

# NATEF PROGRAM ACCREDITATION STANDARDS

## Automobile

Administered By:

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## **POLICIES**

### **AUTOMOBILE TECHNICIAN TRAINING ACCREDITATION PROGRAM**

The Board of Trustees of the National Automotive Technicians Education Foundation (NATEF) is responsible for accreditation of automotive (automobile, collision repair & refinish, medium/heavy truck) programs at secondary and post-secondary levels. NATEF will grant accreditation to programs that comply with the evaluation procedure, meet established standards, and adhere to the policies in this document. Program accreditation is under the direct supervision of the NATEF Board of Trustees and such personnel designated or employed by NATEF.

#### History

Effective January 1, 2011, NATEF assumed the role of accreditation of automotive programs as an extension of the role of evaluating programs for certification by the National Institute for Automotive Service Excellence (ASE). ASE standards for automobile program certification were introduced in 1982. Standards for collision repair & refinish programs were launched in 1989 and truck standards followed in 1992. NATEF's role in the process was to work with industry and education to update the standards on a regular basis and evaluate programs against those standards. Based on a positive evaluation, programs were "certified" by ASE for a period of five (5) years.

Effective January 1, 2011, all programs that held current program certification, were grandfathered as accredited by NATEF until such time that they must renew their accreditation. At that time, these programs must follow the procedures and meet standards for reaccreditation by NATEF.

The cost to each program for accreditation will be as reasonable as possible to encourage program participation. This cost will include self-evaluation materials, application (processing) fee, on-site team evaluation materials, and the honorarium and expenses of the Evaluation Team Leader (ETL).

The eight Automobile areas that may be accredited are:

- 1. Brakes**
- 2. Electrical/Electronic Systems**
- 3. Engine Performance**
- 4. Suspension and Steering**
5. Automatic Transmission and Transaxle
6. Engine Repair
7. Heating and Air Conditioning
8. Manual Drive Train and Axles

**Four** areas are required for minimum accreditation or renewal of accreditation: Brakes, Electrical/Electronic Systems, Engine Performance, and Suspension & Steering.

In the event a program is not able to meet the accreditation requirements in the four required areas or more, options exist to pursue accreditation as an articulated program. For information on articulated accreditation, see page 12.

**OPTIONAL LIGHT/MEDIUM DUTY CNG/LPG**  
**(\*Order Light/Medium Duty CNG/LPG Materials for Details\*)**

The Light/Medium Duty Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) accreditation areas are optional – supplemental – areas to the existing NATEF Automobile Program. “Master Automobile Program” accreditation is not affected by the addition of these alternative fuel areas. Accreditation in Light/Medium Duty CNG/LPG is dependent on a program meeting the minimum program requirements for accreditation for Automobile, as well as those requirements specified in the Light/Medium Duty CNG/LPG accreditation manual.

*\*\*Programs seeking Light/Medium Duty CNG/LPG accreditation **must** order the separate Light/Medium Duty CNG/LPG accreditation materials\*\**

**Optional Areas for Program Accreditation and Hours Required**

Programs seeking Light/Medium Duty CNG/LPG accreditation must have their automobile program accredited in at least the four required automobile areas or must be accredited in Electrical/Electronic Systems (area 2) and Engine Performance (area 3) and articulate with another NATEF accredited program for Brakes (area 1) and Suspension & Steering (area 4).

Programs may apply for accreditation for LPG only, CNG only, or both CNG and LPG. Areas 2, 3, 9, and 10 are required for minimum accreditation of LPG programs. Areas 2, 3, 12, and 13 are required for minimum accreditation of CNG programs.

9. LPG Diagnosis and Repair
10. LPG Maintenance
11. LPG Conversion/Installation
12. CNG Diagnosis and Repair
13. CNG Maintenance
14. CNG Conversion/Installation

# ACCREDITATION PROCESS

## Program Self Evaluation

The accreditation process begins with an extensive self-evaluation performed by training program instructors, administrators, and advisory committee members. Members of this group compare the program to national standards, and have the opportunity to make improvements before submitting evaluation documents to NATEF.

## NATEF Review

The application for accreditation or renewal of accreditation is then sent to NATEF, where it is reviewed to determine if the program qualifies for an on-site team evaluation.

**Programs will have a maximum of 18 months to complete the accreditation process from the date that their Application for Accreditation or Application for Renewal of Accreditation is received by the NATEF office (this timeframe may be shortened when applying under standards that are in the process of being phased out).**

Once a program is approved for an on-site evaluation, a letter will be sent to the designated point of contact, stating the date in which the program must complete the entire accreditation/renewal of accreditation process.

## On-Site Evaluation

If the program qualifies, an Evaluation Team Leader (ETL), an educator certified by ASE and trained by NATEF, is assigned to the program and an on-site visit is conducted.

## Recommendation for Accreditation

When industry requirements are met, the program will become accredited for a period of five years.

**Expired programs that have let their accreditation lapse for two or more years will be required to follow the procedures for initial accreditation when they apply for renewal of their accreditation.**

*Please note: Expired programs will be allowed to submit the 'renewal of accreditation' forms versus 'initial' accreditation forms up to 18 months past their expiration date (applications for renewal of accreditation submitted 18 months or more after program expiration will be returned). Furthermore, expired programs must complete the entire renewal process within two years of their expiration date.*

Programs having difficulty in meeting the hours or tools & equipment accreditation requirements should consider the following options:

- A) Initiating an Articulation Agreement with another secondary or post-secondary training institution (see NATEF Policies on Articulation Agreements).
- B) Borrowing equipment needed for instruction from a manufacturer, dealership or independent repair shop.
- C) Arranging for instruction on tasks requiring equipment not available in the school program at a dealership or independent repair shop.

Programs choosing option B or C are required to show documentation on where the tasks are taught, by whom, and how students are evaluated.

# **AUTOMOBILE STANDARDS STATEMENTS**

## **STANDARD 1 – PURPOSE**

The automobile technician training program should have clearly stated program goals, related to the needs of the students and employers served.

## **STANDARD 2 – ADMINISTRATION**

Program administration should ensure that instructional activities support and promote the goals of the program.

## **STANDARD 3 – LEARNING RESOURCES**

Support material, consistent with both program goals and performance objectives, should be available to staff and students.

## **STANDARD 4 – FINANCES**

Funding should be provided to meet the program goals and performance objectives.

## **STANDARD 5 – STUDENT SERVICES**

Systematic skills assessment, interviews, counseling services, placement, and follow-up procedures should be used.

## **STANDARD 6 – INSTRUCTION**

Instruction must be systematic and reflect program goals. A task list and specific performance objectives with criterion referenced measures must be used.

## **STANDARD 7 – EQUIPMENT**

Equipment and tools used must be of the type and quality found in the repair industry and must also be the type needed to provide training to meet the program goals and performance objectives.

## **STANDARD 8 – FACILITIES**

The physical facilities must be adequate to permit achievement of the program goals and performance objectives.

## **STANDARD 9 – INSTRUCTIONAL STAFF**

The instructional staff must have technical competency and meet all state and local requirements for accreditation.

## **STANDARD 10 – COOPERATIVE AGREEMENTS**

Written policies and procedures should be used for cooperative and apprenticeship training programs. (This applies only to programs that offer cooperative/apprenticeship training.)

## **STANDARD 11 – E-LEARNING**

Written policies and procedures must be followed when e-learning curricular materials are used outside of scheduled classroom/lab/shop time for the purpose of meeting NATEF instructional hour requirements. (This applies only to programs that are using e-learning to meet program hour requirements. This is a go/no go Standard that requires validation of a 'yes' response to each of the criterion.)

## AUTOMOBILE MINIMUM REQUIREMENTS

1. The minimum program requirements are identical for initial accreditation and for renewal of accreditation.
2. A program providing instruction in all of the automobile areas must have a minimum total of 1,080 hours of combined laboratory/shop (co-op) and classroom instruction. Tasks related to the eight automobile areas may be taught at different times during the course of study. Therefore, the hours for an individual area are the sum total of all the hours of instruction related to the tasks. Individual areas must have the following minimum hours:

<b>a. Brakes</b>	<b>105</b>
<b>b. Electrical/Electronic Systems</b>	<b>230</b>
<b>c. Engine Performance</b>	<b>220</b>
<b>d. Suspension &amp; Steering</b>	<b>95</b>
e. Automatic Transmission & Transaxle	125
f. Engine Repair	120
g. Heating & Air Conditioning	95
h. Manual Drive Train & Axles	<u>90</u>
TOTAL HOURS	1,080

3. All eight areas are required for master accreditation designation.
4. **The average rating on each of Standards 6, 7, 8, and 9 must be a four** on the five-point scale. The program will not be approved for an on-site evaluation if the average is less than 4 on any of those standards. The program should make improvements before submitting the application to NATEF for review. **A program will be denied accreditation if the on-site evaluation team average on Standards 6, 7, 8, or 9 is less than four.**
5. A ‘YES’ response must be achieved on all six (6) criteria in Standard 11 if the program is using it to meet the instructional hour requirements for the purpose of accreditation. The program will not be approved for an on-site evaluation if it cannot support a ‘YES’ response to each criterion on the self-evaluation. ***A program will be denied accreditation if the on-site evaluation team does not give a ‘YES’ response to all six (6) criteria in Standard 11. This applies only to programs using the provisions in Standard 11 for the purpose of meeting instructional hour requirements.***

6. A program may not be approved for an on-site evaluation if the average rating on Standards 1- 5 and 10 is less than a four on the five-point scale. **A program may be denied accreditation if the on-site evaluation team average on Standards 1 - 5 and 10 is less than four.** Approval for on-site evaluation or accreditation will be made by NATEF, based on the number of standards rated at 4 or 5 as well as the individual rating on any standard rated less than four.
7. All instructors must hold current ASE certification in the automobile area(s) in which they teach.
8. All instructors must attend a minimum of 20 hours per year of recognized industry update training relevant to the areas in which their program is accredited.
9. The program Advisory Committee must conduct at least two working meetings a year and must have a minimum of 5 people (excluding school personnel) on the committee. Minutes of the meetings must be provided for review by the on-site evaluation team and must reflect relevant areas of the standards as having been considered by the Advisory Committee.
10. The NATEF Standards recognize that program content requirements vary by program type and by regional employment needs. Therefore, flexibility has been built into the NATEF task list by assigning each task a priority number. The priority number indicates the minimum percentage of those tasks, by area, a program must include in their program in order to be accredited in that area. The Task List is divided into three priority areas. The following guidelines must be followed:

**95% of all Priority 1 (P-1) items must be taught in the curriculum**

**80% of all Priority 2 (P-2) items must be taught in the curriculum**

**50% of all Priority 3 (P-3) items must be taught in the curriculum**

11. A program that does not meet the minimum hour requirements may be eligible for accreditation if both of the following conditions are met for the program areas seeking accreditation:
  - a. show evidence that all graduates from the previous academic year have taken the ASE certification examination, and
  - b. show documentation that 75% of those graduates passed the ASE certification tests.
12. The concern for safety is paramount to the learning environment. Each program area has the following safety requirement preceding all related tasks:

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

## **INFORMATION ABOUT EVALUATION TEAM LEADERS (ETLs)**

Evaluation Team Leaders (ETLs) are educators who have been trained by NATEF to lead the on-site evaluation. The NATEF office will assign an ETL once a program has been approved for an on-site evaluation. Every effort will be made to assign an ETL located close to the school to reduce the cost for the evaluation. Three additional team members, selected by the program and approved by the ETL, are required for an automobile program on-site evaluation (see the following page for additional information about team members and on-site teams).

Persons selected as ETLs must:

1. have a minimum of six years of combined experience as an automobile technician and automobile instructor (at least three years experience as an automobile technician is required);
2. have a B.A. or B.S. in Education from a college or university recognized for teacher training by the state; and
3. be a current ASE certified master automobile technician (A1-A8).

Or, if a state does not require automobile instructors to have a B.A. or B.S. degree, the following qualifications will apply:

1. six years experience as an automobile technician,
2. four years automobile teaching experience at the secondary, post-secondary or community college level, and
3. current ASE certified master automobile technician (A1-A8).

ETL candidates who are active instructors must be directly associated with an accredited program. ETL candidates who are inactive instructors must have formerly been directly associated with an accredited program.

ETL training is valid for three years. However, automatic three-year renewal is granted every time an ETL conducts an on-site evaluation. ETLs are required to attend additional training sessions or serve as a team member if they have not conducted an on-site evaluation within three years. This additional training is required even though the individual holds current ASE certification.

Anyone interested in becoming an Evaluation Team Leader should contact the NATEF office at (703) 669-6650 or their state Trade & Industrial Supervisor for more details.

## INFORMATION ABOUT ON-SITE EVALUATION TEAM MEMBERS

The program requesting accreditation is responsible for recruiting and recommending on-site evaluation team members. The ETL must approve individuals recommended by the program. The on-site evaluation team members must be practicing automobile technicians, service managers or shop owners from businesses in the area served by the training program. For initial accreditation only, one team member may be an automobile instructor from another school district/system\*.

Team members must have:

1. a high school diploma or the equivalent (industry or military training may be considered as the equivalent), and
2. at least seven years full-time experience as a general automobile technician.

ASE automobile certification is recommended but not required.

\* An automobile instructor from another school district/system must have a minimum total of seven years experience, which must include three or more years full-time experience as an automobile technician and three or more years of post high school training.

The **initial** accreditation evaluation team is composed of four individuals: the ETL and three team members. Two team members must be from industry (one from a dealership and one from an independent repair facility). The third member may be from one of the following: a dealership, an independent repair facility or an automobile training program.

The **renewal of accreditation** evaluation team is composed of three individuals: the ETL and two team members. One team member must be from a dealership and one team member must be from an independent repair facility.

Each program requesting initial accreditation or renewal of accreditation must identify their choices for evaluation team members on the On-Site Evaluation Team Member List. An alternate team member choice must be identified on the On-Site Evaluation Team Member List in the event that one of the team members is unable to conduct the on-site evaluation. **The alternate team member must be from either a dealership or from an independent repair facility.**

Team members must not be advisory committee members, former instructors, or graduates of the program within the past ten years.

## TASK LIST INFORMATION

An essential element of any curriculum or training program is a valid task list. Automobile technician instructors need a well-developed task list that serves as a solid base for course of study outlines and facilitates communication and articulation of their training programs with other institutions in the region.

It is a NATEF policy that the task list developed by the National Institute for Automotive Service Excellence (ASE) serves as the basis for the NATEF task list. Panels of technical service experts from the automotive service industry and career technical education are called upon to develop and validate the ASE and NATEF task lists.

The NATEF task list is used to develop the NA3SA test (formerly the End-of-Program test), which was pilot tested in the spring of 1996, and became available for use nationwide in the spring of 1997. The ASE task list is used to develop the ASE certification examination, a nationally recognized symbol of competence in diagnosing and repairing vehicle problems.

Additional information on the development of the NATEF task list can be found in the Task List section.

**All tasks have a Priority designation.** NATEF Standards recognize that program content requirements vary by program type and regional employment needs. Therefore, flexibility has been built into the NATEF task list by assigning each task a priority number. The priority number simply indicates the minimum percentage of those tasks, by area, that a program must include in their curriculum in order to be accredited in that area.

- **Ninety-five percent (95%) of Priority 1 (P-1) items must be taught in the curriculum.**
- **Eighty percent (80%) of Priority 2 (P-2) items must be taught in the curriculum.**
- **Fifty percent (50%) of the Priority 3 (P-3) items must be taught in the curriculum.**

## TOOLS AND EQUIPMENT INFORMATION

The basic tools and equipment that must be available for use in the automobile program are listed in the Tools and Equipment section. Many tools and much of the equipment are the same for some or all of the program areas. However, some equipment is specialized and must be available for use in the selected program areas. These individual program area lists are included in the Tools and Equipment section.

The student hand tool list covers all program areas. This list indicates the tools a student will need to own to be successful in each of the specialty areas.

Although no brand names are listed, the equipment and tools must address the following programmatic issues:

1. Safety - Equipment and tools must have all shields, guards, and other safety devices in place, operable, and used.
2. Type and Quality - The tools and equipment used in an accredited program must be of the type and quality found in industry. They must also be adequate and in sufficient quantity to meet the program goals and student performance objectives.
3. Consumable Supplies - Supplies should be in sufficient quantity to assure continuous instruction. Consumable supplies, such as solvents, sand paper, etc. are not listed.
4. Maintenance - A preventive maintenance schedule should be used to minimize equipment down time.
5. Replacement - A systematic schedule for replacement should be used to maintain up-to-date tools and equipment at industry and safety standards. Information gained from student program evaluations as well as advisory committee input should be used in the replacement process.
6. Inventory - An inventory system should be used to account for tools, equipment, parts, and supplies.
7. Parts Purchasing - A systematic parts-purchasing system should be used from work order to supplier.
8. Hand Tools - Each student should be encouraged to purchase a hand tool set during the period of instruction.
9. Storage - Adequate storage of tools should be provided. Space for storage of the students' hand tools should be provided.

## AUTOMOBILE PROGRAM EVALUATION

NATEF Standards for Initial Accreditation and Renewal of Accreditation are identical. Items listed below are considered **Go/No Go** items, and are critical for accreditation and are in **bold** print in the Automobile Program Self-Evaluation materials.

- 2.5 A** Does the Advisory Committee, with at least five (5) in attendance, convene a minimum of two working meetings per year?
- 5.5 F** Does the Advisory Committee review information from the annual follow-up procedure and provide input for modifications to the training program?
- 6.5 A** Do the [automobile] areas provide theory and “hands-on” training for 95% of the P-1, 80% of the P-2, and 50% of the P-3 tasks, as evidenced by cross-referencing the course of study, lesson plans, job sheets, and student progress charts [in each area to be accredited]?
- 6.5 B** Are the tools and equipment available for the tasks taught in each program area?
- 7.1 A** Are all shields, guards, and other safety devices in place, operable, and used?
- 7.1 B** Do all students, instructors, and visitors wear safety glasses in the lab/shop area while lab is in session?
- 9.1 D** Do instructors hold current ASE certification in the automobile area(s) they teach?
- 9.3 B** Do instructors attend a minimum of 20 hours per year of recognized [industry update training](#) relevant to the areas in which their program is accredited?

*For programs using e-learning for the purpose of meeting NATEF instructional hour requirements, support for a ‘YES’ response must be provided for each criterion below:*

- 11.1 A** Is there documentation that students have access to appropriate technology for e-learning purposes?
- 11.2 A** Are the content/tasks that are to be delivered via e-learning clearly highlighted in the course of study?
- 11.2 B** Is there documentation that e-learning is incorporated into the content/tasks in the program plan?
- 11.2 C** Do the instructional hours to be credited toward meeting up to 25 percent of the program specialty hour requirements correlate with the vendor’s average completion time for each instructional module?
- 11.2 D** Is there documentation of the implementation and use of e-learning instructional materials as evidenced in a Learning Management System (LMS)?
- 11.3 A** Are Advisory Committee meeting minutes available to confirm that the committee has discussed and approved e-learning?

Programs must be able to support a yes response for all eight items (fourteen items if using Standard 11 – E-learning). Programs must also meet the hour requirements listed in item 2 on page 7 in the areas identified for accreditation unless they meet both the requirements listed in item 11 on page 8. **If these responses are not achieved, do not apply for accreditation at this time.**

**In addition, an on-site evaluation will not be scheduled unless the average score on each of Standards 6, 7, 8, and 9 is at least a 4 on the Automobile Program Self-Evaluation.** Please refer to the Automobile Program Requirements for more information.

**Instructors must be ASE certified in the areas they teach. Please refer to item 7 on page 8.**

## **NATEF POLICIES ON ARTICULATION AGREEMENTS FOR NATEF PROGRAM ACCREDITATION**

In a number of states and localities, technician training programs are able to meet NATEF standards for accreditation only by establishing an articulation effort between secondary and post-secondary programs. NATEF Trustee action, as well as language in the Carl D. Perkins Vocational Education Act, encourages articulation between programs at the secondary and post-secondary levels.

Articulation agreements encourage, but cannot require, graduates of secondary programs to go on to post-secondary education. Financial and social considerations suggest that many, perhaps most, graduates must seek employment upon graduation from high school.

Articulation agreements for automobile technician training programs may involve two or more training centers at secondary and post-secondary levels. There are two options available to secondary programs that choose to become accredited as an articulated program:

1. **Traditional Articulation\*** – This option allows Automobile programs to select a minimum of two of the four required automobile specialty areas in which to pursue accreditation, and articulate with another NATEF accredited technician training program that provides instruction in at least the other two required areas. Articulated training centers may both be accredited in one or more of the same specialty areas as long as they meet the minimum required areas (Brakes, Electrical/Electronic Systems, Engine Performance, and Suspension & Steering) jointly. Electrical/ Electronics Systems is required as one of the specialty areas of instruction for all programs that articulate under the traditional articulation method.
  
2. **General Service Technician Program\*** – This program is intended to serve automobile programs in areas where the local employers prefer to hire graduates who have a broad skill set and general understanding of all automotive systems rather than skill sets with greater depth in fewer areas. Articulated accreditation as a general service technician program is available to programs articulating with NATEF accredited programs (with accreditation in the four required areas or more).

**\* The input and advice of each school’s program advisory committee is critical to the decision about which accreditation option is most appropriate for that program and its students.**

Articulation agreements must be in writing and approved by the administration of each institution. The agreement shall:

- a. List the areas of instruction (either General Service Technician or selected traditional areas) to be offered by each training center.

- b. Stipulate how *credit*\* will be granted for successful completion of instruction. This should also include the criteria for evaluating successful completion.
- c. Describe procedures for applying for *credit*\* at the post-secondary level for instruction received.

\* Credit is defined as a form of recognition for work that has been completed. It includes, but is not limited to, granting: academic credit, advanced placement, task completion, etc.

**\*\* IN EVERY CASE A SIGNED COPY OF THE ARTICULATION AGREEMENT MUST BE SUBMITTED WITH THE SELF-EVALUATION MATERIALS. \*\***

## RECOGNITION FOR ACCREDITATION

A program approved for accreditation or renewal of accreditation will receive a plaque that bears the ASE/NATEF seal, the school's name, and the expiration date of accreditation. A statement below the seal will read:

"THE INSTRUCTION, COURSE OF STUDY, FACILITIES AND EQUIPMENT OF THIS INSTITUTION HAVE BEEN EVALUATED BY THE NATIONAL AUTOMOTIVE TECHNICIANS EDUCATION FOUNDATION AND MEET STANDARDS OF QUALITY FOR THE TRAINING OF AUTOMOBILE TECHNICIANS IN THE FOLLOWING AREAS:

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Institutions receiving NATEF accreditation are encouraged to put the following statement on the graduate's diploma or certificate:

"The person holding this diploma has participated in an automobile technician training program that was accredited by the National Automotive Technicians Education Foundation and has completed instruction in the following areas:

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A screened ASE/NATEF logo may be overprinted with the above statement and placed on the graduate's diploma. A camera-ready logo is provided in the promotional material a program receives upon accreditation.

Programs granted initial accreditation will also receive a 24"x30" sign indicating that the training program is NATEF accredited.

## INTEGRATED ACADEMIC SKILLS RECOGNITION

An automotive technician's job description consists of far more than the performance of manipulative tasks required to service today's complex vehicles. Successful technicians must possess an array of workplace skills and a unique blend of academic and technical skills.

To that end, the NATEF Board of Trustees has approved an updated version of integrated academic skills in the disciplines of English, mathematics, and science for automotive technicians. This document includes a listing of communication, math, and science skills required of automotive technicians to effectively analyze, diagnose, service and/or repair today's technically sophisticated automobiles.

Furthermore, the integrated academic skills have been correlated with comparable national standards for English, mathematics, and science as published respectively by the International Reading Association/National Council of Teachers of English, the National Council of Teachers of Mathematics, and the National Science Teachers Association. Such correlations add credibility to the multi-disciplinary approach to training automotive technicians.

ASE and NATEF will issue a certificate of excellence to those programs that provide documentation including, but not limited to, student assignments or activities, classroom/lab instructional materials, student performance records, and interviews with academic instructors.

Programs that wish to receive recognition must complete the Integrated Academic Skills Recognition form and return it with the application for accreditation or renewal of accreditation. Documentation on integrated academic skills activities must be available for the ETL at the time of the on-site evaluation.

Programs may receive recognition in English, Mathematics, Science, or any combination of the three areas.

To receive a copy of the *Integrated Academic Skills* manual for automobile technicians, please go to the NATEF website at [www.natef.org](http://www.natef.org) to access the order form, or contact the NATEF office.

## **APPEALS AND ACTION FOR REVOCATION**

### **APPEALS: PROGRAMS APPLYING FOR ACCREDITATION**

A complaint received from any school concerning the procedures, evaluation or accreditation of the automobile technician training program must be made in writing to the ASE office in Leesburg, VA. It will be immediately referred to the Grievance Examiner who will acknowledge receipt of the complaint in writing to the complainants. Thereafter, the Grievance Examiner will investigate the complaint and prepare a report. A copy of the report will be given to the complainants and to an Appeals Committee within thirty (30) days of the receipt of the complaint.

The Appeals Committee will review the findings and recommendations of the Grievance Examiner, together with the complaint and any data supplied in connection therewith. The Appeals Committee will be empowered to dismiss the matter or to initiate such action as it may deem appropriate.

If the complainants desire to review the Appeals Committee's evaluation, they may do so at the office of the Grievance Examiner in Leesburg, VA. However, they will not be permitted to make copies of the results.

### **ACTION FOR REVOCATION: NATEF ACCREDITED PROGRAMS**

The Appeals Committee will also advise the NATEF President of its judgments and recommendations for action in any cases of malpractice or misrepresentation involving the misuse of NATEF accreditation for an automobile technician training program. Upon receipt of a complaint alleging misuse or misrepresentation by an accredited program, the Grievance Examiner will be notified. The Grievance Examiner will notify the parties against whom the complaint has been filed, in writing, indicating the alleged wrongdoing. The parties will be further advised that they may submit a written explanation concerning the circumstances of the complaint within thirty (30) days. After the Grievance Examiner has considered the complaint and received the explanation, if any, the Grievance Examiner will determine whether there is a reasonable basis for a possible wrongdoing. If the Grievance Examiner finds such a basis, the Grievance Examiner will inform the parties of the findings. At that time, the Grievance Examiner will inform the parties of their right to a hearing before the Appeals Committee. The parties will have fifteen (15) days to notify the Grievance Examiner, in writing, of their decision.

In the event the involved parties elect to be bound by the findings of the Grievance Examiner without a hearing, the Grievance Examiner will submit a written report with recommendations to the Chair of the Appeals Committee. This report will be submitted within sixty (60) days of the receipt of the waiver of a hearing. The Chair of the Appeals Committee will mail a copy of the Grievance Examiner's findings and recommendations to the parties. In the event that the involved parties elect to appear at a hearing, the Chair of the Appeals Committee will call a Board of Inquiry. This Board will consist of four ASE Board members, one from each of the

following categories: Education, Public Interest, Service Employers, and Vehicle and Service Products Manufacturers. The Board of Inquiry will be convened in Leesburg, VA at a date and time determined by the Chair. The Board will notify the involved parties, in writing, regarding the time and place of the hearing.

The Grievance Examiner will be responsible for investigating and presenting all matters pertinent to the alleged wrongdoing to the Board of Inquiry. The involved parties will be entitled to be at the hearings with or without counsel. The parties will be given an opportunity to present such evidence or testimony as they deem appropriate.

The Board of Inquiry will notify the Chair of the Appeals Committee of its findings and recommendations in writing within ten (10) days after the hearing is completed.

The Appeals Committee will review the findings and recommendations of either the Grievance Examiner if a hearing was waived, or the Board of Inquiry if a hearing was held. The Appeals Committee will determine if the record on the complaint supports a finding of conduct contrary to or in violation of reasonable practices. If two-thirds of the Appeals Committee so find, the Committee will recommend to the President of NATEF appropriate sanctions or courses of action against the parties charged.

## DEFINITIONS – EDUCATIONAL TERMS

1. **AREA(S)**: Relates to one or more of the following: (1) Automatic Transmission/Transaxle, (2) Brakes, (3) Electrical/Electronic Systems, (4) Engine Performance (including emission control systems), (5) Engine Repair, (6) Heating and Air Conditioning, (7) Manual Drive Train and Axles, (8) Suspension and Steering, (9) LPG Diagnosis and Repair, (10) LPG Maintenance, (11) LPG Conversion/Installation, (12) CNG Diagnosis and Repair, (13) CNG Maintenance, and (14) CNG Conversion/Installation.
2. **ARTICULATION**: A formal written agreement, usually between a secondary and post-secondary institution that are geographically within a reasonable daily commuting distance of each other. The agreement will clearly denote that students completing specific secondary courses in accordance with predetermined performance criteria will have partially completed commensurate requirements for a completion certificate or diploma awarded by the post-secondary institution. Commensurate requirements could be in the form of credit equivalents, advanced placement, task completion, etc. at the post-secondary institution.
3. **CURRICULUM**: All the objectives of the lesson plan with respect to the content and learning activities, arranged in a sequence for a particular instructional area. An orderly arrangement of integrated subjects, activities, time allocations, and experiences which students pursue for the attainment of a specific educational goal.
4. **COMPETENCY: (Hands On)** - Performance of task to the level or degree specified in the performance standard and curriculum for the task.
5. **COMPETENCY: (Written)** – Understanding of task to the level or degree specified in the performance standard and curriculum for the task.
6. **CRITERION REFERENCED MEASURE(S)**: An exercise based on a performance objective for a task, and designed to measure attainment of that objective. (Also called performance test(s) or criterion-referenced test.)
7. **E-LEARNING**: An electronically-based instructor-managed and student-driven process that enhances and/or supplements learning—outside the regularly scheduled classroom and lab/shop timeframe—and *includes integrated and scored auditable assessment and reporting* in compliance with NATEF’s e-learning general framework criteria.
8. **GOAL**: A statement of the intended outcome of participation in the training program.

9. **LEARNING MANAGEMENT SYSTEM (LMS)**: An interactive electronic instructional delivery platform that also includes an administrative component to monitor and report student progress, time on task, and evaluations of all learning activities performed within the LMS.
10. **MASTERY**: (See Competency - Hands On and Competency - Written).
11. **OBJECTIVE, PERFORMANCE**: A written statement describing an intended outcome (competent task performance) in terms of student performance. (Also called "behavioral" objective or instructional objective) R.F. Mager Associates, 13245 Rhoda Drive, Los Altos Hill, California.
12. **ON-VEHICLE SERVICE AND REPAIR WORK**: The processing, assignment and student performance of the appropriate tasks on vehicles donated by manufacturers or other sources, customer-owned, and other training vehicles.
13. **PERSONAL CHARACTERISTIC**: Attributes that are not readily measurable, and are generally in the affective or cognitive domains.
14. **PRIORITY RATINGS**: Indicates the minimum percentage of tasks, by area, a program must include in its curriculum in order to be accredited in that area.
15. **STANDARD**: "...Something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value, quality, etc." Webster's New World Dictionary (1991)
16. **STANDARD – (PERFORMANCE)**: A written specification of the results of acceptable task performance.
17. **STANDARD – (PERSONAL)**: An attribute or characteristic of an individual that facilitates entry into, or advancement within an occupation.
18. **STANDARD – (PROGRAM)**: A specific quality or desired characteristic of a training program designed to prepare individuals for employment or advancement.
19. **TASK**: A psychomotor or cognitive entry-level learning activity consisting of one or more measurable steps accomplished through an instructor presentation, demonstration, visualization or a student application.
20. **TRAINING STATION**: An area with appropriate tools and equipment, large enough to allow the development of both safety and competency in task performance.

\*\*\*\*\*

Must or shall is an imperative need, duty or requirement; an essential or indispensable item; mandatory.

Should is used to express a recommendation, not mandatory but attainment would increase program quality.

May or could expresses freedom to follow a suggested alternative.

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# PROCEDURES FOR ACCREDITATION/RENEWAL OF ACCREDITATION

## Process Overview

**NOTE:** NATEF recommends that programs maintain a file containing copies of all reference and documentation materials developed during all phases of the accreditation process.

### 1. Purchase application materials

The program requesting accreditation must purchase self-evaluation materials from NATEF in Leesburg, VA. To begin the accreditation process, the program must return the following items from the evaluation materials packet:

- a. Application for Accreditation or Renewal of Accreditation
- b. Self-Evaluation Summary Sheet
- c. On-site Evaluation Team Member List
- d. Instructor Qualifications Forms and [Instructor Training Forms](#)
- e. Advisory Committee List
- f. Articulation Agreement (if applicable)
- g. Applied Academics Recognition Forms (optional)
- h. Payment Worksheet—Purchase Order, Check, or Credit Card Authorization for Application Fee and On-Site Evaluation Team Packets (self-evaluations will be returned if received without payment)
- i. Facilities Evaluation (CNG/LPG programs only)

### 2. NATEF review of application

The national office will review the materials within 30 days. Following the review, the Program Administrator and the state Trade & Industrial Supervisor will be notified about the status of the program. The program will be identified as one of the following:

- a. Qualified for on-site evaluation for all the specialty areas listed on the application.
- b. Qualified for on-site evaluation for some but not all specialty areas listed on the application. The program administrator may proceed with the on-site evaluation for the areas that qualify at that time OR make improvements and resubmit the application at a later date.
- c. Not qualified for an on-site evaluation at that time. NATEF will indicate specific improvements that must be made before the on-site evaluation can be scheduled.

### 3. Evaluation Team Leader (ETL) assigned, Program Coordinator makes contacts

NATEF will assign an Evaluation Team Leader (ETL) to the program. NATEF will send the program the Application for On-site Evaluation. With a legitimate reason, the Program Coordinator may contact the NATEF office to request a different ETL. A request for a different

ETL must be in writing and specific as to the reason for the request. (The ETL assigned must NOT be a present or former teacher or administrator of the program to be evaluated.) The Program Coordinator must contact the ETL to arrange a date for the on-site evaluation.

The Application for the On-site Evaluation will be sent with instructions that outline the plans for the local administration and the costs for the ETL's services and expenses. All costs will be paid by the institution requesting accreditation.

#### **4. Send on-site application, course of study, and list of on-site evaluation team members to ETL**

The Application for On-site Evaluation, signed by the program administrator, must be sent to the ETL. A copy of the course of study, Advisory Committee minutes (one year's worth for initial accreditation; five year's worth for renewal of accreditation) and this application must be received by the ETL at least two weeks prior to the on-site evaluation or the on-site must be rescheduled. The course of study should include the following items:

- a. Syllabus for each class
- b. Tasks to be taught under each area, specified according to Priority designations P-1, P-2, P-3. (Tasks may be taught at different times in the program or in more than one area. However, the hours for the tasks may be counted only once.)
- c. Number of contact hours for each area
- d. Areas and sequence of instruction to be included in the program
- e. List of training materials and audio-visual materials used in training
- f. Sample evaluation form used to track student progress

For programs using e-learning (Standard 11) to meet NATEF hour requirements the following must be included in addition to the above:

- g. Tasks and information to be taught using e-learning materials outside of classroom/lab/shop time
- h. Number of hours allocated to using e-learning instructional materials outside of classroom/lab/shop time correlated with vendor/developer's average completion time for each module
- i. Sample of the Learning Management System (LMS) used to track student progress

The On-site Evaluation Team Member List must be included for the ETL to review and approve. Once a date has been set and the on-site evaluation team members have been approved by the ETL, the program coordinator must contact the on-site evaluation team members to make arrangements for the evaluation day(s).

#### **5. On-site evaluation**

Initial accreditation requires 2 consecutive days while students are in class for the on-site evaluation review of all the standards. However, if more than one program is applying for

accreditation (general automotive and GM ASEP, for example), additional team members and additional days may be required to complete the on-site evaluation. The NATEF office will determine the need for additional team members and days.

Renewal of Accreditation requires a 1-day on-site evaluation while students are in class. The on-site evaluation team reviews Standards 6-9 (and Standard 11 if applicable) as well as all go/no-go (critical) items. However, if the Advisory Committee average on Standards 1-5 or Standard 10 is less than 4, the on-site evaluation team must also review these standards. The NATEF office will determine whether an additional day or additional team members will be required to complete the evaluation.

## **6. ETL reports results to NATEF**

The ETL will submit all on-site evaluation materials and a final report to NATEF with a recommendation for or against program accreditation.

## **7. Program accreditation**

The national office will review the final report and all additional evaluation materials to determine whether the program meets the requirements for accreditation and will make their recommendation to the ASE Board. The NATEF President will approve accreditation as sanctioned by the Board of Directors.

Programs that do not earn accreditation will be given a written report specifying improvements that must be made to qualify for accreditation. The decision at the national level will be final unless appealed to the ASE Board of Directors. Appeals will be heard only at regular meetings of the Board.

The Program Administrator and the state Trade & Industrial Supervisor will be notified of all decisions regarding the accreditation status of all programs applying for NATEF accreditation.

## **8. Display and reporting of accreditation materials**

A wall plaque identifying the accredited areas will be forwarded from the national office to the program administrator. Schools **must** accurately report areas of NATEF accreditation.

## **9. Accredited Technician Training Program List**

The NATEF office maintains a current listing of all NATEF accredited programs. The list is made available on the NATEF website.

## **10. Compliance report**

A program will be accredited for five years. A compliance report is required after 2½ years. The compliance report will be used to verify that a program is maintaining its standards. NATEF will

notify the program administrator of the compliance date and will send the appropriate compliance review forms at that time. The Advisory Committee must complete the report and the program administrator must return the forms to the NATEF office.

NATEF may randomly select programs at the 2½-year period for an on-site compliance review by an ETL and NATEF Trustees, staff, consultants, or other designated representatives. The selected programs will be notified, in advance, of the on-site review by the NATEF office. Programs should be prepared to provide documentation on how they are maintaining the standards. All costs for this on-site review will be paid by NATEF.

## **11. Renewal of Accreditation**

The NATEF office will contact the program eleven (11) months prior to the accreditation expiration date. Programs must formally request renewal of accreditation materials and follow the process outlined above.

## On-site Evaluation Cost Sheet

### AUTOMOBILE

	ACCREDITATION	RENEWAL OF ACCREDITATION
Program Accreditation Documents	\$94.00	\$82.00
Application Fee	\$315.00	\$315.00
On-site Evaluation Team Manuals (minimum of 4 sets for initial documents and 3 sets for renewal @ \$65 each.)	\$260.00	\$195.00
Honorarium for Evaluation Team Leader (ETL) @ \$250/day <b>*Please see below</b>	*\$500.00	*\$250.00
<u>Estimated</u> mileage, hotel, and meal expenses for the ETL <b>**Please see below</b>	<u>\$150.00</u>	<u>\$100.00</u>
<b><u>ESTIMATED</u> TOTAL COSTS</b>	<b>\$1319.00</b>	<b>\$942.00</b>

**NOTE:** It is anticipated that team members recruited from local independent repair facilities and dealerships will serve without charge to the institution.

The NATEF office must receive the application fee and payment for the on-site evaluation team packets with the completed application. Applications received without these payments will be returned to the program for resubmission with payment.

**\*ETLs are to receive an additional honorarium of \$100 per additional program when evaluating multiple programs at one location.** Example: An ETL evaluates one general program and one manufacturer-specific program during an initial accreditation on-site evaluation. The honorarium paid to the ETL would be \$450 for the standard two-day honorarium, and \$100 for the additional program, for a total honorarium of \$550.

*ETLs are paid as independent contractors, not as school employees.*

**\*\*Mileage is to be reimbursed at the “business purpose” rate specified by the IRS. Please visit [IRS.gov](http://IRS.gov) for the current mileage reimbursement rate.**

**Costs of accreditation/renewal of accreditation are subject to change. Contact the NATEF office for current information.**

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## **AUTOMOBILE PROGRAM STANDARDS**

### **STANDARD 1 - PURPOSE**

**THE AUTOMOBILE TECHNICIAN TRAINING PROGRAM SHOULD HAVE CLEARLY STATED PROGRAM GOALS, RELATED TO THE NEEDS OF THE STUDENTS AND EMPLOYERS SERVED.**

#### **Standard 1.1 - Employment Potential**

The employment potential for automobile technicians, trained to the level for the specialty or general areas outlined in the program goals, should exist in the geographic area served by the program.

#### **Standard 1.2 - Program Description/Goals**

The written description/goals of the program should be shared with potential students and should include admission requirements, employment potential, area(s) of specialty training offered, and the cost of all tuition and fees. Technical qualifications of the faculty and the overall goal(s) of the program should also be included.

### **STANDARD 2 - ADMINISTRATION**

**PROGRAM ADMINISTRATION SHOULD ENSURE THAT INSTRUCTIONAL ACTIVITIES SUPPORT AND PROMOTE THE GOALS OF THE PROGRAM.**

#### **Standard 2.1 - Student Competency Certification**

The certificate or diploma a student receives upon program completion should clearly specify the area(s) of demonstrated competency.

#### **Standard 2.2 - Chain of Command**

An organizational chart should be used to indicate the responsibilities for instruction, administration, and support services.

#### **Standard 2.3 - Administrative Support**

Positive administrative support from institutional and local governing bodies should be demonstrated. Indicators of administrative support would include: support for staff in-service training; provision of appropriate facilities; up-to-date tools, equipment, training support materials, and curriculum.

#### **Standard 2.4 - Written Policies**

Written policies should be adopted by the administration and policy board for use in decision-making situations and to provide guidance in achieving the program goals. Policies regarding safety, liability, and lab/shop operation should be written and prominently displayed as well as provided to all students and instructors.

### **Standard 2.5 - Advisory Committee**

An Advisory Committee consisting of at least five (5) members (not including school personnel), must convene at least two times a year and be utilized to provide counsel, assistance, and information from the community served by the training program. This Committee should be broadly based and include former students, employed technicians, employers, and representatives for consumers' interests.

### **Standard 2.6 - Public/Community Relations**

An organized plan should be used to provide the community at large information regarding the training program, its graduates, its plans, and any services provided to the community.

### **Standard 2.7 – Customer Vehicle Work**

A systematic method of collecting, documenting, and disbursing customer vehicle work repair receipts should be used. Instructional staff should not be required to collect payment for customer vehicle work repairs. (This applies only to programs that accept customer vehicles for instruction.)

## **STANDARD 3 - LEARNING RESOURCES**

### **SUPPORT MATERIAL CONSISTENT WITH BOTH PROGRAM GOALS AND PERFORMANCE OBJECTIVES SHOULD BE AVAILABLE TO STAFF AND STUDENTS.**

#### **Standard 3.1 - Service Information**

Service information with current manufacturer's service procedures and specification data for vehicles manufactured within the last ten (10) years should be available. This information should be accessible to students while working in the lab/shop area.

#### **Standard 3.2 - Multimedia**

Appropriate up-to-date multimedia materials such as video equipment, transparencies, CD ROM, etc. should be readily available and utilized in the training process.

#### **Standard 3.3 - Instructional Development Services**

The service of professional instructional development personnel should be used when available. At a minimum, equipment and supplies should be available for duplication or copying printed materials and transparencies. Instructional development personnel should conduct in-service and/or training in curriculum and media development.

#### **Standard 3.4 - Periodicals**

Current general and technical automobile magazines and newspapers should be available for student and instructor use.

### **Standard 3.5 - Student Materials**

Pertinent instructional texts, resources, and e-learning materials should be available for each student to satisfy the objectives of the mode of instruction used. Basic and specialty textbooks should have copyright dates that are not over six (6) years old.

## **STANDARD 4 - FINANCES**

### **FUNDING SHOULD BE PROVIDED TO MEET THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.**

#### **Standard 4.1 - Program Training Cost**

The enrollment in the program or program area should be sufficient to keep the per-student training costs to a realistic figure.

#### **Standard 4.2 - Budget**

An adequate annual budget should be developed, allocated, and used for the operation of the program.

#### **Standard 4.3 - Budget Preparation**

The budget should be prepared by the institutional administration in conjunction with the program faculty.

#### **Standard 4.4 - Status Reports**

Budget status reports should be made available to program staff at least quarterly.

## **STANDARD 5 - STUDENT SERVICES**

### **SYSTEMATIC SKILLS ASSESSMENT, INTERVIEWS, COUNSELING SERVICES, PLACEMENT, AND FOLLOW-UP PROCEDURES SHOULD BE USED.**

#### **Standard 5.1 – Skills Assessment**

For students to develop the skills and knowledge required to service today's automobiles, each student must possess, or be given the opportunity to develop, essential foundation skills in reading, mathematics, science, and mechanical aptitude. To this end, a formal skills assessment instrument (process) for these fundamental skills should be used to evaluate students to ensure that each student has a reasonable probability of success as an automobile technician. Testing procedures and how the test results will be used (e.g., placement, assessment of student's developmental needs, etc.) should be stated in program explanatory material, and justification for all requirements should be available.

#### **Standard 5.2 - Pre-admission Counseling**

Prior to program admission, a student should be counseled regarding automotive careers.

**Standard 5.3 - Student Records**

Permanent records of all students, former and current, should be available, preferably in one central location, and kept confidential.

**Standard 5.4 - Placement**

A systematic student placement system should be used to assist program graduates to obtain employment in the automobile industry.

**Standard 5.5 – Annual Follow-up**

A follow-up system should be used to determine students' employment location and for feedback regarding the efficiency, effectiveness, and appropriateness of training. The follow-up procedure should be designed to assure feedback regarding needed additions to or deletions from the training curriculum, program, and tools and equipment. Follow-up of graduates employed outside of the automobile industry should indicate reasons for non-automobile employment. When applicable, this information should be used to modify the training quality and/or content.

**Standard 5.6 - Legal Requirements**

The training program should meet all applicable local, state, and federal requirements.

**STANDARD 6 - INSTRUCTION**

**INSTRUCTION MUST BE SYSTEMATIC AND REFLECT PROGRAM GOALS. A TASK LIST AND SPECIFIC PERFORMANCE OBJECTIVES WITH CRITERION REFERENCED MEASURES MUST BE USED.**

**Standard 6.1 - Program Plan**

The training plan should progress in logical steps, provide for alternate sequences, where applicable, and be made available to each student.

**Standard 6.2 - Student Training Plan**

A training plan for each student should be developed and used, indicating the student's training goal(s) and specific steps needed to meet that goal. Students should be given a copy of their training plan.

**Standard 6.3 - Preparation Time**

Adequate time should be provided for teacher preparation and program development.

**Standard 6.4 - Teaching Load**

The instructor/student ratio and class contact hours should allow time for interaction on a one-to-one basis.

**Standard 6.5 - Curriculum**

All tasks have been given a priority rating. Ninety-five percent (95%) of the tasks designated as Priority 1 (P-1) must be taught in the curriculum. Eighty percent (80%) of the tasks designated as Priority 2 (P-2) must be taught in the curriculum. Fifty percent (50%) of the tasks designated as Priority 3 (P-3) must be taught in the curriculum. Additional tasks may be included to meet the needs of local employers. All additional tasks should be approved by the Advisory Committee.

Instruction on the legal aspects and responsibilities of the automobile technician in areas such as Environmental Protection Agency regulations, safety regulations, OSHA regulations, and other appropriate requirements should be included in the curriculum. Instruction and practice in filling out work order forms, ordering parts, and basic record keeping should be a part of the training program.

Tools and equipment must be available to perform the tasks in each of the areas for which accreditation is requested.

**Standard 6.6 - Student Progress**

A record of each student's progress should be maintained through the use of a progress chart or other recording device. The record should indicate tasks required for program completion and those tasks the student has mastered.

**Standard 6.7 - Performance Standards**

All instruction should be performance based, with an acceptable performance standard stated for each task. These standards should be shared with students and potential employers. Students should demonstrate "hands-on competency" of a task before the instructor verifies a student's performance.

**Standard 6.8 - Safety Standards**

Safety instruction should be given prior to lab/shop work and be an integral part of the training program. A safety test should be included in the training program. Students and instructors should comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

**Standard 6.9 - Personal Characteristics**

All training activities and instructional material should emphasize the importance of maintaining high personal standards.

**Standard 6.10 - Work Habits/Ethics**

The training program should be organized in such a manner that work habits and ethical practices required on the job are an integral part of the instruction.

**Standard 6.11 - Provision for Individual Differences**

The training program should be structured in such a manner that students with different levels of cognitive and psychomotor skills can be accommodated.

**Standard 6.12 - Related Instruction**

Instruction in related mathematics, science, communications, and interpersonal relations should be provided and coordinated with ongoing instruction in the training program. This instruction should be provided by a qualified instructor.

**Standard 6.13 - Testing**

Both written and performance based tests should be used to validate student competency. Students should be encouraged to take certification tests that are publicly recognized indicators of capabilities.

**Standard 6.14 - Evaluation of Instruction**

Instructional procedures should be evaluated in a systematic manner. This evaluation should be through regular reviews by students and the administration. Self-evaluation of instruction should also be utilized on a systematic and regular basis. This system should include input from former students and the Advisory Committee members. Instructional procedures should show responsiveness to the feedback from these evaluations.

**Standard 6.15 – On-Vehicle Service and Repair Work**

On-vehicle service and repair work should be scheduled to benefit the student and supplement ongoing instruction on items specified in the NATEF task list. A student should have had instruction and practice on a specific repair task before on-vehicle service and repair work requiring that task is assigned. Vehicles donated by the manufacturers or other sources, customer-owned vehicles, and other training vehicles may be used as the primary source of on-vehicle service and repair work. Training program student-owned vehicles, school buses, and other vehicles owned and operated by the governing body of the school should not be the primary source of on-vehicle service and repair work vehicles. All vehicles in the lab/shop should have a completed industry-type work order attached to or on the vehicle.

**Standard 6.16 - Articulation**

Agreements between programs with equivalent competencies should be used to eliminate unnecessary duplication of instruction and foster continued study.

## **STANDARD 7 - EQUIPMENT**

**EQUIPMENT AND TOOLS USED MUST BE OF THE TYPE AND QUALITY FOUND IN THE REPAIR INDUSTRY AND MUST ALSO BE THE TYPE NEEDED TO PROVIDE TRAINING TO MEET THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.**

### **Standard 7.1 - Safety**

Equipment and tools used in the training program must have all shields, guards, and other safety devices in place, operable, and used. Safety glasses must be worn by all students, instructors, and visitors in the lab/shop area while lab is in session.

### **Standard 7.2 - Quantity and Quality**

The tools and equipment used in the training program should reflect the program goals and performance objectives. Sufficient tools and equipment should be available for the training offered. The tools and equipment should meet industry quality standards.

### **Standard 7.3 - Consumable Supplies**

Sufficient consumable supplies should be readily available to assure continuous instruction.

### **Standard 7.4 - Maintenance**

A preventive maintenance schedule should be used to minimize equipment down-time.

### **Standard 7.5 - Replacement**

An annual review process should be used to maintain up-to-date tools and equipment at industry and safety standards. Student follow-up and Advisory Committee input should be used in this process.

### **Standard 7.6 - Inventory**

An inventory system should be used to account for tools, equipment, parts, and supplies.

### **Standard 7.7 - Parts Purchasing**

A systematic parts purchasing system, from work order - to parts specialist - to jobber, should be used. Task performance should not be unreasonably delayed due to lack of replacement parts.

### **Standard 7.8 - Hand Tools**

Each student should have access to basic hand tools comparable to tools required for employment. Students should be encouraged to purchase a hand tool set during the period of instruction.

## **STANDARD 8 - FACILITIES**

### **THE PHYSICAL FACILITIES MUST BE ADEQUATE TO PERMIT ACHIEVEMENT OF THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.**

#### **Standard 8.1 - Training Stations**

Training stations (bench and on-vehicle service and repair work) should be available in the type and number required for the performance of tasks outlined in the program goals and performance objectives.

#### **Standard 8.2 - Safety**

The facilities should meet all applicable safety standards and an emergency plan should be in place and posted in all classrooms and lab/shop areas.

#### **Standard 8.3 - Maintenance**

A written facilities maintenance program should be used to ensure facilities are suitable when required for instruction.

#### **Standard 8.4 - Housekeeping**

The classroom(s), lab/shop, and support area(s) should be kept clean and orderly.

#### **Standard 8.5 - Office Space**

An area separate from the lab/shop should be available and convenient for the instructor(s) use as an office.

#### **Standard 8.6 - Instructional Area**

A classroom convenient to, but separate from, the lab/shop area should be available for instruction and other non-lab/shop activities.

#### **Standard 8.7 - Storage**

Storage areas for tools, parts, supplies, and automobiles should be sufficient to support the activities outlined in the program goals and performance objectives. Security should be provided to prevent pilferage and vandalism.

#### **Standard 8.8 - Support Facilities**

Restrooms and clean-up areas should be provided for both male and female students and should be convenient to the instructional area.

#### **Standard 8.9 - Ventilation**

An adequate exhaust fume removal system should be in place and operational. When appropriate, heating and cooling systems should be used to provide sufficient comfort for learning.

#### **Standard 8.10 - First Aid**

A first aid kit should be in place and should comply with local regulations and school policy.

**Standard 8.11 - Facility Evaluation**

The Advisory Committee should conduct an annual evaluation of the facilities to assure adequacy to meet program goals.

**STANDARD 9 - INSTRUCTIONAL STAFF****THE INSTRUCTIONAL STAFF MUST HAVE TECHNICAL COMPETENCY AND MEET ALL STATE AND LOCAL REQUIREMENTS FOR ACCREDITATION.****Standard 9.1 - Technical Competency**

Instructors must hold current ASE certification in the automobile areas they teach and which are being evaluated for program accreditation.

**Standard 9.2 - Instructional Competency/Certification**

Instructors should meet all state certifying requirements.

**Standard 9.3 - Technical Updating**

Faculty members should be provided technical materials required to maintain their competency. Instructors must attend a minimum of 20 hours of technical update training each year.

**Standard 9.4 - First Aid**

The program should have a written policy, approved by the administrator of the school, on First Aid procedures.

**Standard 9.5 - Substitutes**

A systematic method of obtaining "substitute" instructors should be used to assure instructional continuity. An orientation session for substitutes should be held on a regular basis. The substitute should be a competent automobile instructor.

**STANDARD 10 - COOPERATIVE AGREEMENTS****WRITTEN POLICIES AND PROCEDURES SHOULD BE USED FOR COOPERATIVE AND APPRENTICESHIP TRAINING PROGRAMS. (This applies only to programs that offer cooperative/apprenticeship training.)****Standard 10.1 - Standards**

The student training plan and performance standards should be developed and coordinated by the automobile instructor.

**Standard 10.2 - Agreements**

All agreements should be written and legally binding.

**Standard 10.3 - Supervision**

A supervising automobile instructor or supervising co-op coordinator should be assigned responsibility, authority, and time to coordinate and monitor automobile cooperative/apprenticeship programs.

**STANDARD 11 – E-LEARNING**

**WRITTEN POLICIES AND PROCEDURES MUST BE FOLLOWED WHEN E-LEARNING CURRICULAR MATERIALS ARE USED OUTSIDE OF SCHEDULED CLASSROOM/LAB/SHOP TIME FOR THE PURPOSE OF MEETING NATEF INSTRUCTIONAL HOUR REQUIREMENTS. (This applies only to programs that are using e-learning to meet program hour requirements. This is a go/no go Standard that requires validation of a ‘yes’ response to each of the criterion.)**

**Standard 11.1 – Access**

Students must have access to the appropriate technology needed to access e-learning materials.

**Standard 11.2 – Curriculum and Student Progress**

All content/tasks taught by e-learning must be identified and a record of each student’s progress must be maintained through the use of a Learning Management System (LMS).

**Standard 11.3 – Advisory Committee Input**

E-learning, for the purpose of meeting NATEF hour requirements, must be discussed and approved by the Advisory Committee.

## TASK LIST AND ASSUMPTIONS

The NATEF task list was reviewed and updated in January 2008. A national committee was assembled in Torrance, California to review the standards used in the automobile accreditation program. The committee consisted of individuals representing the major automobile manufacturers, automobile repair shop owners and technicians, automobile instructors and trainers, and automobile equipment and parts suppliers.

The committee reviewed the task list, tools and equipment list, program hours, and instructor qualifications. The committee was also provided the most current National Institute for Automotive Service Excellence (ASE) Automobile Technician Tests Task Lists for reference purposes.

All the tasks are assigned a priority number: P-1, P-2, or P-3. Please refer to the Task List Information in the Policies section for additional information on the requirements for instruction on tasks. *Note: A task is a psychomotor or cognitive entry-level learning activity consisting of one or more measurable steps accomplished through an instructor presentation, demonstration, visualization or a student application.*

Theory instruction and hands-on performance of all the basic tasks will provide initial training for **entry-level** employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

1. It is assumed that:
  - \* in all areas, appropriate theory, safety, and support instruction will be required for performing each task;
  - \* the instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
  - \* **the student has received the necessary training to locate and use current reference and training materials from accepted industry publications and resources;**
  - \* **in all areas, the student has demonstrated the ability to write work orders and warranty reports, to include information regarding problem resolution and the results of the work performed for the customer and manufacturer. The writing process will incorporate the “Three C’s” (concern, cause and correction) as a format to communicate this information.**
  
2. It is assumed that:
  - \* all diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures and safety precautions as published.

3. It is assumed that:
  - \* individual training programs being evaluated for accreditation should have written and detailed performance standards for each task covered and taught in the curriculum;
  - \* the learning progress of students will be monitored and evaluated against these performance standards;
  - \* a system is in place that informs all students of their individual progress through all phases of the training program.
  
4. It is assumed that:
  - \* individual courses of study will differ across automobile technician training programs;
  - \* development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.
  
5. It is assumed that:
  - \* all students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29, Code of Federal Regulation Part 1910.1200, 'Right to Know Law', and state and local requirements;
  - \* **hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.**

## DEFINITIONS – TECHNICAL TERMS

1. ADJUST - To bring components to specified operational settings.
2. ALIGN - To r restore the proper position of components.
3. ANALYZE - Assess the condition of a component or system.
4. ASSEMBLE (REASSEMBLE) - To fit together the components of a device or system.
5. BALANCE - To establish correct linear, rotational or weight relationship.
6. BLEED - To remove air from a closed system.
7. CAN – Controller Area Network. CAN is a network protocol (SAE J2284/ISO 15765-4) used to interconnect a network of electronic control modules.
8. CHARGE - To bring to a specified state, e.g., battery or air conditioning system.
9. CHECK - To verify condition by performing an operational or comparative examination.
10. CLEAN - To rid component of foreign matter for the purpose of reconditioning, repairing, measuring or reassembling.
11. DEGLAZE – To remove a smooth glossy surface.
12. DETERMINE - To establish the procedure to be used to perform the necessary repair.
13. DETERMINE NECESSARY ACTION – Indicates that the diagnostic routine(s) is the primary emphasis of a task. The student is required to perform the diagnostic steps and communicate the diagnostic outcomes and corrective actions required addressing the concern or problem. The training program determines the communication method (worksheet, test, verbal communication, or other means deemed appropriate) and whether the corrective procedures for these tasks are actually performed.
14. DIAGNOSE - To identify the cause of a problem.
15. DISASSEMBLE - To separate a component's parts as a preparation for cleaning, inspection or service.
16. DISCHARGE - To empty a storage device or system.

17. EVACUATE - To remove air, fluid or vapor from a closed system by use of a vacuum pump.
18. FLUSH - To internally clean a component or system.
19. HIGH VOLTAGE – Voltages of 50 volts and higher.
20. HONE - To restore or resize a bore by using rotating cutting stones.
21. JUMP START - To use an auxiliary power supply to assist a battery to crank an engine.
22. LOCATE – Determine or establish a specific spot or area.
23. MEASURE - To determine existing dimensions/values for comparison to specifications.
24. NETWORK - A system of interconnected electrical modules or devices.
25. ON-BOARD DIAGNOSTICS (OBD) - Diagnostic protocol which monitors computer inputs and outputs for failures.
26. PARASITIC DRAW - Electrical loads which are still present when the ignition circuit is OFF.
27. PERFORM - To accomplish a procedure in accordance with established methods and standards.
28. PERFORM NECESSARY ACTION – Indicates that the student is to perform the diagnostic routine(s) and perform the corrective action item. Where various scenarios (conditions or situations) are presented in a single task, at least one of the scenarios must be accomplished.
29. PURGE - To remove air or fluid from a closed system.
30. REMOVE - To disconnect and separate a component from a system.
31. REPAIR - To restore a malfunctioning component or system to operating condition.
32. REPLACE - To exchange a component; to reinstall a component.
33. RESURFACE – To restore correct finish.
34. SERVICE - To perform a procedure as specified in the owner's or service manual.
35. TEST - To verify condition through the use of meters, gauges or instruments.

36. TORQUE - To tighten a fastener to specified degree or tightness (in a given order or pattern if multiple fasteners are involved on a single component).
37. VERIFY - To confirm that a problem exists after hearing the customer's concern; or, to confirm the effectiveness of a repair.
38. VOLTAGE DROP - A reduction in voltage (electrical pressure) caused by the resistance in a component or circuit.

# NATEF TASK LIST

## ENGINE REPAIR

For every task in Engine Repair, the following safety requirement must be strictly enforced:

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### I. ENGINE REPAIR

#### A. 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. P-1
2. Identify and interpret engine concern; determine necessary action. P-1
3. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1
4. Locate and interpret vehicle and major component identification numbers. P-1
5. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1
6. Diagnose engine noises and vibrations; determine necessary action. P-2
7. Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action. P-2
8. Perform engine vacuum tests; determine necessary action. P-1
9. Perform cylinder power balance tests; determine necessary action. P-2
10. Perform cylinder cranking and running compression tests; determine necessary action. P-1
11. Perform cylinder leakage tests; determine necessary action. P-1

12. Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition. P-2

13. Install engine covers using gaskets, seals and sealers as required. P-1

Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. P-1

14. Inspect, remove and replace engine mounts. P-2

## **I. ENGINE REPAIR**

### **B. 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. P-1

2. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition. P-1

3. Inspect valve springs for squareness and free height comparison; determine necessary action. P-3

4. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action. P-3

5. Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action. P-3

6. Inspect valves and valve seats; determine necessary action. P-3

7. Check valve spring assembled height and valve stem height; determine necessary action. P-3

8. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action. P-2

9. Inspect valve lifters; determine necessary action. P-2

10. Adjust valves (mechanical or hydraulic lifters). P-1

- |     |  |     |
|-----|--|-----|
| 11. | 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 variable valve timing components). | P-1 |
| 12. | Inspect and/or measure camshaft for runout, journal wear and lobe wear.  | P-2 |
| 13. | Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.  | P-2 |
| 14. | Establish camshaft position sensor indexing.   | P-1 |

**I. ENGINE REPAIR**

**C. Engine Block Assembly Diagnosis and Repair**

- |    |  |     |
|----|--|-----|
| 1. | Disassemble engine block; clean and prepare components for inspection and reassembly.  | P-1 |
| 2. | Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.  | P-2 |
| 3. | Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.   | P-2 |
| 4. | Deglaze and clean cylinder walls.  | P-2 |
| 5. | Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.   | P-3 |
| 6. | Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine necessary action. | P-1 |
| 7. | Inspect main and connecting rod bearings for damage and wear; determine necessary action.  | P-2 |
| 8. | Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.   | P-3 |
| 9. | Inspect and measure piston skirts and ring lands; determine necessary action.  | P-2 |

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|-----|---|-----|
| 10. | Remove and replace piston pin.  | P-3 |
| 11. | Determine piston-to-bore clearance.   | P-2 |
| 12. | Inspect, measure, and install piston rings.   | P-2 |
| 13. | Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance or silencer); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time. | P-2 |
| 14. | Remove, inspect or replace crankshaft vibration damper (harmonic balancer).   | P-2 |
| 15. | Assemble engine block.  | P-1 |

## **I. ENGINE REPAIR**

### **D. Lubrication and Cooling Systems Diagnosis and Repair**

- |     |  |     |
|-----|--|-----|
| 1.  | Perform oil pressure tests; determine necessary action.  | P-1 |
| 2.  | Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.  | P-2 |
| 3.  | Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; determine necessary action. | P-1 |
| 4.  | Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.  | P-1 |
| 5.  | Inspect and replace engine cooling and heater system hoses.  | P-1 |
| 6.  | Inspect, test, and replace thermostat and gasket/seal.   | P-1 |
| 7.  | Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.  | P-1 |
| 8.  | Inspect, remove and replace water pump.  | P-2 |
| 9.  | Remove and replace radiator.   | P-2 |
| 10. | Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.  | P-1 |

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|-----|---|-----|
| 11. | Inspect auxiliary coolers; determine necessary action.                        | P-3 |
| 12. | Inspect, test, and replace oil temperature and pressure switches and sensors. | P-2 |
| 13. | Perform oil and filter change.  | P-1 |
| 14. | Identify causes of engine overheating.  | P-1 |

## **AUTOMATIC TRANSMISSION AND TRANSAXLE**

**For every task in Automatic Transmission and Transaxle, the following safety requirement must be strictly enforced:**

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### **II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

#### **A. General Transmission and Transaxle Diagnosis**

- |    |  |     |
|----|--|-----|
| 1. | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.  | P-1 |
| 2. | Identify and interpret transmission/transaxle concern; differentiate between engine performance and transmission/transaxle concerns; determine necessary action.                                 | P-1 |
| 3. | Research applicable vehicle and service information, such as transmission/transaxle system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 4. | Locate and interpret vehicle and major component identification numbers.   | P-1 |
| 5. | Diagnose fluid loss and condition concerns; check fluid level in transmissions with and without dip-stick; determine necessary action.   | P-1 |
| 6. | Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.   | P-1 |
| 7. | Perform stall test; determine necessary action.  | P-3 |

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|-----|--|-----|
| 8.  | Perform lock-up converter system tests; determine necessary action.  | P-3 |
| 9.  | Diagnose noise and vibration concerns; determine necessary action.   | P-2 |
| 10. | Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. | P-1 |
| 12. | Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).  | P-2 |
| 13. | Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.                   | P-1 |

**II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

**B. In-Vehicle Transmission/Transaxle Maintenance and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.  | P-2 |
| 2. | Inspect and replace external seals gaskets, and bushings.   | P-2 |
| 3. | Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses. | P-1 |
| 4. | Diagnose electronic transmission control systems using a scan tool; determine necessary action.   | P-1 |
| 5. | Inspect, replace, and align powertrain mounts.  | P-2 |
| 6. | Service transmission; perform visual inspection; replace fluid and filters.   | P-1 |

**II. AUTOMATIC TRANSMISSION AND TRANSAXLE**

**C. Off-Vehicle Transmission and Transaxle Repair**

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|----|--|-----|
| 1. | Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces. | P-1 |
| 2. | Disassemble, clean, and inspect transmission/transaxle.  | P-1 |

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|-----|--|-----|
| 3.  | Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, checkvalves/balls, screens, spacers, and gaskets). | P-2 |
| 4.  | Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.   | P2  |
| 5.  | Assemble transmission/transaxle.   | P-1 |
| 6.  | Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.   | P-1 |
| 7.  | Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.              | P-2 |
| 8.  | Install and seat torque converter to engage drive/splines.   | P-1 |
| 9.  | Inspect, measure, and reseal oil pump assembly and components.   | P-1 |
| 10. | Measure transmission/transaxle end play or preload; determine necessary action.  | P-1 |
| 11. | Inspect, measure, and replace thrust washers and bearings.   | P-2 |
| 12. | Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.                                  | P-2 |
| 13. | Inspect bushings; determine necessary action.  | P-2 |
| 14. | Inspect and measure planetary gear assembly components; determine necessary action.  | P-2 |
| 15. | Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.  | P-2 |
| 16. | Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.  | P-2 |
| 17. | Inspect, measure, repair, adjust or replace transaxle final drive components.  | P-2 |
| 18. | Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action.   | P-2 |

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|-----|---|-----|
| 19. | Measure clutch pack clearance; determine necessary action.  | P-1 |
| 20. | Air test operation of clutch and servo assemblies.  | P-1 |
| 21. | Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action. | P-1 |
| 22. | Inspect bands and drums; determine necessary action.  | P-2 |
| 23. | Describe the operational characteristics of a continuously variable transmission (CVT).                             | P-3 |
| 24. | Describe the operational characteristics of a hybrid vehicle drive train.   | P-3 |

## **MANUAL DRIVE TRAIN AND AXLES**

**For every task in Manual Drive Train and Axles, the following safety requirement must be strictly enforced:**

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### **III. MANUAL DRIVE TRAIN AND AXLES**

#### **A. General Drive Train Diagnosis**

- |    |   |     |
|----|---|-----|
| 1. | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                               | P-1 |
| 2. | Identify and interpret drive train concern; determine necessary action.   | P-1 |
| 3. | Research applicable vehicle and service information, such as drive train system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 4. | Locate and interpret vehicle and major component identification numbers.  | P-1 |
| 5. | Diagnose fluid loss, level, and condition concerns; determine necessary action.   | P-1 |
| 6. | Drain and fill manual transmission/transaxle and final drive unit.  | P-1 |

### **III. MANUAL DRIVE TRAIN AND AXLES**

#### **B. Clutch Diagnosis and Repair**

1. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
2. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
3. Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action. P-1
4. Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable). P-1
5. Bleed clutch hydraulic system. P-1
6. Inspect flywheel and ring gear for wear and cracks; determine necessary action. P-1
7. Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action. P-1
8. Measure flywheel runout and crankshaft end play; determine necessary action. P-2

### **III. MANUAL DRIVE TRAIN AND AXLES**

#### **C. Transmission/Transaxle Diagnosis and Repair**

1. Remove and reinstall transmission/transaxle. P-1
2. Disassemble, clean, and reassemble transmission/transaxle components. P-1
3. Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. P-2
4. Diagnose noise concerns using transmission/transaxle powerflow principles. P-2
5. Diagnose hard shifting and jumping out of gear concerns; determine necessary action. P-2

- |     |  |     |
|-----|--|-----|
| 6.  | Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.   | P-2 |
| 7.  | Inspect, replace, and align powertrain mounts.   | P-2 |
| 8.  | Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.  | P-2 |
| 9.  | Remove and replace transaxle final drive.  | P-3 |
| 10. | Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.                                   | P-2 |
| 11. | Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.                                       | P-1 |
| 12. | Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.   | P-1 |
| 13. | Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.  | P-3 |
| 14. | Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. | P-3 |
| 15. | Inspect lubrication devices (oil pump or slingers); perform necessary action.  | P-3 |
| 16. | Inspect, test, and replace transmission/transaxle sensors and switches.  | P-2 |
| 17. | Describe the operational characteristics of an electronically controlled manual transmission/transaxle.  | P-3 |

### **III. MANUAL DRIVE TRAIN AND AXLES**

#### **D. 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. | P-1 |
| 2. | Diagnose universal joint noise and vibration concerns; perform necessary action.                | P-2 |

3. Remove and replace front wheel drive (FWD) front wheel bearing. P-1
4. Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
5. Inspect, service, and replace shaft center support bearings. P-3
6. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles. P-2

### **III. MANUAL DRIVE TRAIN AND AXLES**

#### **E. Drive Axle Diagnosis and Repair**

##### **1. Ring and Pinion Gears and Differential Case Assembly**

1. Diagnose noise and vibration concerns; determine necessary action. P-2
2. Diagnose fluid leakage concerns; determine necessary action. P-1
3. Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2
4. Inspect ring gear and measure runout; determine necessary action. P-2
5. Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2
6. Measure and adjust drive pinion depth. P-2
7. Measure and adjust drive pinion bearing preload. P-2
8. Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). P-2
9. Check ring and pinion tooth contact patterns; perform necessary action. P-1
10. Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2
11. Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2

##### **2. Limited Slip Differential**

1. Diagnose noise, slippage, and chatter concerns; determine necessary action. P-3

- |    |  |     |
|----|--|-----|
| 2. | Clean and inspect differential housing; refill with correct lubricant and/or additive. | P-2 |
| 3. | Inspect and reinstall limited slip differential components.                            | P-3 |
| 4. | Measure rotating torque; determine necessary action.                                   | P-3 |

### **3. Drive Axle Shaft**

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

## **III. MANUAL DRIVE TRAIN AND AXLES**

### **F. Four-wheel Drive/All-wheel Drive Component Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Diagnose noise, vibration, and unusual steering concerns; determine necessary action.                                       | P-3 |
| 2. | Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. | P-3 |
| 3. | Remove and reinstall transfer case.   | P-3 |
| 4. | Disassemble, service, and reassemble transfer case and components.  | P-3 |
| 5. | Inspect front-wheel bearings and locking hubs; perform necessary action.  | P-3 |
| 6. | Check drive assembly seals and vents; check lube level.   | P-3 |
| 7. | Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.                           | P-3 |
| 8. | Identify concerns related to variations in tire circumference and/or final drive ratios.                                    | P-3 |

## SUSPENSION AND STEERING

**For every task in Suspension and Steering, the following safety requirement must be strictly enforced:**

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### IV. SUSPENSION AND STEERING

#### A. General Suspension and Steering Systems Diagnosis

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
2. Identify and interpret suspension and steering system concerns; determine necessary action. P-1
3. Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1
4. Locate and interpret vehicle and major component identification numbers. P-1

### IV. SUSPENSION AND STEERING

#### B. Steering Systems Diagnosis and Repair

1. Disable and enable supplemental restraint system (SRS). P-1
2. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). P-1
3. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. P-2
4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action. P-2

5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action. P-2
6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2
7. Adjust non-rack and pinion worm bearing preload and sector lash. P-3
8. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. P-2
9. Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-2
10. Determine proper power steering fluid type; inspect fluid level and condition. P-1
11. Flush, fill, and bleed power steering system. P-2
12. Diagnose power steering fluid leakage; determine necessary action. P-2
13. Remove, inspect, replace, and adjust power steering pump belt. P-1
14. Remove and reinstall power steering pump. P-2
15. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. P-2
16. Inspect and replace power steering hoses and fittings. P-2
17. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-2
18. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-1
19. Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. P-3
20. Inspect and test electric power assist steering. P-3
21. Identify hybrid vehicle power steering system electrical circuits, service and safety precautions. P-3

## **IV. SUSPENSION AND STEERING**

### **C. Suspension Systems Diagnosis and Repair**

1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
2. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
3. Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-2
4. Remove, inspect and install strut rods and bushings. P-2
5. Remove, inspect, and install upper and/or lower ball joints. P-1
6. Remove, inspect, and install steering knuckle assemblies. P-2
7. Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-3
8. Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
9. Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2
10. Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-1
11. Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3

### **D. Related Suspension and Steering Service**

1. Inspect, remove, and replace shock absorbers. P-1
2. Remove, inspect, and service or replace front and rear wheel bearings. P-1
3. Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. P-3

- |    |  |     |
|----|--|-----|
| 4. | Diagnose, inspect, adjust, repair or replace components of electronically controlled steering systems (including sensors, switches, and actuators); initialize system as required. | P-3 |
| 5. | Describe the function of the idle speed compensation switch.   | P-3 |
| 6. | Lubricate suspension and steering systems.   | P-2 |

**IV. SUSPENSION AND STEERING**

**E. Wheel Alignment Diagnosis, Adjustment, and Repair**

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

**IV. SUSPENSION AND STEERING**

**F. Wheel and Tire Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action. | P-1 |
| 2. | Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.                                   | P-2 |

- |     |   |     |
|-----|---|-----|
| 3.  | Rotate tires according to manufacturer's recommendations.   | P-1 |
| 4.  | Measure wheel, tire, axle flange, and hub runout; determine necessary action.                       | P-2 |
| 5.  | Diagnose tire pull problems; determine necessary action.  | P-2 |
| 6.  | Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic). | P-1 |
| 7.  | Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.  | P-2 |
| 8.  | Reinstall wheel; torque lug nuts.   | P-1 |
| 9.  | Inspect tire and wheel assembly for air loss; perform necessary action.                             | P-1 |
| 10. | Repair tire using internal patch.   | P-1 |
| 11. | Inspect, diagnose, and calibrate tire pressure monitoring system.                                   | P-2 |

## **BRAKES**

For every task in Brakes, the following safety requirement must be strictly enforced:

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### **V. BRAKES**

#### **A. General Brake Systems Diagnosis**

- |    |   |     |
|----|---|-----|
| 1. | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.             | P-1 |
| 2. | Identify and interpret brake system concern; determine necessary action.  | P-1 |
| 3. | Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |

4. Locate and interpret vehicle and major component identification numbers. P-1

## **B. Hydraulic System Diagnosis and Repair**

1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). P-1
2. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. P-1
3. Check master cylinder for internal/external leaks and proper operation; determine necessary action. P-1
4. Remove, bench bleed, and reinstall master cylinder. P-1
5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. P-2
6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. P-1
7. Replace brake lines, hoses, fittings, and supports. P-2
8. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). P-2
9. Select, handle, store, and fill brake fluids to proper level. P-1
10. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-3
11. Inspect, test, and/or replace components of brake warning light system. P-3
12. Bleed and/or flush brake system. P-1
13. Test brake fluid for contamination. P-1

## **V. BRAKES**

### **C. Drum Brake Diagnosis and Repair**

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1

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|----|---|-----|
| 2. | Remove, clean, inspect, and measure brake drums; determine necessary action.  | P-1 |
| 3. | Refinish brake drum; measure final drum diameter.   | P-1 |
| 4. | Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. | P-1 |
| 5. | Inspect and install wheel cylinders.  | P-2 |
| 6. | Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.  | P-2 |
| 7. | Install wheel, torque lug nuts, and make final checks and adjustments.  | P-1 |

**V. BRAKES**

**D. Disc Brake Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.                  | P-1 |
| 2. | Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.                                     | P-1 |
| 3. | Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.                           | P-1 |
| 4. | Remove, inspect and replace pads and retaining hardware; determine necessary action.  | P-1 |
| 5. | Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. | P-3 |
| 6. | Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.                               | P-1 |
| 7. | Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.                         | P-1 |
| 8. | Remove and reinstall rotor.   | P-1 |
| 9. | Refinish rotor on vehicle; measure final rotor thickness.   | P-1 |

- 10. Refinish rotor off vehicle; measure final rotor thickness. P-1
- 11. Retract caliper piston on an integrated parking brake system. P-3
- 12. Install wheel, torque lug nuts, and make final checks and adjustments. P-1
- 13. Check brake pad wear indicator system operation; determine necessary action. P-2

**V. BRAKES**

**E. Power Assist Units Diagnosis and Repair**

- 1. Test pedal free travel; check power assist operation. P-2
- 2. Check vacuum supply to vacuum-type power booster. P-1
- 3. Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action. P-1
- 4. Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action. P-3
- 5. Measure and adjust master cylinder pushrod length. P-3

**V. BRAKES**

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

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

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|----|---|-----|
| 6. | Replace wheel bearing and race.                     | P-2 |
| 7. | Inspect and replace wheel studs.                    | P-1 |
| 8. | Remove and reinstall sealed wheel bearing assembly. | P-1 |

**V. BRAKES**

**G. Electronic Brake, Traction and Stability Control Systems  
Diagnosis and Repair**

- |     |  |     |
|-----|--|-----|
| 1.  | Identify and inspect electronic brake control system components; determine necessary action.   | P-1 |
| 2.  | Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.   | P-2 |
| 3.  | Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.   | P-1 |
| 4.  | Depressurize high-pressure components of the electronic brake control system.  | P-3 |
| 5.  | Bleed the electronic brake control system hydraulic circuits.  | P-1 |
| 6.  | Remove and install electronic brake control system electrical/electronic and hydraulic components.   | P-3 |
| 7.  | 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). | P-1 |
| 8.  | Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).   | P-3 |
| 9.  | Identify traction control/vehicle stability control system components.   | P-3 |
| 10. | Describe the operation of a regenerative braking system.   | P-3 |

## ELECTRICAL/ELECTRONIC SYSTEMS

**For every task in Electrical/Electronic Systems, the following safety requirement must be strictly enforced:**

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### VI. ELECTRICAL/ELECTRONIC SYSTEMS

#### A. General Electrical System Diagnosis

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
2. Identify and interpret electrical/electronic system concern; determine necessary action. P-1
3. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. P-1
4. Locate and interpret vehicle and major component identification numbers. P-1
5. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). P-1
6. Use wiring diagrams during diagnosis of electrical circuit problems. P-1
7. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance. P-1
8. Check electrical circuits with a test light; determine necessary action. P-2
9. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs. P-2
10. Check electrical circuits using fused jumper wires; determine necessary action. P-2

- |     |   |     |
|-----|---|-----|
| 11. | Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.                               | P-1 |
| 12. | Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.  | P-1 |
| 13. | Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.  | P-1 |
| 14. | Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action. | P-1 |
| 15. | Remove and replace terminal end from connector; replace connectors and terminal ends.   | P-1 |
| 16. | Repair wiring harness (including CAN/BUS systems).  | P-1 |
| 17. | Perform solder repair of electrical wiring.   | P-1 |
| 18. | Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.                                  | P-2 |

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**B. Battery Diagnosis and Service**

- |    |   |     |
|----|---|-----|
| 1. | Perform battery state-of-charge test; determine necessary action.   | P-1 |
| 2. | Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. | P-1 |
| 3. | Maintain or restore electronic memory functions.  | P-1 |
| 4. | Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs.                   | P-1 |
| 5. | Perform battery charge.   | P-1 |
| 6. | Start a vehicle using jumper cables or an auxiliary power supply.   | P-1 |
| 7. | Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.               | P-3 |
| 8. | Identify electronic modules, security systems, radios, and other accessories  | P-1 |

that require reinitialization or code entry following battery disconnect.

9. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures. P-3

## **VI. ELECTRICAL/ELECTRONIC SYSTEMS**

### **C. Starting System Diagnosis and Repair**

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

## **VI. ELECTRICAL/ELECTRONIC SYSTEMS**

### **D. Charging System Diagnosis and Repair**

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

## **VI. ELECTRICAL/ELECTRONIC SYSTEMS**

### **E. Lighting Systems Diagnosis and Repair**

1. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. P-1

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|----|---|-----|
| 2. | Inspect, replace, and aim headlights and bulbs.   | P-2 |
| 3. | Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.     | P-2 |
| 4. | Identify system voltage and safety precautions associated with high intensity discharge headlights. | P-2 |

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**F. Gauges, Warning Devices, and Driver Information Systems  
Diagnosis and Repair**

- |    |  |     |
|----|--|-----|
| 1. | Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.              | P-1 |
| 2. | Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.                  | P-3 |
| 3. | Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. | P-1 |
| 4. | Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.       | P-3 |

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**G. Horn and Wiper/Washer Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Diagnose incorrect horn operation; perform necessary action.  | P-1 |
| 2. | Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. | P-1 |
| 3. | Diagnose incorrect washer operation; perform necessary action.  | P-2 |

**VI. ELECTRICAL/ELECTRONIC SYSTEMS**

**H. Accessories Diagnosis and Repair**

- |    |  |     |
|----|--|-----|
| 1. | Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. | P-1 |
| 2. | Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.      | P-3 |

- |     |  |     |
|-----|--|-----|
| 3.  | Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. | P-1 |
| 4.  | Diagnose incorrect operation of cruise control systems; determine necessary action.                      | P-3 |
| 5.  | Diagnose supplemental restraint system (SRS) concerns; determine necessary action.                       | P-1 |
| 6.  | Disarm and enable the airbag system for vehicle service.   | P-1 |
| 7.  | Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.         | P-3 |
| 8.  | Remove and reinstall door panel.   | P-1 |
| 9.  | Diagnose body electronic system circuits using a scan tool; determine necessary action.                  | P-2 |
| 10. | Check for module communication (including CAN/BUS systems) errors using a scan tool.                     | P-2 |
| 11. | Diagnose the cause of false, intermittent, or no operation of anti-theft systems.                        | P-3 |
| 12. | Describe the operation of keyless entry/remote-start systems.  | P-3 |
| 13. | Perform software transfers, software updates, or flash reprogramming on electronic modules.              | P-3 |

## HEATING AND AIR CONDITIONING

For every task in Heating and Air Conditioning, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

### VII. HEATING AND AIR CONDITIONING

#### A. A/C System Diagnosis and Repair

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
2. Identify and interpret heating and air conditioning concern; determine necessary action. P-1
3. Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. P-1
4. Locate and interpret vehicle and major component identification numbers. P-1
5. Performance test A/C system; identify A/C system malfunctions. P-1
6. Identify abnormal operating noises in the A/C system; determine necessary action. P-2
7. Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings. P-1
8. Leak test A/C system; determine necessary action. P-1
9. Inspect the condition of refrigerant oil removed from the system; determine necessary action. P-2
10. Determine recommended oil and oil capacity for system application. P-1
11. Using scan tool, observe and record related HVAC data and trouble codes. P-1

## **VII. HEATING AND AIR CONDITIONING**

### **B. Refrigeration System Component Diagnosis and Repair**

1. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. P-2
2. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action. P-1
3. Inspect, test, and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap and adjust as needed. P-2
4. Remove, inspect, and reinstall A/C compressor and mountings; determine required oil quantity. P-1
5. Identify hybrid vehicle A/C system electrical circuits, service and safety precautions. P-3
6. Determine the need for an additional A/C system filter; perform necessary action. P-3
7. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action. P-2
8. Inspect A/C condenser for airflow restrictions; perform necessary action. P-1
9. Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity. P-1
10. Remove, inspect, and install expansion valve or orifice (expansion) tube. P-1
11. Inspect evaporator housing water drain; perform necessary action. P-2
12. Remove, inspect, and reinstall evaporator; determine required oil quantity. P-3
13. Remove, inspect, and reinstall condenser; determine required oil quantity. P-3

## **VII. HEATING AND AIR CONDITIONING**

### **C. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair**

1. Diagnose temperature control problems in the heater/ventilation system; determine necessary action. P-2

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|-----|---|-----|
| 2.  | Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. | P-1 |
| 3.  | Inspect engine cooling and heater system hoses and belts; perform necessary action.   | P-1 |
| 4.  | Inspect, test, and replace thermostat and gasket/seal.  | P-1 |
| 5.  | Determine coolant condition and coolant type for vehicle application; drain and recover coolant.  | P-1 |
| 6.  | Flush system; refill system with recommended coolant; bleed system.   | P-2 |
| 7.  | Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.   | P-1 |
| 8.  | Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.   | P-1 |
| 9.  | Inspect and test heater control valve(s); perform necessary action.   | P-2 |
| 10. | Remove, inspect, and reinstall heater core.   | P-3 |

## **VII. HEATING AND AIR CONDITIONING**

### **D. Operating Systems and Related Controls Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.   | P-2 |
| 2. | Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.                                      | P-1 |
| 3. | Test and diagnose A/C compressor clutch control systems; determine necessary action.  | P-1 |
| 4. | Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. | P-2 |
| 5. | Inspect and test A/C-heater control panel assembly; determine necessary action.   | P-3 |

- |    |   |     |
|----|---|-----|
| 6. | Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.   | P-3 |
| 7. | Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.  | P-2 |
| 8. | Identify the source of A/C system odors.  | P-2 |
| 9. | Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. | P-2 |

## **VII. HEATING AND AIR CONDITIONING**

### **E. Refrigerant Recovery, Recycling, and Handling**

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

## **ENGINE PERFORMANCE**

**For every task in Engine Performance the following safety requirement must be strictly enforced:**

**Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

## **VIII. ENGINE PERFORMANCE**

### **A. General Engine Diagnosis**

- |    |   |     |
|----|---|-----|
| 1. | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. | P-1 |
|----|---|-----|

2. Identify and interpret engine performance concern; determine necessary action. P-1
3. Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. P-1
4. Locate and interpret vehicle and major component identification numbers. P-1
5. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2
6. Diagnose abnormal engine noise or vibration concerns; determine necessary action. P-3
7. Diagnose abnormal exhaust color, odor, and sound; determine necessary action. P-2
8. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. P-1
9. Perform cylinder power balance test; determine necessary action. P-2
10. Perform cylinder cranking and running compression tests; determine necessary action. P-1
11. Perform cylinder leakage test; determine necessary action. P-1
12. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action. P-1
13. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action. P-3
14. Verify engine operating temperature; determine necessary action. P-1
15. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. P-1
16. Verify correct camshaft timing. P-1

## **VIII. ENGINE PERFORMANCE**

### **B. Computerized Engine Controls Diagnosis and Repair**

1. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. P-1
2. Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data. P-1
3. Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action. P-1
4. Check for module communication (including CAN/BUS systems) errors using a scan tool. P-2
5. 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. P-1
6. Access and use service information to perform step-by-step diagnosis. P-1
7. 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. P-3
8. Perform active tests of actuators using a scan tool; determine necessary action. P-1
9. Describe the importance of running all OBDII monitors for repair verification. P-1

## **VIII. ENGINE PERFORMANCE**

### **C. Ignition System Diagnosis and Repair**

1. Diagnose 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. P-1
2. Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. P-1

- |    |  |     |
|----|--|-----|
| 3. | Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.                           | P-1 |
| 4. | Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary. | P-2 |

**VIII. ENGINE PERFORMANCE**

**D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair**

- |     |  |     |
|-----|--|-----|
| 1.  | Diagnose 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. | P-1 |
| 2.  | Check fuel for contaminants and quality; determine necessary action.   | P-2 |
| 3.  | Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.   | P-1 |
| 4.  | Replace fuel filters.  | P-2 |
| 5.  | Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.  | P-2 |
| 6.  | Inspect and test fuel injectors.   | P-1 |
| 7.  | Verify idle control operation.   | P-1 |
| 8.  | Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.  | P-1 |
| 9.  | Perform exhaust system back-pressure test; determine necessary action.   | P-1 |
| 10. | Test the operation of turbocharger/supercharger systems; determine necessary action.   | P-3 |

**VIII. ENGINE PERFORMANCE**

**E. Emissions Control Systems Diagnosis and Repair**

- |    |   |     |
|----|---|-----|
| 1. | Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action. | P-2 |
|----|---|-----|

- |     |   |     |
|-----|---|-----|
| 2.  | Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.                                | P-2 |
| 3.  | Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.  | P-1 |
| 4.  | Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. | P-1 |
| 5.  | Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.                                      | P-2 |
| 6.  | Diagnose emissions and driveability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action.                                 | P-2 |
| 7.  | Inspect and test mechanical components of secondary air injection systems; perform necessary action.  | P-3 |
| 8.  | Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.   | P-3 |
| 9.  | Inspect and test catalytic converter efficiency.  | P-1 |
| 10. | Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action.  | P-1 |
| 11. | Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.  | P-1 |
| 12. | Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.  | P-1 |

## **VIII. ENGINE PERFORMANCE**

### **F. Engine Related Service**

- |    |   |     |
|----|---|-----|
| 1. | Adjust valves on engines with mechanical or hydraulic lifters.  | P-1 |
| 2. | Remove and replace timing belt; verify correct camshaft timing.   | P-1 |
| 3. | Remove and replace thermostat and gasket/seal.  | P-1 |
| 4. | Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. | P-1 |

5. Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert. P-1
6. Perform engine oil and filter change. P-1
7. Identify hybrid vehicle internal combustion engine service precautions. P-3

## Task List Priority Item Totals (by area)

I. Engine Repair

P-1 = 27      95% = 26 tasks  
 P-2 = 22      80% = 18 tasks  
 P-3 = 9        50% = 5 tasks

II. Automatic Transmission and Transaxle

P-1 = 21      95% = 20 tasks  
 P-2 = 17      80% = 14 tasks  
 P-3 = 4        50% = 2 tasks

III. Manual Drive Train and Axles

P-1 = 24      95% = 23 tasks  
 P-2 = 24      80% = 19 tasks  
 P-3 = 17      50% = 9 tasks

IV. Suspension and Steering

P-1 = 25      95% = 24 tasks  
 P-2 = 25      80% = 20 tasks  
 P-3 = 11      50% = 6 tasks

V. Brakes

P-1 = 39      95% = 37 tasks  
 P-2 = 10      80% = 8 tasks  
 P-3 = 11      50% = 6 tasks

VI. Electrical/Electronic Systems

P-1 = 39      95% = 37 tasks  
 P-2 = 13      80% = 10 tasks  
 P-3 = 10      50% = 5 tasks

VII. Heating and Air Conditioning

P-1 = 26      95% = 25 tasks  
 P-2 = 14      80% = 11 tasks  
 P-3 = 7        50% = 4 tasks

VIII. Engine Performance

P-1 = 39      95% = 37 tasks  
 P-2 = 12      80% = 10 tasks  
 P-3 = 7        50% = 4 tasks

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## TOOLS AND EQUIPMENT

Local employer needs and the availability of funds are key factors for determining each program's structure and operation. The NATEF Standards recognize that not all programs have the same needs, nor do all programs teach 100 % of the NATEF tasks. Therefore, the basic philosophy for the tools and equipment requirement is as follows: *for all tasks which are taught in the program, the training should be as thorough as possible with the tools and equipment necessary for those tasks.* In other words, if a program does not teach a particular task, the tool from the tool list associated with that task is not required (unless of course it is required for a task that is taught in another area). **NOTE: For programs pursuing accreditation under the General Service Technician Program, there is a separate Tools & Equipment List. Please refer to the General Service Technician Program section in this manual.**

The NATEF tool lists are organized into three basic categories: *Hand Tools, General Lab/Shop Equipment, and Specialty Tools and Equipment.* The specialty tools section is further separated into the eight NATEF task categories. When referring to the tools and equipment list, please note the following:

1. The organization of the tool list is not intended to dictate how a program organizes its tool crib or student tool sets (i.e., which tools should be in a student set, if utilized, and which should be in the tool crib or shop area).
2. Quantities for each tool or piece of equipment are determined by the program needs; however, sufficient quantities to provide quality instruction should be on hand.
3. For *Specialty Tools and Equipment*, the program need only have those tools for the areas being accredited.
4. Programs may meet the equipment requirements by borrowing special equipment or providing for off-site instruction (e.g., in a dealership or independent repair shop). Use of borrowed or off-site equipment *must* be appropriately documented.
5. No specific brand names for tools and equipment are specified or required.
6. Although the NATEF Standards recommend that programs encourage their students to begin to build their own individual tools sets prior to entry into the industry, there is no requirement to do so. NOTE: Industry surveys indicate that most (90%) employers require that a candidate for employment provide his/her own basic hand tool set in order to be hired as an entry-level automobile technician.

## **HAND TOOLS**

**(Contained in individual sets or the tool crib  
in sufficient quantities to permit efficient instruction)**

Air Blow Gun (meeting OSHA requirements)  
Allen (Wrench or Socket) Set - Standard (.050" - 3/8")  
Allen (Wrench or Socket) Set - Metric (2mm - 8mm, 10mm, 12mm)  
Battery Post Cleaner  
Battery Terminal Pliers  
Battery Terminal Puller  
Chisels:  
    Cape 5/16"  
    Cold 3/8", 3/4"  
Chisel Holder  
Claw Type Pickup Tool  
Combination Wrenches:  
    Standard (1/4" - 1 1/4")  
    Metric (7mm - 24mm)  
Crowfoot Wrench Set - Metric  
Crowfoot Wrench Set - Standard  
Ear Protection  
Feeler Gauge (Blade Type):  
    .002" - .040"  
    .006mm - .070mm  
Files:  
    Coarse 6" and 12"  
    Fine 6" and 12"  
    Half Round 12"  
    Round 6" and 12"  
Flare Nut (tubing) Wrenches:  
    3/8" - 3/4"  
    10mm - 17mm  
Flashlight  
Fuse Puller  
Fused Jumper Wire Set (with various adapters)  
Hack Saw  
Hammers:  
    16 oz. Ball Peen  
    Brass  
    Dead Blow Plastic Mallet  
    Plastic Tip  
    Rubber Mallet  
Inspection Mirror  
Magnetic Pickup Tool

Pliers:

- Combination 6"
- Hose Clamp
- Locking Jaw
- Needle Nose 6"
- Side Cutting
- Slip Joint (Water Pump)

Pry Bars:

- Rolling Head
- Straight

Punches:

- Center
- Brass Drift
- Pin 1/8", 3/16", 1/4", 5/16 "
- Taper 3/8", 1/2", 5/8"

Safety Glasses (meeting OSHA requirements)

Scraper:

- Carbon 1"
- Gasket 1"

Screwdriver - Blade Type:

- Stubby
- 6", 9", 12"
- Offset

Screwdriver - Phillips:

- Stubby #1, #2
- 6" #1, #2
- 12" #3
- Offset #2

Screwdriver - Impact Driver Set

Screw Starter:

- Phillips
- Standard

Socket Set - 1/4" Drive:

- 1/4" - 1/2" Standard Depth
- 1/4" - 1/2" Deep
- 6mm - 12mm Standard Depth
- 6mm - 12mm Deep
- Flex/Universal Type
- 3", 6" Extensions
- Ratchet

Socket Set - 3/8" Drive:

- 5/16" - 3/4" Standard Depth (6 point)
- 3/8" - 3/4" Deep (6 point)
- 10mm - 19mm Standard Depth
- 10mm - 19mm Deep

3", 5", 10" Extensions  
Flexhead Ratchet  
Ratchet  
Spark Plug Sockets 5/8", 13/16"  
Speed Handle  
Universal Joint  
Flexible Socket Set 3/8" - 3/4"  
Flexible Socket Set 10mm - 19mm  
Socket Set - 1/2" Drive:  
7/16" - 1 1/8" Standard Depth  
7/16" - 1 1/8" Deep  
10mm - 24mm Standard Depth  
10mm - 24mm Deep  
3", 6", 12" Extensions  
Flex Handle (Breaker Bar)  
Ratchet  
Spark Plug Feeler Gauge (Gap Tool)  
Tape Measure – Standard and Metric  
Test Light (12V and self-powered)  
Tire Pressure Gauge  
Tire Tread Depth Gauge  
Torque Wrench:  
3/8" Drive (10 - 250 lb. in.)  
3/8" Drive (5 - 75 lb. ft.)  
1/2" Drive (50 - 250 lb. ft.)  
Torx® Set (screwdrivers and/or sockets):  
T-8 to T-60  
Wire Brush

## GENERAL LAB/SHOP EQUIPMENT

The tools and equipment on this list are used in general lab/shop work but are not generally considered to be individually owned hand tools. A well equipped, accredited program should have all of these general tools and equipment readily available and in sufficient quantity to provide quality instruction.

Air Chisel Set (various bits)  
Air Compressor and Hoses  
Air Pressure Regulator  
Air Ratchet (3/8" drive)  
Automotive Stethoscope (electronic recommended)  
Axle Stands (Jack Stands)  
Axle Support Stands (Screw Jacks)  
Battery Charger  
Battery/Starter/Charging System Tester  
Battery Conductance Tester (recommended)  
Bearing Packer (hand operated)  
Belt Tension Gauge  
Bench or Pedestal Grinder  
Compression Tester  
Coolant/Combustion Gas Detector (Recommended)  
Coolant Tester  
Cooling System Pressure Tester and Adapters  
Creeper  
Cylinder Leakage Tester  
Dial Indicator with Flex Arm and Clamp Base  
Digital Multimeter with various lead sets  
Digital Storage Oscilloscope (DSO)  
Drain Pans  
Drill - 3/8" variable speed, reversible  
Drill - 1/2" variable speed, reversible  
Electric Heat Gun  
Engine Coolant Recovery Equipment or Recycler or Coolant Disposal Contract Service  
Extension Cords  
Face Shields  
Fender Covers  
Floor Jack (1½ Ton Minimum)  
Graphing Multimeter (GMM)  
Hand Held Vacuum Pump  
Hoist(s)  
Hood Prop  
Hydraulic Press with adapters

Impact Socket Sets - 3/8" Drive (Standard and Metric)  
 Impact Sockets - 1/2" Drive (7/16" - 1 1/8")  
 Impact Sockets - 1/2" Drive (12mm – 24mm)  
 Impact Sockets – 1/2" Drive Deep (30 mm, 32 mm, 36mm)  
 Impact Wrench - 1/2" Drive  
 Impact Wrench - 3/8" Drive  
 Jumper Cables  
 Master Puller Set  
 Micrometer (Depth)  
 Micrometers - 0-1", 1-2", 2-3", 3-4", 4-5" (Outside Type)  
 Oil Can - Pump Type  
 Oil Filter Wrench  
 Oxy-Acetylene Torch Set  
 Parts Cleaning Tank and Gloves (non-solvent based cleanser suggested)  
 Remote Starter Switch  
 Scan Tool (OBDII w/CAN capability) or Personal Computer (PC) with equivalent  
     interface capability  
 Screw Extractor Set  
 Seat Covers  
 Serpentine Belt Tensioner Tools  
 Snap Ring Pliers Set - external  
 Snap Ring Pliers Set - internal  
 Soldering Gun  
 Soldering Iron (Pencil Tip)  
 Spark Plug Boot Puller  
 Tap and Die Set - Standard  
 Tap and Die Set – Metric  
 Temperature Sensing Device  
 Thread Repair Insert Kit  
 Tire Inflator Chuck  
 Trouble/Work Lights (Fluorescent Preferred)  
 Tube Quick Disconnect Tool Set  
 Tubing Bender  
 Tubing Cutter/Flaring Set (Double-lap and ISO)  
 Twist Drill Set - 1/64" - 1/2"  
 Ultra Violet Leak Detection Device (Black Light)  
 Used Oil Receptacle with extension neck and funnel  
 Valve Core Removing Tool  
 Vernier Calipers  
     0 - 6"  
     0 - 125mm  
 Wheel Chocks  
 Workbenches with vises

## **SPECIALTY TOOLS AND EQUIPMENT**

This section covers the tools and equipment a lab/shop should have for training in any given specialty area. This equipment is specialized and it must be available in the lab/shop or to the program. No specific type or brand names are identified because they will vary in each local situation.

### **SUSPENSION & STEERING**

- Ball Joint Press and other Special Tools
- Brake Pedal Depressor
- Bushing Driver Set
- Coil Spring Compressor Tool
- Constant Velocity Joint (CV) Service Tools:
  - Boot Installation Tool
  - Boot Clamp Pliers or Crimping Ring
- Chassis Ear (recommended)
- Hand Grease Gun
- Inner Tie Rod End Tool
- Pitman Arm Puller
- Power Steering Pump Pulley Special Tool Set (appropriate for units being taught)
- Power Steering Pressure Gauges (recommended)
- Shock Absorber Tools
- Strut Spring Compressor Tool
- Steering Column Special Tool Set (appropriate for teaching units being utilized)
- Tie Rod Puller
- Tire Mounting Machine (rim clamp type)
- Tire Patching Tools and Supplies
- Wheel Alignment Equipment-4 wheel (including alignment tools)
- Wheel Balancer - Electronic Type
- Wheel Weight Pliers

## **BRAKES**

Bearing Seal and Race Driver Set  
Brake Bleeder, Pressure or Vacuum  
Brake Disc Micrometer  
Brake Drum Micrometer and Calibration Equipment  
Brake Lathe (bench with disc and drum service attachments)  
Brake Lathe (on car)  
Brake Shoe Adjusting Gauge  
Brake Spring Remover/Installer  
Brake Spring Pliers  
Brake Spoon  
Piston Retraction Set

## **HEATING AND AIR CONDITIONING**

A/C Compressor Clutch Service Tools  
A/C Service Port Adapter Set  
Dye Injector  
Hygrometer  
Leak Detector (SAE Standard)  
Manifold Gauge Set or equivalent (HFC-134a)  
Refrigerant Charging Station (HFC-134a) or equivalent  
Refrigerant Identification Equipment  
Refrigerant Recovery/Recycling Machine (HFC-134a)  
Thermometer

## **ENGINE PERFORMANCE**

Four or Five Gas Exhaust Analyzer (Five Gas Recommended)  
Fuel Injection Pressure Gauge Sets with Adapters  
Injector Pulse Tester  
Leak Detector (Smoke or Nitrogen)  
Logic Probe (suggested)  
Oxygen Sensor Socket  
Pinch-off Pliers  
Sending Unit Socket(s)  
Spark Plug Thread Tap  
Spark Tester  
Timing Advance Light  
Vacuum/Pressure Gauge

## **AUTOMATIC TRANSMISSION/TRANSAXLE**

Differential Setup Tools (appropriate for units being taught)  
Hydraulic Pressure Gauge Set  
Front Wheel Drive Engine Support Fixture  
Transaxle Removal and Installation Equipment  
Transmission Jack(s)  
Transmission/Transaxle Flushing Equipment (recommended)  
Transmission/Transaxle Holding Fixtures  
Transmission/Transaxle Special Tool Sets (appropriate for units being utilized)

## **ELECTRICAL/ELECTRONIC SYSTEMS**

Connector Pick Tool Set  
Door Panel Trim Tool(s)  
Headlight Aimer or Screen  
Heat Gun (or equivalent for heat shrinking operations)  
Wire and Terminal Repair Kit

## **MANUAL DRIVE TRAIN AND AXLES**

Axle Nut Socket Set (or equivalent)  
Clutch Alignment Set  
Clutch Pilot Bearing/Bushing Puller/Installer  
Differential Setup Tools (appropriate for units being taught)  
Front Wheel Drive Engine Support Fixture  
Rotating Torque Wrench (beam-type or equivalent)  
Transaxle Removal and Installation Equipment  
Special Tools for Transmissions/Transaxles (appropriate for units being taught)  
Transmission/Transaxle Holding Fixtures  
Transmission Jack(s)  
Universal Joint Tools

## **ENGINE REPAIR**

Ball (Small Hole) Gauges  
Cam Bearing Driver Set (suggested)  
Camshaft Holding Tool (appropriate for units being taught)  
Cylinder Deglazer  
Dial Bore Indicator  
Antifreeze/Coolant Tester  
Engine Stands/Benches  
Inside Micrometer Set:  
    0 - 6"  
    0 - 125mm  
Oil Pressure Gauge  
Outside Micrometer Set:  
    0 - 6"  
    0 - 125mm  
Portable Crane - 1/2 Ton  
Ring Compressor  
Ring Expander  
Ring Groove Cleaner  
Straight Edge  
Telescopic Gauge Set  
Torque Angle Gauge  
Transaxle Removal and Installation Equipment  
V-Blocks  
Valve Spring Compressor  
Valve Spring Tester