic modules.

HEATING AND AIR CONDITIONING

General: A/C System Diagnosis and Repair

1. Identify and interpret heating and air conditioning problems; determine necessary action.
2. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
3. Performance test A/C system; identify problems.
4. Identify abnormal operating noises in the A/C system; determine necessary action.
5. Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.
6. Leak test A/C system; determine necessary action.
7. Inspect condition of refrigerant oil removed from A/C system; determine necessary action.
8. Determine recommended oil and oil capacity for system application.
9. Using a scan tool, observe and record related HVAC data and trouble codes.

HEATING AND AIR CONDITIONING

Refrigeration System Component Diagnosis and Repair

1. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.
2. Inspect, test, service or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.
3. Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil quantity.
4. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.
5. Determine need for an additional A/C system filter; perform necessary action.
6. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.

7. Inspect A/C condenser for airflow restrictions; perform necessary action.
8. Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine recommended oil quantity.
9. Remove, inspect, and install expansion valve or orifice (expansion) tube.
10. Inspect evaporator housing water drain; perform necessary action.
11. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.

HEATING AND AIR CONDITIONING

Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair

1. Inspect engine cooling and heater systems hoses; perform necessary action.
2. Inspect and test heater control valve(s); perform necessary action.
3. Diagnose temperature control problems in the heater/ventilation system; determine necessary action.

HEATING AND AIR CONDITIONING

Operating Systems and Related Controls Diagnosis and Repair

1. Inspect and test A/C-heater blower motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.
2. Diagnose A/C compressor clutch control systems; determine necessary action.
3. Diagnose malfunctions in the vacuum, mechanical, and electrical components and the electrical controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.
4. Inspect and test A/C-heater control panel assembly; determine necessary action.
5. Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.
6. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; perform necessary action.
7. Identify the source of A/C system odors.
8. Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

HEATING AND AIR CONDITIONING

Refrigerant Recovery, Recycling, and Handling

1. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.
2. Identify and recover A/C system refrigerant.
3. Recycle, label, and store refrigerant.
4. Evacuate and charge A/C system; add refrigerant oil as required.

ENGINE PERFORMANCE

General: Engine Diagnosis

1. Identify and interpret engine performance concerns; determine necessary action.
2. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
3. Diagnose abnormal engine noises or vibration concerns; determine necessary action.
4. Diagnose abnormal exhaust color, odor, and sound; determine necessary action.
5. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
6. Perform cylinder power balance test; determine necessary action.
7. Perform cylinder cranking and running compression tests; determine necessary action.
8. Perform cylinder leakage test; determine necessary action.
9. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.
10. Verify engine operating temperature; determine necessary action.
11. Verify correct camshaft timing.

ENGINE PERFORMANCE

Computerized Engine Controls Diagnosis and Repair

1. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.
2. Access and use service information to perform step-by-step (troubleshooting) diagnosis.
3. Perform active tests of actuators using a scan tool; determine necessary action.
4. Describe the importance of running all OBDII monitors for repair verification.
5. Diagnose the causes of emissions or driveability concerns using stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.
6. Diagnose emissions or driveability concerns without use of stored diagnostic trouble codes; determine necessary action.
7. Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.
8. Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM installed accessories, or similar systems); determine necessary action.

ENGINE PERFORMANCE

Ignition System Diagnosis and Repair

1. Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.
2. Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.
3. Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.
4. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.

ENGINE PERFORMANCE

Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1. Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action.
2. Check fuel for contaminants; determine necessary action.
3. Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.
4. Replace fuel filter(s).
5. Inspect, service, or replace air filters, filter housings, and intake duct work.
6. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
7. Inspect and test fuel injectors.
8. Verify idle control operation.
9. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action.
10. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed.
11. Perform exhaust system back-pressure test; determine necessary action.
12. Check and refill diesel exhaust fluid (DEF).

ENGINE PERFORMANCE

Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1. Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.
2. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
3. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.
4. Diagnose emissions and driveability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action.
5. Diagnose emissions and driveability concerns caused by the evaporative

emissions control system; determine necessary action.

6. Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
7. Inspect, test, service, and replace components of the EGR system including tubing, exhaust passages, vacuum/pressure controls, filters, and hoses; perform necessary action.
8. Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.
9. Inspect and test catalytic converter efficiency.
10. Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.
11. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.

REQUIRED SUPPLEMENTAL TASKS

Shop and Personal Safety

1. Identify general shop safety rules and procedures.
2. Utilize safe procedures for handling of tools and equipment.
3. Identify and use proper placement of floor jacks and jack stands.
4. Identify and use proper procedures for safe lift operation.
5. Utilize proper ventilation procedures for working within the lab/shop area.
6. Identify marked safety areas.
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
8. Identify the location and use of eye wash stations.
9. Identify the location of the posted evacuation routes.
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
11. Identify and wear appropriate clothing for lab/shop activities.
12. Secure hair and jewelry for lab/shop activities.

13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems , and hybrid vehicle high voltage circuits.
14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
15. Locate and demonstrate knowledge of material safety data sheets (MSDS).

Tools and Equipment

1. Identify tools and their usage in automotive applications.
2. Identify standard and metric designation.
3. Demonstrate safe handling and use of appropriate tools.
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper)

Preparing Vehicle for Service

1. Identify information needed and the service requested on a repair order.
2. Identify purpose and demonstrate proper use of fender covers, mats.
3. Demonstrate use of the three C's (concern, cause, and correction).
4. Review vehicle service history.
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Preparing Vehicle for Customer

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

Apprentice Program Summary

You have all heard the horror stories of students who have attended college and graduated with tens of thousands of dollars in student loan debt and a low-paying job or a job not even in their field of study. Automotive technician training is also expensive, with community college-based training averaging $7,000 per year and private programs like Lincoln Tech or UTI topping $25,000 per year or more. ASE tests average $50 each, and Maryland State Inspector Training costs over $1,500, so your educational costs can increase quickly. Under this program, if you complete the course and fulfill at least four years of employment after graduation from the WANADA ADEI, you will not only have zero tuition expenses, but you could have received $3,000 of Snap-on or Matco hand tools at no additional cost to you, along with ASE credits that stay with you. This could save you or your family $50,000 or more in educational expenses. The Fitzgerald Auto Malls is willing to make the educational investment in you as long as you take an interest in your career and bring the passion and commitment to excellence we expect from our associates.

As you start down the road to becoming a technician in the company you will be exposed to various positions within the dealership. If you begin your training and start to feel becoming a technician may not be the career you wish to pursue, you may want to try another position within the dealership. Many technician apprentices have ended up as service advisors, service managers, parts department associates, salespersons, managers in sales or finance, accounting staff, etc. Do not be afraid to tell your manager if your interest changes. We will make every effort to find a position you enjoy and find rewarding. When you enjoy what you do, it is not a job but a passion.

If you are offered the chance to join our team, we hope you realize the unique opportunity The Fitzgerald Auto Mall is extending to you and that you seize that opportunity. Service departments sell parts and labor, and we recognize our technicians are the machines that produce that labor for us to sell. Many companies talk about team members, but you really will be on a team who all work for each other for the benefit of you, your fellow teammates, and our customers. **We call that The Fitzway. There is just no better way!**

That's the FitzWay! There's just no better way to go!

Fitzgerald AUTO MALLS

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