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ABSTRACT

The purpose of this federally-funded interim report is to present the results of a task inventory analysis survey of automotive mechanics completed by project staff within the Instructional Systems Design Program at the Center for Vocational and Technical Education. Intended for use in curriculum development for vocational education programs in automotive mechanics, a task inventory with 329 task statements was constructed after a literature review and revised after interviewing four consultants about the appropriateness of each task. A mail survey of 139 independent garage automotive mechanics in Ohio yielded 72 useable responses and 12 new car dealerships returned 66 inventory packets. A task job description and time analysis was validated. It was found that on-the-job (self-learned) training and company-sponsored training were the most frequent sources of job skills development. Sample survey materials are appended. (AG)

Research and Development Series No. 86

Automotive Mechanics Occupational Performance Survey

THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION
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- Conducting research and development to fill voids in existing knowledge and to develop methods for applying knowledge
- Programmatic focus on state leadership development, vocational teacher education, curriculum, and vocational choice and adjustment
- Stimulating and strengthening the capacity of other agencies and institutions to create durable solutions to significant problems
- Providing a national information storage, retrieval, and dissemination system for vocational and technical education through the affiliated ERIC Clearinghouse

Research and Development Series No 86

AUTOMOTIVE MECHANICS OCCUPATIONAL PERFORMANCE SURVEY

Interim Report

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U.S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE

National Institute
of Education

FOREWORD

A continued programmatic effort at The Center for Vocational and Technical Education is to develop more effective procedures for curriculum development. One product of this effort is this interim report of the automotive mechanics task inventory survey. Data reported herein were collected and analyzed as a preliminary stage of a long-range effort to develop a set of generic procedures for the development of up-to-date curricula in vocational and technical education. This research was conducted within the Instructional Systems Design Program at The Center.

It is hoped that the revised task inventory contained in this report will be useful to practitioners across the country while development of procedures for designing improved curricula continues. The Center welcomes any questions, criticisms, or other comments which may be helpful to the research team in their continuing efforts.

The profession owes its thanks to Sidney D. Borcher, former research specialist at The Center and currently director of the Arizona Research Coordinating Unit; and to Paul B. Leiter, research associate, for their work in preparing this report. Assistance was also provided by John W. Joyner, research associate. The Center also expresses its appreciation to the many individuals in the field of automotive mechanics for their interest and cooperation in the study.

Robert E. Taylor
Director
The Center for Vocational
and Technical Education

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CHAPTER I

INTRODUCTION

Purpose of the Study

The Center for Vocational and Technical Education is developing a system for acquiring and using occupational information effectively in designing and revising curricula. This interim report is offered before completion of the major project so that the occupational information collected during the development of the system may be available for use by curriculum developers, instructors, and others involved in planning and conducting vocational and technical programs.

One of the occupational areas used in the initial piloting of the system was automotive mechanics. It is the purpose of this report to present the results of the task inventory analysis survey conducted by the project staff in the automotive mechanics occupational area. The objectives of the task inventory analysis survey were as follows:

1. To construct and validate a task inventory for the automotive mechanics occupational area.

2. To determine the percent of incumbent workers in the automotive mechanics occupations performing each task.

3. To determine the relative time spent in performing specific tasks by incumbent workers in the automotive mechanics occupations.

4. To validate a task job description for automotive mechanics.

5. To determine what tasks are common to all jobs within the automotive mechanics occupational area.

Definition of the Automotive Mechanics Occupational Area

Automotive mechanics are skilled and highly trained people in the field of automobile repair and maintenance. Because of the complex design of most of today's automobiles, the mechanic must have not only the ability, but the knowledge to cope with the problems of repairing and maintaining specialized equipment, much of which changes in its specifications yearly, along with new features which are added to each new model.

These mechanics may work in large new car dealerships, where they may be expected to become experts in one facet or another of the mechanics trade, while at the same time retain their skills at any or all jobs which may come into the service department. Such businesses may hire as many as fifty or as few as five automotive mechanics, according to the needs of the shop. Other mechanics may work in an independent garage, which may normally employ from one to fifteen workers. While the independent garage mechanic may usually be called upon to do a specific task (e.g., transmission inspection and repair), he will most likely be expected to display a wider range of mechanical knowledge than his associates working in the larger new car dealership service departments. This is true by the very nature of the job which limits the "new car" mechanic to one or two makes of automobiles, while the independent garage mechanic must be prepared to repair or maintain any model or make of car.

Job titles associated with automotive mechanics are: (1) mechanic's helper or apprentice, (2) mechanic, (3) service manager (generally in large dealerships only), (4) service writer or advisor (also generally applies only to new car dealerships) and (5) garage owner (usually only in the case of the independent garage).

The purpose of the survey was to collect occupational information that would be useful for revising and designing vocational and technical programs for automotive mechanics. Since the emphasis of these programs is to develop skills beyond those of the tire and muffler man or new car preparation man, these job titles were omitted.

CHAPTER II

METHODOLOGY

Construction of the Task Inventory

The task statements were identified by searching existing automotive mechanic occupations task lists, job descriptions, and curriculum guides. All tasks that were thought to be performed by an incumbent worker in one of the automotive mechanics occupations were included.

Following the initial identification, the tasks were grouped into functional areas called "Duties." Action words ending in "ing" (gerunds) were used to designate duties. The duty categories identified were:

1. Organizing and planning
2. Supervising
3. Inspecting and evaluating
4. Training
5. Performing maintenance control functions
6. Performing engine overhaul functions
7. Maintaining and repairing power trains
8. Maintaining and repairing automatic transmissions
9. Maintaining and repairing electrical systems
10. Maintaining and repairing fuel systems
11. Maintaining and repairing cooling systems
12. Maintaining and repairing standard and power steering units
13. Maintaining and repairing braking systems
14. Maintaining and repairing front ends
15. Maintaining and repairing automobile air conditioners
16. Maintaining and repairing automobile heaters
17. Lubricating and maintaining

After the task statements were grouped under the appropriate duties, each task statement was carefully reviewed and rewritten into the proper format (see Appendix A). Each task statement was written so as to begin with a present tense action word with the subject "I" understood. The task statements were arranged alphabetically under each duty so as to shorten the incumbents' reading time and to assist them in recalling tasks which were not listed. In all, 329 task statements were included in the inventory along with four pertinent background information questions.

Consultant Review of the Task Inventory

After the initial task inventory had been constructed from published sources, it was reviewed by four consultants who were employed in automotive mechanics occupations. Three of these were service managers for new car dealerships and one was an independent garage owner. All were personally interviewed by members of the project staff.

The consultants were asked to respond to each task individually and comment on its clarity and appropriateness. The comments of the four consultants were pooled and revisions of the task inventory were made based on their comments.

Selection of the Worker Sample

Since the duties and tasks performed by mechanics are not typically related to geographic location, it was felt that a sample of incumbent workers in the automotive mechanics occupations from one state (Ohio) would be sufficient for validating the task inventory. Therefore, respondents were selected from lists provided by the Ohio New Car Dealers Association and the Independent Garage Owners of Ohio.

Data Collection Procedures

An automotive task inventory packet was assembled for use in the data collection process. The packet included: (A) the task inventory booklet, (B) a letter to the individual, soliciting his help, (C) a return envelope, self-addressed and stamped, and (D) two small incentives; a pen with Ohio State inscribed on the side and a 1971-72 Ohio State University football schedule.

The executive secretary of the Independent Garage Owners of Ohio was contacted and agreed to provide the names and addresses of those automotive mechanics who had taken the battery of tests for National Automotive Technicians Certification Examination within the last year. These mechanics were contacted by direct mail with a package containing the packet plus a letter from their executive secretary urging them to participate in the study. A postcard reminder and follow-up letters followed the original mailing. In all, 139 independent garage automotive mechanics were contacted, and completed returns were received from seventy-two of them. This represented a 52 percent return rate.

It was impossible to secure a list of the names and addresses of automotive mechanics working in new car dealerships. Therefore, a random sample of twenty dealers in the Columbus, Ohio area was selected. A letter was sent to the

selected dealers explaining the study and asking for their help. Approximately one week after mailing the letter, the staff called each dealer and arranged a meeting at his dealership to discuss the study and present him with sufficient inventory packets. Of the twenty dealers contacted, twelve agreed to pass out the packets. Overall, 120 packets were delivered to the dealerships. Of these, sixty-six were returned complete, representing a 55 percent return rate. Thank-you letters were sent to those dealerships that responded positively.

Each of the respondents was asked to answer the four background information questions and check the tasks they perform on their present job. After they had checked the tasks they perform, the respondents were then asked to go back and rate those tasks they had checked on a seven point "relative time-spent" scale. A rating of one indicated that the respondent spent very little total time on the task, as compared with the time he spent on each of the other tasks he did. A rating of seven indicated that he spent a very large amount of his total time performing that particular task as compared to the other tasks he performed. Examples of the instructions and rating scale are presented in Appendix B.

To permit comparisons across respondents on specific tasks, the relative time-spent ratings were converted to percent values. These values are regarded as estimates of the percent of work time spent by the respondents on each task. It is assumed that the total of the respondent's raw ratings represents 100 percent of his work time. Based on this assumption, each raw rating is expressed as a percent of that total. The following formula was used in converting the raw ratings to percentages of time spent:

$$\frac{r_i}{\sum_{i}^{n} r_i} \times 100$$

where r_i = the rating provided by a respondent on task i, and

$\sum_{i}^{n} r_i$ = the sum of a respondent's ratings on the n tasks he performs.

CHAPTER III

FINDINGS

Description of the Worker Sample

The distribution of usable responses to the automotive mechanics inventory by job title and type of business is presented in Table 1. Forty-eight percent of the respondents were employed in new car dealerships and 38 percent were employed in independent garages. Of the total respondents, 78 percent indicated their job title was that of automotive mechanic. Only two respondents indicated their job title was that of job specialist.

The frequency of worker responses to the question of where they received their automotive mechanic training by job title is given in Table 2. It should be noted that a respondent could check more than one source of training; therefore, the total number of responses (257) is greater than the number of workers (138) included in the sample

The source of training checked most frequently was on-the-job (self-learned), and the second most frequent was company-sponsored training. The least frequent was post-high school programs with only four out of the 138 workers checking it. Very few of the workers indicated they had received training from apprenticeship programs (5) and adult education programs (5).

Automotive Mechanics Job Description

Inspection of the tasks checked by the workers who possessed the job titles of automotive apprentice and job specialists revealed that the tasks they performed were

TABLE 1. Distribution of Respondents by Job Title and Type of Business

JOB TITLE		Type of business: New Car Dealer	Independent Garage Owner	Service Station	Other	TOTAL
Automotive Apprentice	(N)	1	0	0	0	1
	(%)	0.7	0	0	0	0.7
Automotive Mechanic	(N)	58	35	7	7	107
	(%)	42	26	5	5	78
Service Advisor	(N)	4	2	0	0	6
	(%)	3	1	0	0	4
Job Specialist	(N)	0	2	0	0	2
	(%)	0	1	0	0	1
Service Manager	(N)	3	1	1	0	5
	(%)	2	.7	.7	0	3.4
Garage Owner	(N)	0	12	1	0	13
	(%)	0	9	.7	0	9.7
Other	(N)	0	1	0	3	4
	(%)	0	.7	0	2	2.7
Total	(N)	66	53	9	10	138
	(%)	48	38	6.7	7.3	100

TABLE 2. Frequency of Worker Responses to the Question of Where They Received Their Automotive Mechanics Training by Job Title

Type of Training		Job Title							
		Automotive Apprentice	Automotive Mechanic	Service Advisor	Job Specialist	Service Manager	Garage Owner	Other	Total
On-the-job Training	(N)	1	98	5	2	4	10	4	124
	(%)	100	49	36	67	40	40	80	48.2
Military Training	(N)	0	16	1	0	1	3	1	22
	(%)	0	8	7	0	10	12	20	8.6
Private Schools	(N)	0	15	1	0	1	3	0	20
	(%)	0	7.5	7	0	10	12	0	7.8
Company Training	(N)	0	48	3	1	1	5	0	58
	(%)	0	24	22	33	10	20	0	22.6
Apprentice-ship	(N)	0	4	0	0	1	0	0	5
	(%)	0	2	0	0	10	0	0	1.9
High School	(N)	0	13	2	0	1	3	0	19
	(%)	0	6.5	14	0	10	12	0	7.4
Post High	(N)	0	1	1	0	1	1	0	4
	(%)	0	.5	7	0	10	4	0	1.6
Adult Education	(N)	0	4	1	0	0	0	0	5
	(%)	0	2	7	0	0	0	0	1.9
Total	(N)	1	199	14	3	10	25	5	257*
	(%)	100	100	100	100	100	100	100	100

*Any single respondent may have had more than one training experience.

similar to those who checked the job title of automotive mechanic. Therefore, the respondents in these job titles were combined with those in the automotive mechanics job title to generate the composite task job description for all automotive mechanics. Table 3 displays the task job description for all types of automotive mechanics.

The reader is directed to the data collection section of the methodology chapter for an explanation of how the average time-spent figures were calculated. The letter and number preceding each task in Table 3 refers to the location of the task on the original inventory. The letter refers to the duty heading under which the task was categorized and the number indicates its alphabetical rank under that duty heading. A complete list of the duties and task statements under each duty on the original inventory are displayed in Appendix C.

Inspection of the data in Table 3 reveals that a greater percentage of the mechanics perform repair and maintenance tasks than managerial tasks. It is also shown that mechanics spend a relatively larger percentage of their time on repair and maintenance tasks than on managerial tasks.

TABLE 3. Task Job Description for Automobile Mechanics (N=110)

Ranked by ... PERCENT OF MEMBERS PERFORMING	D-TSK	TASK TITLE	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
N	2	Adjust and repack front wheel bearing	93.64	0.72	0.67	0 67
N	17	Replace shock absorbers and/or mounting	92.73	0 75	0.70	1.37
M	3	Bleed and/or adjust brakes	91.82	0.75	0.69	2 06
N	7	Check or inspect wheel bearings	90.91	0.82	0.74	2.80
M	20	Replace brake shoes	90.91	0.75	0.69	3.49
M	18	Repair or replace wheel cylinder	90 91	0 74	0.67	4.16
N	15	Replace front wheel bearings grease seal	90 00	0.77	0.69	4.85
M	7	Inspect or turn brake drums	90.00	0.72	0.65	5.49
M	13	Repair or replace master cylinder	89.09	0.66	0.59	6.08
I	22	Replace light bulbs	89.09	0.64	0.57	6.65
I	21	Replace generators or alternators	88.18	0.61	0.54	7.18
I	20	Replace flasher units	88.18	0.59	0.52	7.70
I	19	Replace and adjust distributors	88.18	0.60	0.53	8.23
I	16	Repair or replace switches	88.18	0.60	0.53	8.76
J	15	Remove, service, or replace fuel pumps	88.18	0.58	0.51	9.27
J	8	Inspect, service, or replace carburetor air cleaner	88.18	0 64	0.56	9.83
J	7	Inspect, clean and adjust choke unit (automatic and manual)	88.18	0.62	0.55	10.38
J	1	Adjust carburetor	88 18	0.66	0.58	10.97
I	27	Set ignition timing	88.18	0.72	0.64	11 60
M	19	Replace brake hoses and lines	88.18	0.66	0.58	12 19
I	7	Inspect secondary circuit leads, plug wires, distributor, cap and/or rotor	88.18	0.69	0.61	12.80
I	6	Clean gap and test spark plugs	87.27	0.69	0.60	13.39
M	1	Adjust and/or replace hand brake linkage	87 27	0.59	0.52	13.91
J	6	Clean or replace fuel filter units	87.27	0.62	0.55	14.46
I	24	Replace stop-light switch	86.36	0.56	0.48	14.94
I	28	Test and repair turn-signal units	86.36	0.61	0.53	15.47
J	10	Install carburetors	86.36	0.57	0.50	15.96
J	9	Inspect, service or replace gas tank, cap and sending unit	86.36	0.57	0.49	16.45
J	11	Measure fuel flow and pressure	86 36	0.57	0.50	16.95
F	35	Run compression test	86.36	0.69	0.60	17.54
G	4	Check shifting	85.45	0.67	0.57	18.12
I	1	Adjust headlights	85 45	0 59	0.51	18.62
I	25	Service or replace batteries, cables, and battery boxes	85.45	0.63	0.54	19.16
I	23	Replace starters	85.45	0.60	0.52	19.68
I	12	Repair or replace charging system regulators	85.45	0.60	0.52	20.20
I	8	Inspect and repair ignition switch, resistor, wiring, coil, points and condenser of the primary circuit	35 45	0.64	0.55	20.74
K	12	Replace water pump	85.45	0.61	0.52	21.27
K	10	Replace radiator and/or heater hoses	85.45	0.61	0.52	21.79
K	7	Inspect water hoses	85.45	0.68	0.58	22.37
K	1	Check coolant freezing point	84.55	0.65	0 55	22.92
M	4	Check and/or replace brake pads (disc brakes)	84.55	0.71	0.60	23.52
P	2	Inspect and/or replace thermostat	83.64	0.60	0.50	24.02
J	20	Repair or replace fuel lines and hoses	83 64	0.55	0.46	24.48
K	8	Remove and reinstall radiators	83.64	0.60	0.50	24.98
G	25	Replace transmission mounts	83.64	0 59	0.50	25.48
G	24	Replace rear-axle shaft, bearings and/or seal	83.64	0.65	0.55	26.03
G	18	Replace and/or adjust mechanical-type clutch	83.64	0.61	0.51	26.54
F	18	Replace engine mounts	83.64	0.62	0.52	27.06
I	5	Check alternator and generator and regular output	82.73	0 62	0.51	27.57
G	9	Perform operations and/or inspections of drive shafts, u-joints, and center bearings	82.73	0.64	0.53	28.10
I	15	Repair or replace lighting system components	82.73	0.60	0.49	28.59

TABLE 3. Task Job Description for Automobile Mechanics (N=110) - Continued

Ranked by .. D-TSK		TASK TITLE	PERCENT OF MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
I	18	Repair starters	82.73	0.62	0.52	29.11
N	9	Lubricate ball joints	82 73	0.73	0.61	29.72
I	1	Adjust valves	82 73	0.62	0 51	30 23
Q	3	Lubricate vehicles and equipment	82.73	0.62	0.51	30.74
Q	1	Change oil and filters	81.82	0.67	0.55	31.29
F	10	Inspect exhaust systems	81.82	0.68	0 55	31 84
J	22	Repair or service carburetors	81.82	0.61	0 50	32 34
J	5	Clean carburetor	81 82	0 60	0 49	32.83
G	6	Lubricate and/or replace speedometer cable, drive gear and housing	81.82	0 56	0 46	33.29
F	19	Replace flywheel, muffler and/or tail pipe assemblies	81 82	0.65	0.53	33 82
F	21	Replace gaskets and seals	80.91	0 63	0 51	34.33
I	14	Repair generators or alternators	80 91	0.60	0.48	34 82
I	11	Perform operational inspections of lighting systems	80.91	0.61	0.49	35.31
I	26	Service the generator	80 00	0.58	0 46	35.77
K	15	Test thermostat	80 00	0 57	0.45	36 22
K	14	Test and replace coolant pressure caps	80.00	0.57	0 46	36.68
G	1	Adjust external shift linkage on manual transmissions	80 00	0.57	0 46	37 14
F	34	Replace head gaskets	80.00	0.59	0 47	37.61
I	2	Adjust, repair, or replace backup light switches	80 00	0.54	0 43	38 04
G	20	Replace a manual transmission	80.00	0 55	0.44	38 48
G	27	Replace throw-out bearings	80.00	0.59	0.47	38.95
G	16	Repair or replace slip joints or universal joints	80 00	0.56	0 45	39.40
F	3	Check or replace exhaust manifolds	80 00	0 55	0 44	39.84
P	5	Remove, repair and/or replace heater	80.00	0 58	0.46	40.31
M	12	Repair disc brakes	80.00	0.67	0 54	40.84
M	9	Perform operational brake inspections	79.09	0.65	0.51	41.36
P	4	Replace heater water control units	79.09	0 53	0.42	41.78
P	1	Diagnose heating system malfunctions	79 09	0.59	0 47	42.25
N	11	Perform visual inspections of suspension systems	79.09	0.90	0.71	42.96
N	10	Lubricate the front and rear suspension	79.09	0.68	0.53	43.49
I	4	Analyze malfunctions in the cranking system	79.09	0 58	0.46	43.95
G	7	Lubricate universal joints	79.09	0.60	0.48	44.43
F	23	Replace pan and valve covers	79 09	0.58	0.46	44.88
K	5	Inspect, adjust and/or replace fan	79.09	0.54	0 43	45.31
I	10	Perform operational inspections of electrical systems	79 09	0.63	0.50	45.82
I	13	Repair distributors	79.09	0.56	0.44	46 26
K	9	Replace freeze plugs	78.18	0.53	0.42	46.67
F	31	Replace valve lifters	78.18	0.55	0.43	47.10
P	3	Inspect and replace defroster hose	78 18	0.52	0.41	47.51
P	6	Service heater control components	78.18	0 56	0.44	47.95
F	22	Replace oil pumps	77.27	0.54	0.41	48.37
K	2	Check coolant temperature	77.27	0.59	0.46	48.83
F	14	Remove engines from vehicles	77.27	0.59	0.46	49.28
F	7	Disassemble engines	76.36	0.62	0.48	49.76
J	14	Perform operational inspections of fuel systems	76.36	0.56	0 43	50.19
G	5	Check drive shaft	76 36	0.59	0.45	50.64
G	23	Replace pilot bearings	76.36	0.54	0.41	51.05
M	14	Repair or replace hydraulic power brake units	76.36	0.58	0.45	51.49
F	30	Repair or service crankcase ventilation systems	75.45	0.57	0.43	51.92
F	26	Replace timing gears and chains	75.45	0.59	0.44	52.36
I	3	Analyze or adjust engine performance using engine analyzer	75.45	0.63	0.48	52.84

TABLE 3. Task Job Description for Automobile Mechanics (N=110) - Continued

Ranked by .. PERCENT OF MEMBERS PERFORMING	D-TSK	TASK TITLE	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
F	27	Replace valves	74 55	0.60	0.45	53.29
G	22	Replace pinion seal	74.55	0 52	0.39	53.68
G	14	Repair or replace differentials	74.55	0.58	0.43	54.11
H	1	Adjust linkage from steering column to automatic transmission	74.55	0.57	0.42	54.53
G	8	Perform operational and/or test inspections of differentials	74.55	0.63	0.47	54.99
G	10	Perform operational manual transmission inspections	74.55	0.56	0.42	55.41
M	16	Repair or replace hydraulic lines and fittings	74.55	0.59	0.44	55.86
L	3	Check steering	74.55	0.80	0.60	56.45
J	24	Service or replace manifold heat controls	74.55	0.52	0.39	56.84
F	5	Clean engine parts and check for condition	74.55	0.60	0.45	57.29
F	16	Replace connecting rods and bearings	74.55	0.57	0.42	57.71
F	9	Grind valves	72 73	0.61	0.45	58.16
N	14	Replace ball joints	72.73	0.73	0.53	58.68
G	19	Replace drive line seals	72.73	0.54	0.39	59.08
F	24	Replace pistons	72.73	0.53	0.39	59.47
F	17	Replace crankshaft and bearings	72.73	0.55	0 40	59.86
H	11	Replace external seals, gaskets, and lines on automatic transmissions	72.73	0.58	0.42	60.28
F	25	Replace rings on pistons	71.82	0.57	0.41	60.69
G	12	Rebuild manual transmission (major repairs)	71.82	0.54	0.39	61.08
M	2	Adjust and/or replace hand brake external band	71.82	0.52	0.38	61.46
J	25	Service or replace units in vacuum systems	71.82	0.54	0.39	61.84
L	1	Adjust worm and sector in steering box	71.82	0.72	0.52	62.36
I	29	Test and rewire dash units	71.82	0.53	0.38	62.74
I	9	Measure resistance in plug wires	70.91	0.59	0.42	63.16
L	5	Lubricate the steering box and linkage	70.91	0.57	0.40	63.56
N	3	Balance wheels and tires	70.91	0.87	0.62	64.18
F	12	Perform operational inspections of positive crankcase ventilation system	70.91	0.58	0.41	64.58
F	6	Diagnose valve train and head malfunctions	70.91	0.58	0.41	65.01
M	17	Repair or replace hydraulic power cylinders	70.00	0.56	0.39	65.40
K	3	Check over flow tank and accessories	70.00	0.59	0.41	65 81
K	13	Solder minor leaks in radiator	70.00	0.53	0.37	66.18
F	32	Resurface valve seats	70.00	0.59	0.41	66.60
F	33	Replace camshaft and/or camshaft bearings	69.09	0.52	0.36	66.96
K	11	Replace variable-speed fan	69.09	0.55	0.38	67.34
I	17	Repair solenoids	69.09	0.55	0.38	67.72
J	23	Repair or service exhaust emission control systems	68.18	0.51	0.35	68.07
L	9	Repair or replace power steering pumps	68.18	0.59	0.40	68.47
L	7	Repair or replace manual steering components	68.18	0.63	0.43	68.90
F	13	Perform operational inspections of engine lubrication system	68.18	0.55	0.38	69.27
Q	10	Winterize vehicles	68.18	0.56	0.38	69.65
Q	4	Remove, repair or replace tires	67.27	0.72	0.48	70.13
N	8	Inspect and repair front suspension systems	67.27	0.80	0.54	70.67
H	10	Remove and/or install automatic transmission	67.27	0.60	0.40	71.07
G	21	Replace manual transmission gaskets and seals (in-car repairs)	66.36	0.51	0.34	71.41
N	16	Replace front suspension control arms and/or bushings	66.36	0.70	0.46	71.88
J	13	Perform operational inspections of exhaust emission control system	66.36	0.53	0.35	72.23
H	2	Adjust linkage from engine to automatic transmission	65.45	0.56	0.37	72.60
F	20	Replace flywheel ring gears	64.55	0.56	0.36	72.96
L	2	Check or replace steering spindles	64.55	0.67	0.43	73.39
F	4	Clean engines	64.55	0.52	0.34	73.73
G	15	Repair or replace spider gear	63.64	0.54	0.34	74.08

TABLE 3. Task Job Description for Automobile Mechanics (N=110) - Continued

Ranked by D-TSK	TASK TITLE	PERCENT OF MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
M 15	Repair or replace hydraulic control valves	63.64	0 56	0 35	74 43
N 13	Repair or replace rear suspension system	62.73	0 63	0.39	74.82
L 11	Replace pivot points on steering linkage	62 73	0 68	0.43	75.25
L 8	Repair or replace power steering components	61.82	0 64	0 39	75.6[illegible]
L 4	Lubricate the power steering	61.82	0 61	0.37	76 02
H 3	Check and/or repair transmission cooling system	61 82	0.54	0 33	76 35
J 3	Analyze for moisture or foreign particle level in fuel system	61.82	0 51	0 32	76.66
N 12	Rebush king pins or link pins	60 91	0.67	0 41	77 07
F 2	Check head for warp	60.91	0 50	0.30	77.38
F 11	Inspect the crankshaft and connecting rod assembly using micrometers and other equipment	59 09	0 53	0.32	77.69
L 10	Replace pivot points on power steering linkage	59.09	0.68	0 40	78.09
M 10	Reline brake shoes	58 18	0 62	0 36	78.45
K 4	Chemically clean and flush cooling system	58 18	0.55	0.32	78.77
H 7	Make external adjustment of bands on automatic transmission	57.27	0.60	0.34	79 12
G 13	Repair hydraulic-type clutch	57.27	0.49	0.28	79.40
C 1	Analyze causes of vehicle failures	57 27	0.77	0.44	79.84
P 7	Service or replace circulating heaters	56.36	0.53	0.30	80.14
H 4	Clean and visually inspect transmission	54.55	0.58	0.32	80.46
H 9	Perform operational automatic transmission inspections	53.64	0 59	0 32	80.77
F 15	Repair oil pumps	53.64	0.52	0.28	81.05
G 26	Test and replace out-of-round shaft	52.73	0 56	0 29	81.35
C 16	Inspect tires and wheels	50.00	0 88	0.44	81.78
C 15	Inspect and test windshield-wiper motors, blades, and arms	48 18	0.64	0.31	82.09
F 8	Fit piston pins	48.18	0 49	0.24	82.33
O 11	Service air conditioner control cables and switches	48 18	0 53	0 26	82.58
O 6	Replace air conditioner fan motor	48 18	0.50	0 24	82 82
N 4	Check and align front end	48.18	0 95	0.46	83.28
M 5	Check and turn motor if necessary (disc brakes)	47.27	0.64	0.30	83 59
H 8	Make internal repairs and/or adjustments on automatic transmission	47 27	0.69	0.33	83.91
Q 5	Perform road service	47.27	0 53	0 25	84.16
L 6	Rebuild power steering cylinders	46.36	0.50	0.23	84.40
N 1	Adjust or replace torsion and trunion bars	46 36	0.60	0.28	84.67
G 2	Analyze and repair electrical control circuit and components for over drive unit	44.55	0.47	0.21	84.88
H 6	Inspect and/or repair front pump and components	42 73	0.58	0 25	85.13
H 5	Inspect and/or repair converter	42.73	0.59	0.25	85.38
K 6	Inspect and/or repair blowers on air-cooled engines	42.73	0.45	0.19	85.58
J 2	Adjust governors	42.73	0.42	0.18	85 76
M 8	Inspect and service air tanks and valves	41 82	0 46	0.19	85.95
O 4	Repair and/or replace air conditioning compressor	40 91	0.51	0.21	86.16
J 12	Perform operational checks of governors	40.91	0.45	0.18	86.34
N 6	Check and replace steering damper	40.00	0.67	0.27	86.61
C 8	Estimate cost of vehicle repairs	40.00	0.72	0.29	86.90
F 28	Replace valve guides	39.09	0 53	0.21	87.11
C 20	Perform inspections of vehicle conditions	39 09	0.91	0.35	87 46
E 9	Enter work performed on work order	39.09	0 71	0.28	87.74
Q 7	Service vehicles with fuel or oil	39 09	0.48	0.19	87.93
Q 6	Pick up stalled vehicles	38.18	0.45	0.17	88.10
G 17	Repair, replace, or adjust front-drive axle assemblies	38.18	0.43	0.17	88.26
O 2	Diagnose air conditioning malfunctions	37.27	0.53	0.20	88.46

TABLE 3. Task Job Description for Automobile Mechanics (N=110) - Continued

Ranked by . . . PERCENT OF MEMBERS PERFORMING
AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING
AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS

D-TSK		TASK TITLE				
M	11	Repair air brake systems	37.27	0 48	0 18	88.64
M	6	Inspect or repair brake air compressors	37 27	0.47	0.17	88 82
O	1	Check and/or refill system with freon	36.36	0.55	0.20	89 02
O	5	Replace condenser in air conditioning unit	36.36	0.50	0.18	89.20
G	11	Rebuild overdrive unit	35.45	0.45	0.16	89.35
C	5	Conduct spot check on malfunctions	35.45	0.72	0 25	89 61
A	1	Conduct and/or participate in personnel meetings	35.45	0.68	0.24	89.85
O	9	Replace expansion valve in air conditioning unit	34.55	0.49	0.17	90 02
O	8	Replace dryer in air conditioning unit	34.55	0.53	0.18	90.20
O	7	Replace evaporator in air conditioning unit	34.55	0.48	0.17	90 37
J	16	Repair governors	33.64	0.41	0.14	90.51
A	3	Develop troubleshooting procedures for use in locating vehicle malfunction	33.64	0.78	0.26	90.77
N	5	Check and align rear end	32.73	0.81	0.27	91.03
E	3	Complete forms when servicing vehicles	32.73	0.73	0.24	91.27
B	5	Complete work order form	30.91	0.66	0 20	91.48
C	17	Inspect vehicles for mirrors	30.00	0.68	0.20	91 68
D	5	Demonstrate operation of equipment	30.00	0.71	0.21	91.90
O	10	Replace freon control valve and/or diaphragm in air conditioning unit	30.00	0.52	0.16	92 05
O	3	Install air-conditioners in vehicles	29.09	0 47	0.14	92.19
D	15	Train individuals in the job	29.09	0.62	0.18	92.37
E	13	Initiate request for parts	29.09	0.59	0 17	92.54
A	21	Schedule appointments	29 09	0.63	0.18	92.72
A	14	Inspect vehicles for compliance with local laws	29.09	0.56	0.16	92.88
C	13	Inspect vehicles received and/or sold by organization	29.09	0.62	0.18	93.07
Q	2	Inspect, clean and/or repair automobile interiors	29.09	0.44	0.13	93 19
E	12	Initiate and complete work orders	28.18	0.61	0.17	93.36
E	8	Determine actual cost of vehicle repairs	28.18	0.65	0.18	93.55
J	4	Analyze fuel injection problems by means of electrical diagnostic equipment	27.27	0.59	0.15	93.71
B	20	Resolve technical problems	26 36	0.59	0.16	93.86
A	6	Establish equipment and/or special tool requirements	25.45	0.52	0 13	93.99
E	2	Check lubrication and service guide	25.45	0.54	0.14	94.13
F	29	Replace valve seats	24.55	0.41	0.10	94.23
C	2	Analyze maintenance reports on vehicles	24.55	0.60	0.15	94.38
B	7	Control flow of work	23.64	0.63	0.15	94.53
A	10	Establish methods to improve maintenance procedures	22.73	0.52	0.12	94.65
B	16	Orient newly hired personnel	22.73	0.58	0.13	94.78
J	18	Repair or replace fuel injectors	22.73	0.47	0 11	94.88
J	21	Repair or replace wiring harness for electronic fuel injection system	22.73	0.47	0.11	94.99
Q	8	Maintain tire removal equipment	22.73	0 44	0.10	95.09
P	8	Service or replace gas heaters	21.82	0.37	0.08	95.17
J	19	Repair or replace fuel injector pumps	21.82	0.47	0.10	95.27
E	5	Complete requests for procurement of parts	21.82	0.54	0.12	95.39
B	22	Schedule work assignments	21.82	0.56	0.12	95.51
B	23	Supervise mechanic specialist (such as, front end, transmission, brake, and tune-up	20.91	0.63	0.13	95.64
A	4	Develop plans for performing maintenance	20.91	0.53	0.11	95.75
C	6	Direct quality checks of vehicles after maintenance	20.91	0.65	0.14	95.89
A	13	Establish stock level of supplies	20.00	0.53	0.11	96.00
B	3	Check vehicle maintenance for compliance with warranty policies	20.00	0.45	0.09	96.08
E	11	Follow up on requisitions	19.09	0 46	0.09	96 17
E	1	Annotate and process records on vehicles being serviced and repaired	18.18	0.49	0.09	96.26
B	1	Allocate space and equipment	18.18	0.48	0.09	96.35
C	11	Evaluate suggestions	18.18	0.53	0.10	96.45

TABLE 3. Task Job Description for Automobile Mechanics (N= 110) - Continued

Ranked by ..	D-TSK	TASK TITLE	PERCENT OF MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
B	24	Supervise general mechanics	18.18	0.50	0.09	96.54
C	4	Check maintenance procedures	17.27	0.60	0.10	96.64
E	21	Prepare reports of vehicle defects	17.27	0.47	0 08	96.72
D	2	Brief personnel on changes in methods and procedures	17.27	0.55	0.10	96.82
C	19	Prepare inspection reports	16 36	0 57	0 09	96.91
E	26	Spot check service orders	16.36	0.56	0.09	97.00
E	19	Plan, schedule, and control maintenance of vehicles	16.36	0.55	0.09	97.09
E	4	Complete labor time cards	16.36	0.51	0.08	97.18
B	19	Resolve personnel problems	16.36	0 41	0.07	97.24
B	2	Assign individuals to job positions	16.36	0.52	0.09	97.33
B	17	Prepare requests for shop maintenance	15.45	0.47	0.07	97.40
B	11	Implement plans to check compliance with maintenance manual	15.45	0.39	0.06	97.46
B	10	Implement changes in maintenance procedures	15.45	0.37	0.06	97 52
C	3	Check equipment inventories	14.55	0.56	0.08	97.60
A	11	Establish operational procedures	14.55	0.50	0.07	97.68
E	27	Verify and complete operator's inspection guide and trouble report	14 55	0.42	0.06	97.74
J	17	Repair or replace electrical fuel injection computer	14.55	0.53	0 08	97.81
E	25	Review records to see that maintenance is accomplished according to priority	13.64	0 47	0.06	97 88
G	3	Balance drive shaft (in-car)	13.64	0.41	0 06	97.93
C	14	Inspect vehicles and apply materials for corrosion and rust control	13.64	0.47	0.06	98.00
B	18	Prepare requisitions for equipment	13.64	0.48	0.07	98.06
A	20	Prepare job descriptions	13.64	0.52	0.07	98.13
A	12	Establish personnel requirements	12.73	0.53	0 07	98.20
A	8	Establish local procedures for preparing records and report	12.73	0.42	0.05	98 25
E	17	Maintain vehicle warranty records	12.73	0.42	0.05	98.31
E	18	Monitor workload and downtime of vehicles in shop for repair	11 82	0.53	0.06	98.37
A	17	Plan shop safety programs	11.82	0.48	0.06	98.43
Q	9	Maintain washrack equipment	11.82	0.46	0.05	98.48
A	16	Plan emergency procedures for use during unusual maintenance load	10.91	0.57	0.06	98.54
A	18	Plan on-job training programs	10.91	0.61	0.07	98.61
B	6	Conduct safety briefings	10.91	0.34	0.04	98.64
B	14	Initiate personnel actions	10.91	0.53	0.06	98.70
C	12	Evaluate training programs	10.91	0.43	0.05	98.75
B	26	Supervise servicing and preparation personnel	10.91	0.60	0.07	98.82
C	10	Evaluate safety programs	10.00	0.36	0.04	98.85
B	8	Coordinate release of special equipment for testing and adjustment	10.00	0.37	0.04	98.89
A	7	Establish shop inspection system	10.00	0.49	0.05	98.94
D	4	Counsel newly-assigned employees on promotion and educational opportunities	10.00	0.32	0.03	98.97
D	6	Determine training requirements	9.09	0.36	0.03	99.00
D	3	Counsel individuals on training progress	9.09	0.50	0.05	99.05
E	23	Prepare vehicle deadline and work stoppages reports	9.09	0.61	0.06	99.10
E	15	Maintain daily work control logs or status boards	9.09	0.54	0.05	99.15
E	7	Compute average cost rates for mechanics	9 09	0.45	0.04	99.19
E	6	Complete unsatisfactory reports	9.09	0.33	0.03	99.22
B	15	Monitor safety programs	9.09	0.37	0.03	99.26
B	13	Implement training programs	8.18	0.39	0.03	99.29
A	9	Establish local production standards	8.18	0.47	0.04	99.33
A	2	Construct organizational or functional charts	8.18	0.37	0.03	99.36
A	15	Plan and establish operational budgets	8.18	0.48	0.04	99.40
C	9	Evaluate individuals for promotions, or reassignment	8.18	0.41	0.03	99.43
E	10	Establish or maintain correspondence files	8.18	0.30	0.02	99.45

TABLE 3. Task Job Description for Automobile Mechanics (N=110) - Continued

Ranked by: D-TSK		TASK TITLE	PERCENT OF MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS
D	7	Evaluate need for individual or group training	8.18	0.40	0 03	99.49
D	10	Monitor on-job-training programs	7.27	0 48	0.04	99.52
D	8	Evaluate training standards	7.27	0.43	0.03	99.55
E	14	Maintain charts, tables, and graphs on maintenance trends	7.27	0.38	0.03	99.58
B	12	Implement plans to report work stoppages	7.27	0.33	0.02	99.60
B	21	Schedule vacations	7.27	0.33	0.02	99.63
E	22	Prepare time and attendance or personnel rosters	6.36	0.34	0.02	99.65
E	16	Maintain publication files	6.36	0 44	0.03	99.68
E	24	Review Commercial credit slips	6.36	0.44	0.03	99.71
D	14	Supervise training programs	6.36	0.53	0.03	99.74
D	13	Rotate duty assignments of personnel for training purposes	6.36	0.39	0.02	99.77
D	12	Rate progress of individuals in training	6.36	0.45	0.03	99.79
E	20	Prepare medical or accident reports	5.45	0.40	0.02	99.82
D	9	Maintain training progress and qualification records	5.45	0.28	0.02	99.83
C	18	Maintain surveillance over contract maintenance programs	5.45	0.47	0 03	99.86
C	7	Draft changes to the maintenance evaluation programs	5.45	0.46	0.03	99.88
B	4	Complete mechanic proficiency ratings	5.45	0.45	0.02	99.91
A	19	Plan procedures for leased contract maintenance	4.55	0.36	0.02	99.92
B	25	Supervise vehicle body and fender repairman	4.55	0.52	0.02	99.95
B	9	Draft correspondence	4.55	0.31	0.01	99.96
D	11	Prepare or evaluate job proficiency guides	4.55	0.31	0.01	99.97
D	1	Assign on-job-training supervisors	3.64	0.31	0.01	99.99
A	5	Develop working agreements with vehicle leasing organizations	3.64	0.32	0.01	00.00

Description of Differences in Work Being Performed by New Car Dealer Mechanics and Independent Garage Mechanics

The question as to whether there are differences in the types of tasks being performed by new car dealer mechanics and independent garage mechanics was answered by computing separate job descriptions for the two groups of mechanics and generating a consolidated description of the differences in work being performed by the two groups. The description of the differences in tasks performed by mechanics working in new car dealerships and mechanics working in independent garages is presented in Table 4. Those tasks with less than a 20 percent difference between the two groups with respect to the number of individuals performing were omitted from Table 4 since the intent was to present only those tasks for which large differences in frequency of performance existed.

Inspection of Table 4 reveals that mechanics working in independent garages tended to perform more managerial and administrative tasks than mechanics in new car dealerships. New car dealerships have service managers and/or shop foremen whose specific responsibilities are to manage the service department, thus freeing the mechanics to perform primarily repair and maintenance tasks.

Analysis of the data in Table 4 also indicates that a large percent of mechanics working in new car dealerships performed tasks under the duty headings of (F) performing engine overhaul activities, (G) maintaining and repairing power trains, (I) maintaining and repairing electrical systems, and (J) maintaining and repairing fuel systems.

TABLE 4. Description of the Differences in the Percent of Mechanics Working in New Car Dealerships and the Percent of Mechanics Working in Independent Garages Performing the Same Tasks

GROUP 1 = NEW CAR DEALER MECHANICS (N=58)
GROUP 2 = INDEPENDENT GARAGE MECHANICS (N=35)

DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
PERCENT PERFORMING, GROUP 2
PERCENT PERFORMING, GROUP 1

D-TSK		TASK TITLE			
F	8	Fit piston pins	60.34	20.00	-40.34
I	3	Analyze or adjust engine performance using engine analyzer	82.76	47 50	-35.26
I	5	Check alternator and generator and regular output	86.21	57.50	-28.71
J	5	Clean carburetor	82.76	55.00	-27.76
I	13	Repair distributors	82.76	55 00	-27.76
I	10	Perform operational inspections of electrical systems	82.76	55.00	-27.76
I	7	Inspect secondary circuit leads, plug wires, distributor, cap and/or rotor	89.66	62.50	-27.16
F	1	Adjust valves	84.48	57.50	-26.98
J	13	Perform operational inspections of exhaust emission control systems	74 14	47.50	-26.64
J	1	Adjust carburetor	91.38	65.00	-26 38
I	8	Inspect and repair ignition switch, resistor, wiring, coil, points and condenser of the primary circuit	86.21	60.00	-26.21
J	22	Repair or service carburetors	81.03	55.00	-26.03
F	9	Grind valves	77.59	52.50	-25.09
J	7	Inspect, clean and adjust choke unit (automatic and manual)	89.66	65.00	-24.66
I	14	Repair generators or alternators	84.48	60.00	-24.48
F	20	Replace flywheel ring gears	68.97	45.00	-23.97
G	4	Check shifting	86.21	62.50	-23.71
I	6	Clean cap and test spark plugs	86 21	62.50	-23.71
F	19	Replace flywheel, muffler and/or tail pipe assemblies	81.03	57.50	-23.53
I	29	Test and rewire dash units	75.86	52.50	-23 36
G	10	Perform operational manual transmission inspections	72.41	50.00	-22.41
F	5	Clean engine parts and check for condition	72.41	50.00	-22.41
J	23	Repair or service exhaust emission control systems	72.41	50.00	-22.41
I	20	Replace flasher units	89.66	67.50	-22.16
I	18	Repair starters	84.48	62.50	-21.98
I	12	Repair or replace charging system regulators	84.48	62.50	-21.98
F	15	Repair oil pumps	56.90	35.00	-21.90
G	27	Replace throw-out bearings	79.31	57.50	-21.81
I	19	Replace and adjust distributors	86.21	65 00	-21.21
I	16	Repair or replace switches	86.21	65.00	-21.21
J	9	Inspect, service or replace gas tank, cap and sending unit	86.21	65.00	-21.21
I	1	Adjust headlights	86.21	65.00	-21.21
F	35	Run compression test	86.21	65.00	-21.21
J	4	Analyze fuel injection problems by means of electrical diagnostic equipment	36.21	15.00	-21.21
I	2	Adjust, repair, or replace backup light switches	81.03	60.00	-21.03
F	10	Inspect exhaust systems	81.03	60.00	-21.03
G	12	Rebuild manual transmission (major repairs)	70.69	50.00	-20.69
I	27	Set ignition timing	87.93	67.50	-20.43
I	22	Replace light bulbs	87.93	67.50	-20.43
I	15	Repair or replace lighting system components	82.76	62.50	-20.26
J	21	Repair or replace wiring harness for electronic fuel injection system	32.76	12.50	-20.26

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TASKS OMITTED WHERE DIFFERENCES IN PERCENT PERFORMING = -20.00 THROUGH 20.00

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TABLE 4. Description of the Differences in the Percent of Mechanics Working in New Car Dealerships and the Percent of Mechanics Working in Independent Garages Performing the Same Tasks - Continued

GROUP 1 = NEW CAR DEALER MECHANICS (N=58)
GROUP 2 = INDEPENDENT GARAGE MECHANICS (N=35)

D-TSK		TASK TITLE	PERCENT PERFORMING, GROUP 1	PERCENT PERFORMING, GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
N	6	Check and replace steering damper	34.48	55.00	20.52
B	11	Implement plans to check compliance with maintenance manuals	6.90	27.50	20.60
E	20	Prepare medical or accident reports	1.72	22 50	20.78
A	16	Plan emergency procedures for use during unusual maintenance loads	3.45	25.00	21.55
B	6	Conduct safety briefings	3.45	25.00	21.55
A	7	Establish shop inspection system	3.45	25.00	21.55
D	8	Evaluate training standards	3.45	25.00	21.55
D	4	Counsel newly-assigned employees on promotion and educational opportunities	3.45	25 00	21.55
D	7	Evaluate need for individual or group training	3.45	25.00	21.55
B	13	Implement training programs	3.45	25 00	21.55
D	14	Supervise training programs	3.45	25.00	21 55
E	10	Establish or maintain correspondence files	3.45	25.00	21.55
L	9	Repair or replace power steering pumps	53.45	75.00	21.55
N	12	Rebush king pins or link pins	48.28	70.00	21.72
E	11	Follow up on requisitions	10 34	32.50	22.16
B	24	Supervise general mechanics	10.34	32 50	22.16
Q	5	Perform road service	27.59	50.00	22.41
D	2	Brief personnel on changes in methods and procedures	12.07	35 00	22.93
B	17	Prepare requests for shop maintenance	6.90	30.00	23.10
F	7	Compute average cost rates for mechanics	6.90	30.00	23.10
E	19	Plan, schedule, and control maintenance of vehicles	6.90	30.00	23.10
A	9	Establish local production standards	1.72	25.00	23.28
L	8	Repair or replace power steering components	46.55	70.00	23.45
E	1	Annotate and process records on vehicles being serviced and repaired	8.62	32.50	23.88
B	21	Schedule vacations	3.45	27.50	24.05
A	8	Establish local procedures for preparing records and reports	5.17	30.00	24.83
E	13	Initiate request for parts	17.24	42.50	25.26
N	4	Check and align front end	34.48	60.00	25.52
B	9	Draft correspondence	1.72	27.50	25.78
D	6	Determine training requirements	3.45	30.00	26.55
B	14	Initiate personnel actions	3.45	30.00	26.55
N	8	Inspect and repair front suspension systems	50.00	77.50	27.50
C	2	Analyze maintenance reports on vehicles	12.07	40.00	27.93
B	10	Implement changes in maintenance procedures	6.90	35.00	28.10
C	3	Check equipment inventories	6.90	35.00	28.10
A	10	Establish methods to improve maintenance procedures	6.90	35.00	28.10
A	15	Plan and establish operational budgets	1.72	30.00	28.28
L	10	Replace pivot points on power steering linkage	41.38	70.00	28.62
A	18	Plan on-job-training programs	3.45	32.50	29.05
Q	6	Pick up stalled vehicles	15.52	45.00	29.48
A	20	Prepare job descriptions	5.17	35.00	29.83
N	5	Check and align rear end	17.24	47.50	30.26
C	6	Direct quality checks of vehicles after maintenance	12.07	42.50	30.43
E	21	Prepare reports of vehicle defects	6.90	37.50	30.60
B	19	Resolve personnel problems	8.62	40.0	31.38
C	12	Evaluate training programs	3.45	35.00	31.55
A	17	Plan shop safety programs	3.45	35.00	31.55
A	4	Develop plans for performing maintenance	5 17	37.50	32.33

TABLE 4. Description of the Differences in the Percent of Mechanics Working in New Car Dealerships and the Percent of Mechanics Working in Independent Garages Performing the Same Tasks - Continued

GROUP 1 = NEW CAR DEALER MECHANICS (N=58)
GROUP 2 = INDEPENDENT GARAGE MECHANICS (N=35)

D-TSK		TASK TITLE	PERCENT PERFORMING, GROUP 1	PERCENT PERFORMING, GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
B	18	Prepare requisitions for equipment	5.17	37.50	32.33
E	9	Enter work performed on work orders	29.31	62.50	33.19
A	6	Establish equipment and/or special tool requirements	13.79	47.50	33.71
L	11	Replace pivot points on steering linkage	43.10	77.50	34.40
A	11	Establish operational procedures	3.45	40.00	36.55
A	12	Establish personnel requirements	3.45	40.00	36.55
E	8	Determine actual cost of vehicle repairs	17.24	55.00	37.76
B	20	Resolve technical problems	13.79	52.50	38.71
D	15	Train individuals on the job	15.52	55.00	39.48
B	1	Allocate space and equipment	5.17	45.00	39.83
B	2	Assign individuals to job positions	5.17	45.00	39.83
E	12	Initiate and complete work orders	17.24	57.50	40.26
B	16	Orient newly hired personnel	12.07	52.50	40.43
B	7	Control flow of work	13.79	55.00	41.21
C	8	Estimate cost of vehicle repairs	25.86	67.50	41.64
B	22	Schedule work assignments	10.34	52.50	42.16
B	23	Supervise mechanic specialist (such as, front end, transmission, brake, and tune-up)	8.62	52.50	43.88
A	13	Establish stock level of supplies	3.45	47.50	44.05
N	1	Adjust or replace torsion and trunion bars	24.14	70.00	45.86
C	11	Evaluate suggestions	3.45	50.00	46.55
B	5	Complete work order form	15.52	62.50	46.98
D	5	Demonstrate operation of equipment	13.79	62.50	48.71
A	21	Schedule appointments	8.62	67.50	58.88

Description of Differences in Work Being Performed by Automotive Mechanics and Managers of Automotive Mechanics

Separate job descriptions were computed for automotive mechanics and managers of mechanics. Included in the job description for automotive mechanics were the respondents checking the job titles of: automotive mechanic apprentice, automotive mechanic, and job specialist. The respondents checking the job titles of service advisor or writer, service manager, and garage owner were grouped together for the job description of managers of mechanics. In order to determine what tasks were performed more often by managers of mechanics than by mechanics, a consolidated difference description of the tasks performed by the two groups was computed and is given in Table 5. Only those tasks with a difference between the groups of 20 percent or more are presented.

Examination of the data in Table 5 reveals that the tasks grouped under the following duties were performed more often by managers of mechanics than by automotive mechanics:

A. Organizing and planning
B. Supervising
C. Evaluating and inspecting
D. Training
E. Performing maintenance control functions

The tasks listed under the other duty headings tended to be performed more often by automotive mechanics than by managers. The reader is referred to the table for the titles of the specific tasks performed most often by the two groups.

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1	PERCENT PERFORMING, GROUP 2	PERCENT PERFORMING, GROUP 1

D-TSK		TASK TITLE			
[illegible]	5	Clean carburetor	81.55	34.78	-56.77
H	11	Replace external seals, gaskets, and lines on automatic transmissions	73.79	30.43	-43.35
F	22	Replace oil pumps	77.67	34.78	-42.89
[illegible]	22	Replace light bulbs	89.32	47.83	-41.49
I	16	Repair or replace switches	89.32	48.83	-41.49
F	3	Check or replace exhaust manifolds	80.58	39.13	-41.45
I	1	Adjust headlights	84.47	43.48	-40.99
G	18	Replace and/or adjust mechanical-type clutch	84.47	43.48	-40.99
I	21	Replace generators or alternators	88.35	47.83	-40.52
I	19	Replace and adjust distributors	88.35	47.83	-40.52
Q	3	Lubricate vehicles and equipment	83.50	43.48	-40.02
I	16	Replace connecting rods and bearings	74.76	34.78	-39.97
I	6	Clean gap and test spark plugs	87.38	47.83	-39.55
I	14	Repair generators or alternators	82.52	43.48	-39.05
I	19	Replace flywheel, muffler and/or tail pipe assemblies	82.52	43.48	-39.05
J	22	Repair or service carburetors	82.52	43.48	-39.05
[illegible]	9	Grind valves	73.79	34.78	-39.00
G	19	Perform operational manual transmission inspections	73.79	34.78	-39.00
F	35	Run compression test	86.41	47.83	-38.58
J	9	Inspect, service or replace gas tank, cap and sending unit	86.41	47.83	-38.58
N	17	Replace shock absorbers and/or mounting	93.20	56.52	-36.68
K	10	Replace radiator and/or heater hoses	84.47	47.83	-36.64
I	3	Analyze or adjust engine performance using engine analyzer	75.73	39.13	-36.60
G	23	Replace pilot bearings	75.73	39.13	-36.60
F	7	Disassemble engines	75.73	39.13	-36.60
F	8	Fit piston pins	49.51	13.04	-36.47
I	7	Inspect secondary circuit leads, plug wires, distributor, cap and/or rotor	88.35	52.17	-36.18
J	8	Inspect, service, or replace carburetor air cleaner	88.35	52.17	-36.18
I	20	Replace flasher units	88.35	52.17	-36.18
J	15	Remove, service, or replace fuel pumps	88.35	52.17	-36.18
G	7	Lubricate universal joints	79.61	43.48	-36.13
F	18	Replace engine mounts	83.50	47.83	-35.67
J	6	Clean or replace fuel filter units	87.38	52.17	-35.20
F	33	Replace camshaft and/or camshaft bearings	69.00	34.78	-35.12
M	20	Replace brake shoes	91.26	56.52	-34.74
M	13	Repair or replace master cylinder	91.26	56.52	-34.74
F	1	Adjust valves	82.52	47.83	-34.70
I	18	Repair starters	82.52	47.83	-34.70
I	24	Replace stop-light switch	86.41	52.17	-34.23
J	11	Measure fuel flow and pressure	86.41	52.17	-34.23
J	10	Install carburetors	86.41	52.17	-34.23
I	14	Remove engines from vehicles	77.67	43.48	-34.19
H	10	Remove and/or install automatic transmission	68.93	34.78	-34.15
M	7	Inspect or turn brake drums	90.29	56.52	-33.77
N	15	Replace front wheel bearings grease seal	90.29	56.52	-33.77
Q	1	Change oil and filters	81.55	47.83	-33.73
G	6	Lubricate and/or replace speedometer cable, drive gear and housing	81.55	47.83	-33.73

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks - Continued

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

D-TSK	TASK TITLE	PERCENT PERFORMING, GROUP 1	PERCENT PERFORMING, GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
G 19	Replace drive line seals	72.82	39.13	-33.69
N 2	Adjust and repack front wheel bearing	94.17	60.87	-33.31
I 8	Inspect and repair ignition switch, resistor, wiring, coil, points and condenser of the primary circuit	85.44	52 17	-33.26
I 25	Service or replace batteries, cables, and battery boxes	85.44	52.17	-33.26
I 12	Repair or replace charging system regulators	85.44	52.17	-33.26
J 7	Inspect, clean and adjust choke unit (automatic and manual)	89.32	56.52	-32.80
F 21	Replace gaskets and seals	80.58	47.83	-32.76
I 29	Test and rewire dash units	71.84	39.13	-32.71
K 7	Inspect water hoses	84.47	52.17	-32.29
K 12	Replace water pump	84.47	52.17	-32.[illegible]
H 7	Make external adjustment of bands on automatic transmissions	58.25	26.09	-32.17
I 27	Set ignition timing	88.35	56.52	-31.83
M 1	Adjust and/or replace hand brake linkage	88.35	56.52	-31.83
M 12	Repair disc brakes	79.61	47.83	-31.79
I 2	Adjust, repair, or replace backup light switches	79.61	47.83	-31.79
G 20	Replace a manual transmission	79 61	47.83	-31.79
G 16	Repair or replace slip joints or universal joints	79.61	47.83	-31.79
G 27	Replace throw-out bearings	79.61	47.83	-31.79
G 1	Adjust external shift linkage on manual transmissions	79.61	47.83	-31.79
G 12	Rebuild manual transmission (major repairs)	70.87	39.13	-31.74
F 32	Resurface valve seats	70.87	39.13	-31.74
F 25	Replace rings on pistons	70.87	39.13	-31.74
M 3	Bleed and/or adjust brakes	92.23	60.87	-31.36
K 1	Check coolant freezing point	83.50	52.17	-31.32
G 25	Replace transmission mounts	83.50	52.17	-31.32
G 24	Replace rear-axle shaft, bearings and/or seal	83.50	52.17	-31.32
I 15	Repair or replace lighting system components	83.50	52.17	-31 32
F 27	Replace valves	74.76	43.48	31.28
F 20	Replace flywheel ring gears	66.02	34.78	-31.24
I 13	Repair distributors	78.64	47.83	-30.81
I 9	Measure resistance in plug wires	69.90	39.13	-30.77
M 18	Repair or replace wheel cylinder	91.26	60.87	-30.39
I 5	Check alternator and generator and regular output	82.52	52.17	-30.35
F 10	Inspect exhaust systems	82.52	52.17	-30.35
N 9	Lubricate ball joints	82.52	52.17	-30.35
F 5	Clean engine parts and check for condition	73.79	43.48	-30.31
F 31	Replace valve lifters	77 67	47.83	-29.84
K 9	Replace freeze plugs	77.67	47.83	-29.84
F 24	Replace pistons	72.82	43.48	-29.34
F 17	Replace crankshaft and bearings	72.82	43.48	-29.34
I 23	Replace starters	85.44	56 52	-28.92
M 19	Replace brake hoses and lines	89.32	60.87	-28.45
I 11	Perform operational inspections of lighting systems	80.58	52.17	-28.41
I 26	Service the generator	80.58	52.17	-28.41
J 25	Service or replace units in vacuum systems	71.84	43.48	-28.37
M 4	Check and/or replace brake pads (disc brakes)	84.47	56.52	-27.94
J 14	Perform operational inspections of fuel systems	75.73	47.83	-27.90

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks - Continued

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

D-TSK	TASK TITLE	PERCENT PERFORMING, GROUP 1	PERCENT PERFORMING, GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
H 1	Adjust linkage from steering column to automatic transmission	75.73	47.83	-27.90
M 10	Reline brake shoes	58.25	30.43	-27.82
J 1	Adjust carburetor	88.35	60.87	-27.48
K 14	Test and replace coolant pressure caps	79.61	52.17	-27.44
K 15	Test thermostat	79.61	52.17	-27.44
F 34	Replace head gaskets	79.61	52.17	-27.44
G 14	Repair or replace differentials	74.76	47.83	-26.93
F 26	Replace timing gears and chains	74.76	47.83	-26.93
G 22	Replace pinion seal	74.76	47.83	-26.93
G 13	Repair hydraulic-type clutch	57.28	30.43	-26.85
F 23	Replace pan and valve covers	78.64	52.17	-26.47
I 10	Perform operational inspections of electrical systems	78.64	52.17	-26.47
N 10	Lubricate the front and rear suspension	78.64	52.17	-26.47
P 4	Replace heater water control units	78.64	52.17	-26.47
N 3	Balance wheels and tires	69.90	43.48	-26.42
H 3	Check and/or repair transmission cooling system	61.17	34.78	-26.38
N 7	Check or inspect wheel bearings	91.26	65.22	-26.04
P 2	Inspect and/or replace thermostat	82.52	56.52	-26.00
K 8	Remove and reinstall radiators	82.52	56.52	-26.00
J 20	Repair or replace fuel lines and hoses	82.52	56.52	-26.00
J 24	Service or replace manifold heat controls	73.79	47.83	-25.96
I 28	Test and repair turn-signal units	86.41	60.87	-25.54
K 5	Inspect, adjust and/or replace fan	77.67	52.17	-25.50
P 6	Service heater control components	77.67	52.17	-25.50
K 13	Solder minor leaks in radiator	68.93	43.48	-25.45
J 23	Repair or service exhaust emission control systems	68.93	43.48	-25.45
L 1	Adjust worm and sector in steering box	72.82	47.83	-24.99
G 15	Repair or replace spider gear	64.08	39.13	-24.95
F 4	Clean engines	64.08	39.13	-24.95
G 4	Check shifting	85 44	60.87	-24.57
K 2	Check coolant temperature	76.70	52.17	-24.53
F 13	Perform operational inspections of engine lubrication systems	67.96	43.48	-24.48
I 17	Repair solenoids	67.96	43.48	-24.48
H 4	Clean and visually inspect transmission	54.37	30.43	-23.93
F 15	Repair oil pumps	54.37	30.43	-23.93
F 30	Repair or service crankcase ventilation systems	75.73	52.17	-23.55
Q 4	Remove, repair or replace tires	66.99	43.48	-23.51
I 4	Analyze malfunctions in the cranking system	79.61	56.52	-23.09
M 9	Perform operational brake inspections	79.61	56.52	-23.09
F 12	Perform operational inspections of positive crankcase ventilation systems	70.87	47.83	-23.05
H 9	Perform operational automatic transmission inspections	53.40	30.43	-22.96
H 2	Adjust linkage from engine to automatic transmission	66.02	43.48	-22 54
G 21	Replace manual transmission gaskets and seals (in-car repairs)	66.02	43.48	-22.54
N 16	Replace front suspension control arms and/or bushings	66.02	43.48	-22.54
H 8	Make internal repairs and/or adjustments on automatic transmissions	48.54	26.09	-22.46
P 5	Remove, repair and/or replace heater core	78.64	56.52	-22.12
G 9	Perform operations and/or inspections of drive hafts, u-joints, and center bearings	82.52	60.87	-21.65

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks - Continued

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

D-TSK		TASK TITLE	PERCENT PERFORMING, GROUP 1	PERCENT PERFORMING, GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
P	3	Inspect and replace defroster hose	77.67	56.52	-21.15
Q	10	Winterize vehicles	68.93	47.83	-21 11
K	11	Replace variable-speed fan	68.93	47.83	-21 11
K	3	Check over flow tank and accessories	68.93	47.83	-21.11
N	14	Replace ball joints	72.82	52.17	-20 64
M	14	Repair or replace hydraulic power brake units	76 70	56.52	-20.1⁹
F	11	Inspect the crankshaft and connecting rod assembly using micrometers and other equipment	59 22	39.13	-20 09

TASKS OMITTED WHERE DIFFERENCES IN PERCENT PERFORMING = -20.00 THROUGH 20.00

B	3	Check vehicle maintenance for compliance with warranty policies	18.45	39.13	20 68
C	2	Analyze maintenance reports on vehicles	22.33	43.48	21 15
D	11	Prepare or evaluate job proficiency guides	4 85	26.09	21 23
C	5	Conduct spot checks malfunctions	34.95	56.52	21 57
E	23	Prepare vehicle deadline and work stoppages reports	8.74	30.43	21 70
E	3	Complete forms when servicing vehicles	30.10	52.17	22 08
E	11	Follow up on requisitions	16.50	39.13	22 63
E	18	Monitor workload and downtime of vehicles in shop for repairs	11 65	34.78	23.13
E	14	Maintain charts, tables, and graphs on maintenance trends	6.80	30.43	23.64
A	4	Develop plans for performing maintenance	19.42	43.48	24.06
B	8	Coordinate release of special equipment for testing and adjustment	10.68	34.78	24.10
E	16	Maintain publication files	5 83	30 43	24.61
C	18	Maintain surveillance over contract maintenance programs	5 83	30 43	24.61
D	9	Maintain training progress and qualification records	5.83	30 43	24 61
C	10	Evaluate safety programs	9.71	34 78	25 07
A	2	Construct organizational or functional charts	8.74	34 78	26 04
C	20	Perform inspections of vehicle conditions	38.83	65.22	26.38
A	14	Inspect vehicles for compliance with local laws	27.18	56 52	29,34
A	16	Plan emergency procedures for use during unusual maintenance loads	9.71	39.13	29.42
D	3	Counsel individuals on training progress	9.71	39 13	29.42
B	15	Monitor safety programs	9.71	39 13	29 42
B	11	Implement plans to check compliance with maintenance manuals	13.59	43.48	29.89
A	3	Develop troubleshooting procedures for use in locating vehicle malfunctions	34.95	65 22	30 27
C	1	Analyze causes of vehicle failures	56.31	86 96	30 65
B	6	Conduct safety briefings	11.65	43.48	31.83
E	2	Check lubrication and service guide	24 27	56.52	32.25
A	9	Establish local production standards	6.80	39 13	32.33
D	7	Evaluate need for individual or group training	6.80	39 13	32,33
D	15	Train individuals on the job	28.16	60.87	32.71
D	8	Evaluate training standards	5 83	39 13	33.31
D	12	Rate progress of individuals in training	5.83	39.13	33.31
D	14	Supervise training programs	5.83	39.13	33 31
A	7	Establish shop inspection system	9.71	43 48	33.77
E	5	Complete requests for procurement of parts	22.33	56.52	34 19
B	17	Prepare requests for shop maintenance	13.59	47.83	34.23

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks - Continued

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

D-TSK		TASK TITLE	PERCENT PERFORMING. GROUP 1	PERCENT PERFORMING. GROUP 2	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1
B	4	Complete mechanic proficiency ratings	4 85	39.13	34 28
B	13	Implement training programs	8 74	43.48	34.74
E	6	Complete unsatisfactory reports	8 74	43 48	34.74
D	4	Counsel newly-assigned employees on promotion and educational opportunities	8.74	43.48	34.74
D	5	Demonstrate operation of equipment	12.62	47 83	35.20
A	11	Establish operational procedures	12.62	47.83	35.20
D	1	Assign on-job-training supervisors	3.88	39 13	35.25
E	21	Prepare reports of vehicle defects	16.50	52.17	35.67
E	26	Spot check service orders	15.53	52.17	36.64
E	22	Prepare time and attendance or personnel rosters	6.80	43.48	36.68
D	10	Monitor on-job-training programs	6.80	43.48	36.68
E	9	Enter work performed on work orders	36.89	73 91	37 02
A	6	Establish equipment and/or special tool requirements	22.33	60.87	38.54
A	20	Prepare job descriptions	13.59	52 17	38.58
B	18	Prepare requisitions for equipment	13.59	52.17	38 58
C	3	Check equipment inventories	13.59	52 17	38.58
E	1	Annotate and process records on vehicles being serviced and repaired	17.48	56.52	39.05
E	4	Complete labor time cards	17 48	56.52	39.05
C	4	Check maintenance procedures	17 48	56.52	39.05
B	26	Supervise servicing and preparation personnel	8.74	47.83	39.09
A	8	Establish local procedures for preparing records and reports	12.62	52.17	39.55
A	17	Plan shop safety programs	11.65	52.17	40.52
A	18	Plan on-job-training programs	11.65	52.17	40.52
B	10	Implement changes in maintenance procedures	14.56	56.52	41.96
A	13	Establish stock level of supplies	18.45	60.87	42.42
E	15	Maintain daily work control logs or status boards	9.71	52.17	42.47
B	24	Supervise general mechanics	17.48	60.87	43.39
D	6	Determine training requirements	8.74	52.17	43 44
D	2	Brief personnel on changes in methods and procedures	16.50	60.87	44.36
A	15	Plan and establish operational budgets	7.77	52 17	44.41
B	20	Resolve technical problems	24.27	69.57	45.29
C	6	Direct quality checks of vehicles after maintenance	19.42	65.22	45.80
C	12	Evaluate training programs	10.68	56.52	45.84
A	12	Establish personnel requirements	10 68	56.52	45.84
A	1	Conduct and/or participate in personnel meetings	35.92	82.61	46.69
B	14	Initiate personnel actions	9.71	56.52	46.81
E	12	Initiate and complete work orders	26 21	73.91	47.70
E	8	Determine actual cost of vehicle repairs	26.21	73 91	47.70
C	11	Evaluate suggestions	17.48	65.22	47.74
B	16	Orient newly hired personnel	21.36	69.57	48.21
C	9	Evaluate individuals for promotions, or reassignment	7.77	56 52	48.75
C	8	Estimate cost of vehicle repairs	35 89	86.96	50.06
E	20	Prepare medical or accident reports	5 83	56.52	50.70
B	9	Draft correspondence	4.85	56 52	51.67
E	7	Compute average cost rates for mechanics	8.74	60.87	52.13
E	10	Establish or maintain correspondence files	8.74	60.87	52.13
A	21	Schedule appointments	25.24	78 26	53.02
B	1	Allocate space and equipment	16 50	69.57	53.06

TABLE 5. Description of the Differences in the Percent of Automotive Mechanics and the Percent of Managers of Automotive Mechanics Performing the Same Tasks - Continued

GROUP 1 = AUTOMOTIVE MECHANICS (N=110)
GROUP 2 = MANAGERS OF MECHANICS (N=24)

D-TSK	TASK TITLE	DIFFERENCE IN PERCENT PERFORMING GROUP 2 MINUS GROUP 1	PERCENT PERFORMING, GROUP 2	PERCENT PERFORMING, GROUP 1
B 19	Resolve personnel problems	15.53	69.57	54.03
B 21	Schedule vacations	6.80	60.87	54.07
B 2	Assign individuals to job positions	15.53	73.91	58.38
B 5	Complete work order form	28.16	86.96	58.80
B 23	Supervise mechanic specialist (such as, front end, transmission, brake, and tune-up)	19.42	78.26	58.84
B 22	Schedule work assignments	19.42	82.61	63.19
B 7	Control flow of work	22.33	86.96	64.63

Revision of the Task Inventory Based on the Validation

The original task inventory was constructed as an open-ended instrument in that the workers were asked to write-in and rate any tasks they performed which were not listed. As a result, several respondents did write in task statements describing tasks they perform that were not included in the original inventory. Following is a listing of the tasks which were added to the inventory by the respondents:

- Prepare payroll
- Schedule outside shop work
- Keep manuals and special bulletins up-to-date
- Supervise contract maintenance programs
- Obtain training manuals
- Check and correct bearing fit
- Machine value guides for special seals
- Perform cylinder balance test
- Perform cylinder leakage test
- Rebuild cam followers
- Rebuild rocker boxes
- Weld small holes and cracks in blocks
- Straighten rear housing damaged in accidents
- Straighten rear housing to correct excessive tire wear
- Adjust floor shift linkage
- Diagnose, replace, or adjust modulators
- Install automatic transmission coolers
- Replace or adjust neutral switch
- Service automatic transmission
- Service filter and check transmission cooling system
- Analyze cause of electrical fires
- Locate and repair shorts and open circuits in wiring
- Repair or replace fuse block assembly
- Repair windshield wiper mechanisms or controls
- Replace chassis and under hood wiring
- Replace turn signal switches
- Strobe distributors, modify or correct advance curves
- Test and repair cruise control units
- Service or repair turbocharger
- Repair or replace tilt and telescoping and collapsible mast jackets
- Replace belts and set tension
- Service filter in power steering
- Free up parking brake cables
- Inspect, repair, or replace self-adjusters
- Recondition backing plates
- Pressure test, performance test, and leak test system
- Repair automatic a/c and heater systems vacuum and electrical circuits
- Repair compressor shaft seals
- Replace compressor seals

These written-in task statements along with the data describing the number of workers performing each task were used to revise the original task inventory that was administered to the sample of automotive mechanics. All the written-in task statements were added to the task inventory since it is assumed that if the task was important enough to be written in by an incumbent worker, it should be included in the inventory.

All the task statements that were not performed by at least 5 percent of the sample were examined and omitted from the revised inventory if the task was not judged to be critical for successful employment in the occupational area. The revised task inventory for the automotive mechanics occupational area is presented in Appendix D. It is recommended that future occupational performance surveys should utilize the revised task inventory.

CHAPTER IV

SUMMARY AND CONCLUSIONS

It is the purpose of this report to present the findings of the task inventory analysis of occupational performance which was conducted to ascertain what tasks are actually being performed by workers employed in the automotive mechanics occupational area. The findings of this analysis will be valuable to automotive instructors, local directors of vocational education, state department personnel, and others who are concerned with the development of more relevant and meaningful educational training programs for automotive mechanics.

A task inventory was constructed utilizing existing automotive mechanic occupations task lists, job descriptions and curriculum guides. The initial inventory was reviewed and revised using four consultants who were employed in automotive mechanic occupations. In all, 329 task statements were included in the original inventory along with four pertinent background information questions.

One hundred thirty-eight task inventories representing 53 percent of the workers sampled, were completed and returned by workers employed in the automotive mechanics occupational area. The task data along with the background data collected were coded and tabulated by the project staff at The Center for Vocational and Technical Education. The background variable of type of business employed in, revealed that 40 percent were employed in new car dealerships and 52 percent in other types of business, thus achieving the type of representation initially desired. It should also be noted that the majority (107) of the respondents were employed in the job title of automotive mechanic.

It was found that the most frequent source of training checked by the respondents was on-the-job (self-learned), and the second most frequent was company-sponsored training. This finding confirmed the opinion of the project staff and other research findings concerning training of automotive mechanics.

Extreme care must be taken when extrapolating to the general population the results of a survey, particularly a survey for which the number of respondents was small and pure random sampling techniques were not used. However, the following conclusions appear to be warranted by the data.

1. The task list constructed by the project staff is representative of those tasks which are performed by workers in the automotive mechanics occupational area.
2. Within the confines of the sample, the percent of automotive mechanics performing each task was determined.
3. The relative time spent in performing each of the tasks was validated for automotive mechanics.
4. A task job description for automotive mechanics was validated.
5. The data suggest that there are differences in the types of tasks performed by automotive mechanics employed in new car dealerships and by mechanics employed in independent garages.
6. The data in Table 5 indicate the tasks that are unique to automotive mechanics and the supervisory and management tasks that are unique to managers and supervisors of automotive mechanics.

It was noted earlier that the data reported herein were collected and analyzed as a preliminary stage in a longer-ranged research effort to develop a set of procedures for the identification and selection of curriculum content. That research and development effort is continuing.

In the meantime, the brief overview of the methods and techniques used for task inventory analysis, provided in this report, along with the identification of selected sources for more detailed descriptions of the methods, should be of interest and use to other vocational researchers: particularly those engaged in research and development related to curriculum development and to occupational competency testing. Moreover, the data provide one additional source of relatively specific occupational information which should be useful to vocational instructors and curriculum developers of automotive mechanic training programs.

APPENDIX A

Criteria for Appropriate Task Inventory Statements

APPENDIX A
CRITERIA FOR APPROPRIATE TASK INVENTORY STATEMENTS

1. Clear statement that is easily understood by the worker
2. Statement written using terminology that is consistent with current usage in the occupational area
3. Brief statement to save reading time
4. Use abbreviations cautiously since they may not be understood throughout the occupational area
5. Task statement must be ratable in terms of *Time Spent* and other rating factors (eliminate tasks beginning with "Have responsbility for...." "Know how to...")
6. Vague or ambiguous works such as "check," "assist," and "recommend" should be avoided
7. Use short words in place of long ones whenever possibie
8. Qualifications of a worker such as aptitude, education, or skill are not tasks and are, therefore, not included in task statements
9. Instruction a person receives is not a task unless the worker performs a task
10. Task statements should begin with a present tense action word such as "operate," "write," and "clean"
11. Arrange task statements alphabetically under each duty statement to facilitate ease of scanning and to eliminate duplicate tasks
12. Each task statement must be capable of standing alone, i.e., NOT-"operate other equipment."
13. Each task statement must be a complete sentence
14. Omit the period at the end of the task statement
15. Avoid "and/or" and "etc."
16. Parallel tasks should be included in appropriate duty categories, i.e., for a "supervise" task there should be a task that is "performed"
17. If a modifier is used be sure to include all relevant alternatives i.e., "repair automatic transmissions". Should also have "repair standard transmissions"
18. Avoid obviously trivial tasks, e.g.. turn ignition key
19. Avoid tasks that are too general
20. Avoid multiple verbs unless the sequence is essential to the task
21. Tasks should be independent and distinct

APPENDIX B

Task Inventory Package-Specimens

BACKGROUND INFORMATION

CHECK YOUR PRESENT JOB TITLE:

Automotive mechanic apprentice	☐	Job specialist	☐
Automotive mechanic	☐	Service manager	☐
Service advisor or writer	☐	Garage owner	☐

OTHER (Specify) _____

CHECK THE TYPE OF BUSINESS IN WHICH YOU PRESENTLY WORK:

New car dealer	☐	Service station	☐
Independent garage	☐	OTHER (Specify)	_____

HOW MANY YEARS HAVE YOU WORKED AS AN AUTOMOTIVE MECHANIC?

_____ YEARS

WHERE DID YOU RECEIVE YOUR TRAINING IN AUTOMOTIVE MECHANICS?
(check one or more)

On-the-job (self-learned)	☐	Apprenticeship program	☐
Military training school	☐	High school program	☐
Private automotive mechanic school	☐	Post-high school program	☐
Company training programs	☐	Adult education program	☐

INSTRUCTIONS FOR COMPLETING TASK INVENTORY

CAREFULLY READ EACH OF THE TASK STATEMENTS AND PLACE A CHECK MARK (✓) IN THE COLUMN LABELED CHECK FOR EACH TASK WHICH YOU PERFORM ON YOUR PRESENT JOB.

AFTER CHECKING ALL TASKS WHICH YOU PERFORM, THEN RATE ONLY THE TASK YOU HAVE CHECKED BY PLACING A NUMBER 1, 2, 3, 4, 5, 6, OR 7, IN THE COLUMN LABELED TIME SPENT WHICH MOST CLOSELY ESTIMATES THE AMOUNT OF TIME YOU SPEND IN PERFORMING THE TASK.

TIME SPENT MEANS THE TOTAL TIME YOU SPEND ON EACH TASK YOU ARE RATING, COMPARED WITH THE TIME YOU SPEND ON EACH OF THE OTHER TASKS YOU DO.

AT THE BOTTOM ON ANY PAGE, WRITE IN AND RATE ANY TASKS YOU DO WHICH ARE NOT LISTED.

EXAMPLE:

AUTOMOTIVE MECHANICS TASK INVENTORY	Page 19 of 23 Pages	
LISTED BELOW ARE A DUTY AND THE TASKS WHICH IT INCLUDES. CHECK ALL TASKS WHICH YOU PERFORM. ADD ANY TASKS YOU DO WHICH ARE NOT LISTED. THEN RATE THE TASKS YOU HAVE CHECKED.	CHECK	TIME SPENT
M. MAINTAINING AND REPAIRING BRAKING SYSTEMS	✓ If Done	1 Very Much Below Average 2 Below Average 3 Slightly Below Average 4 About Average 5 Slightly Above Average 6 Above Average 7 Very Much Above Average
1. Repair master cylinder		
2. Repair wheel cylinder	✓	4
3. Replace brake hoses and lines	✓	1
4. Replace brake shoes	✓	6
5. Resurface brake drums		
6. Adjust brakes	✓	7

AUTOMOTIVE MECHANICS TASK INVENTORY	Page 8 of 23 Pages	
LISTED BELOW ARE A DUTY AND THE TASKS WHICH IT INCLUDES CHECK ALL TASKS WHICH YOU PERFORM. ADD ANY TASKS YOU DO WHICH ARE NOT LISTED. THEN RATE THE TASKS YOU HAVE CHECKED.	CHECK	TIME SPENT
F. PERFORMING - ENGINE OVERHAUL ACTIVITIES	✓ If Done	1 Very Much Below Average 2 Below Average 3 Slightly Below Average 4 About Average 5 Slightly Above Average 6 Above Average 7 Very Much Above Average
1. Adjust valves		
2. Check head for warp		
3. Check or replace exhaust manifolds		
4. Clean engines		
5. Clean engine parts and check for condition		
6. Diagnose valve train and head malfunctions		
7. Disassemble engines		
8. Fit piston pins		
9. Grind valves		
10. Inspect exhaust systems		
11. Inspect the crankshaft and connecting rod assembly using micrometers and other equipment		
12. Perform operational inspections of positive crankcase ventilation systems		
13. Perform operational inspections of engine lubrication systems		
14. Remove engines from vehicles		
15. Repair oil pumps		
16. Replace connecting rods and bearings		
17. Replace crankshaft and bearings		
18. Replace engine mounts		
19. Replace flywheel, muffler and/or tail pipe assemblies		
20. Replace flywheel ring gears		
21. Replace gaskets and seals		
22. Replace oil pumps		

APPENDIX C

Original Automotive Mechanics Task Inventory

APPENDIX C

ORIGINAL AUTOMOTIVE MECHANICS TASK INVENTORY

A. ORGANIZING AND PLANNING

1. Conduct and/or participate in personnel meetings
2. Construct organizational or functional charts
3. Develop trouble shooting procedures for use in locating vehicle malfunctions
4. Develop plans for performing maintenance
5. Develop working agreements with vehicle leasing organizations
6. Establish equipment and/or special tool requirements
7. Establish shop inspection system
8. Establish local procedures for preparing records and reports
9. Establish local production standards
10. Establish methods to improve maintenance procedures
11. Establish operational procedures
12. Establish personnel requirements
13. Establish stock level of supplies
14. Inspect vehicles for compliance with local laws
15. Plan and establish operational budgets
16. Plan emergency procedures for use during unusual maintenance loads
17. Plan shop safety programs
18. Plan on-job-training programs
19. Plan procedures for leased contract maintenance
20. Prepare job descriptions
21. Schedule appointments

B. SUPERVISING

1. Allocate space and equipment
2. Assign individuals to job positions
3. Check vehicle maintenance for compliance with warranty policies
4. Complete mechanic proficiency ratings
5. Complete work order form
6. Conduct safety briefings
7. Control flow of work
8. Coordinate release of special equipment for testing and adjustment
9. Draft correspondence
10. Implement changes in maintenance procedures
11. Implement plans to check compliance with maintenance manuals
12. Implement plans to report work stoppages
13. Implement training programs
14. Initiate personnel actions
15. Monitor safety programs
16. Orient newly hired personnel
17. Prepare requests for shop maintenance
18. Prepare requisitions for equipment
19. Resolve personnel problems
20. Resolve technical problems

21. Schedule vacations
22. Schedule work assignments
23. Supervise mechanic specialist (such as, front end, transmission, brake and tune-up)
24. Supervise general mechanics
25. Supervise vehicle body and fender repairman
26. Supervise servicing and preparation personnel

C. EVALUATING AND INSPECTING

1. Analyze causes of vehicle failures
2. Analyze maintenance reports on vehicles
3. Check equipment inventories
4. Check maintenance procedures
5. Conduct spot checks on malfunctions
6. Direct quality checks of vehicles after maintenance
7. Draft changes to the maintenance evaluation programs
8. Estimate cost of vehicle repairs
9. Evaluate individuals for promotions, or reassignment
10. Evaluate safety programs
11. Evaluate suggestions
12. Evaluate training programs
13. Inspect vehicles received and/or sold by organization
14. Inspect vehicles and apply materials for corrosion and rust control
15. Inspect and test windshield-wiper motors, blades, and arms
16. Inspect tires and wheels
17. Inspect vehicles for mirrors
18. Maintain surveillance over contract maintenance programs
19. Prepare inspection reports
20. Perform inspections of vehicle conditions

D. TRAINING

1. Assign on-job-training supervisors
2. Brief personnel on changes in methods and procedures
3. Counsel individuals on training progress
4. Counsel newly-assigned employees on promotion and educational opportunities
5. Demonstrate operation of equipment
6. Determine training requirements
7. Evaluate need for individual or group training
8. Evaluate training standards
9. Maintain training progress and qualification records
10. Monitor on-job-training programs
11. Prepare or evaluate job proficiency guides
12. Rate progress of individuals in training
13. Rotate duty assignments of personnel for training purposes
14. Supervise training programs
15. Train individuals on the job

E. PERFORMING MAINTENANCE CONTROL FUNCTIONS

1. Annotate and process records on vehicles being serviced and repaired
2. Check lubrication and service guide
3. Complete forms when servicing vehicles
4. Complete labor time cards
5. Complete requests for procurement of parts

6. Complete unsatisfactory reports
7. Compute average cost rates for mechanics
8. Determine actual cost of vehicle repairs
9. Enter work performed on work orders
10. Establish or maintain correspondence files
11. Follow up on requisitions
12. Initiate and complete work orders
13. Initiate request for parts
14. Maintain charts, tables, and graphs on maintenance trends
15. Maintain daily work control logs or status boards
16. Maintain publication files
17. Maintain vehicle warranty records
18. Monitor workload and downtime of vehicles in shop for repairs
19. Plan, schedule, and control maintenance of vehicles
20. Prepare medical or accident reports
21. Prepare reports of vehicle defects
22. Prepare time and attendance or personnel rosters
23. Prepare vehicle deadline and work stoppages reports
24. Review commercial credit slips
25. Review records to see that maintenance is accomplished according to priority
26. Spot check service orders
27. Verify and complete operator's inspection guide and trouble report

F. PERFORMING - ENGINE OVERHAUL ACTIVITIES

1. Adjust valves
2. Check head for warp
3. Check or replace exhaust manifolds
4. Clean engines
5. Clean engine parts and check for conditions
6. Diagnose valve train and head malfunctions
7. Disassemble engines
8. Fit piston pins.
9. Grind valves
10. Inspect exhaust systems
11. Inspect the crankshaft and connecting rod assembly using micrometers and other equipment
12. Perform operational inspections of positive crankcase ventilation systems
13. Perform operational inspections of engine lubrication systems
14. Remove engines from vehicles
15. Repair oil pumps
16. Replace connecting rods and bearings
17. Replace crankshaft and bearings
18. Replace engine mounts
19. Replace flywheel, muffler and/or tail pipe assemblies
20. Replace flywheel ring gears
21. Replace gaskets and seals
22. Replace oil pumps
23. Replace pan and valve covers
24. Replace pistons
25. Replace rings on pistons
26. Replace timing gears and chains
27. Replace valves
28. Replace valve guides
29. Replace valve seats
30. Repair or service crankcase ventilation systems

31. Replace valve lifters
32. Resurface valve seats
33. Replace camshaft and/or camshaft bearings
34. Replace head gaskets
35. Run compression test

G. MAINTAINING AND REPAIRING POWER TRAINS

1. Adjust external shift linkage on manual transmissions
2. Analyze and repair electrical control circuit and components for over drive unit
3. Balance drive shaft (in-car)
4. Check shifting
5. Check drive shaft
6. Lubricate and/or replace speedometer cable, drive gear and housing
7. Lubricate universal joints
8. Perform operational and/or road test inspections of differentials
9. Perform operations and/or inspections of drive shafts, u-joints, and center bearings
10. Perform operational manual transmission inspections
11. Rebuild overdrive unit
12. Rebuild manual transmission (major repairs)
13. Repair hydraulic-type clutch
14. Repair or replace differentials
15. Repair or replace spider gear
16. Repair or replace slip joints or universal joints
17. Repair, replace, or adjust front-drive axle assemblies
18. Replace and/or adjust mechanical-type clutch
19. Replace drive line seals
20. Replace a manual transmission
21. Replace manual transmission gaskets and seals (in-car repairs)
22. Replace pinion seal
23. Replace pilot bearings
24. Replace rear-axle shaft, bearings and/or seal
25. Replace transmission mounts
26. Test and replace out-of-round shaft
27. Replace throw-out bearings

H. MAINTAINING AND REPAIRING AUTOMATIC TRANSMISSIONS

1. Adjust linkage from steering column to automatic transmission
2. Adjust linkage from engine to automatic transmission
3. Check and/or repair transmission cooling system
4. Clean and visually inspect transmission
5. Inspect and/or repair converter
6. Inspect and/or repair front pump and components
7. Make external adjustment of bands on automatic transmissions
8. Make internal repairs and/or adjustments on automatic transmissions
9. Perform operational automatic transmission inspections
10. Remove and/or install automatic transmission
11. Replace external seals, gaskets, and lines on automatic transmissions

I. MAINTAINING AND REPAIRING ELECTRICAL SYSTEMS

1. Adjust headlights
2. Adjust, repair, or replace backup light switches
3. Analyze or adjust engine performance using engine analyzer

4. Analyze malfunctions in the cranking system
5. Check alternator and generator and regular output
6. Clean gap and test spark plugs
7. Inspect secondary circuit leads, plug wires, distributor, cap and/or rotor
8. Inspect and repair ignition switch, resistor, wiring, coil, points and condenser of the primary circuit
9. Measure resistance in plug wires
10. Perform operational inspections of electrical systems
11. Perform operational inspections of lighting systems
12. Repair or replace charging system regulators
13. Repair distributors
14. Repair generators or alternators
15. Repair or replace lighting system components
16. Repair or replace switches
17. Repair solenoids
18. Repair starters
19. Replace and adjust distributors
20. Replace flasher units
21. Replace generators or alternators
22. Replace light bulbs
23. Replace starters
24. Replace stop-light switch
25. Service or replace batteries, cables, and battery boxes
26. Service the generator
27. Set ignition timing
28. Test and repair turn-signal units
29. Test and rewire dash units

J. MAINTAINING AND REPAIRING FUEL SYSTEMS

1. Adjust carburetor
2. Adjust governors
3. Analyze for moisture or foreign particle level in fuel
4. Analyze fuel injection problems by means of electrical diagnostic equipment
5. Clean carburetor
6. Clean or replace fuel filter units
7. Inspect, clean and adjust choke unit (automatic and manual)
8. Inspect, service, or replace carburetor air cleaner
9. Inspect, service, or replace gas tank, cap and sending unit
10. Install carburetors
11. Measure fuel flow and pressure
12. Perform operational checks of governors
13. Perform operational inspections of exhaust emission control systems
14. Perform operational inspections of fuel systems
15. Remove, service, or replace fuel pumps
16. Repair governors
17. Repair or replace electrical fuel injection computer
18. Repair or replace fuel injectors
19. Repair or replace fuel injector pumps
20. Repair or replace fuel lines and hoses
21. Repair or replace wiring harness for electronic fuel injection system
22. Repair or service carburetors
23. Repair or service exhaust emission control systems
24. Service or replace manifold heat controls
25. Service or replace units in vacuum systems

K. MAINTAINING AND REPAIRING COOLING SYSTEMS

1. Check coolant freezing point
2. Check coolant temperature
3. Check overflow tank and accessories
4. Chemically clean and flush cooling system
5. Inspect, adjust and/or replace fan
6. Inspect and/or repair blowers on air-cooled engines
7. Inspect water hoses
8. Remove and reinstall radiators
9. Replace freeze plugs
10. Replace radiator and/or heater hoses
11. Replace variable-speed fan
12. Replace water pump
13. Solder minor leaks in radiator
14. Test and replace coolant pressure caps
15. Test and replace thermostat

L. MAINTAINING AND REPAIRING STANDARD AND POWER STEERING UNITS

1. Adjust worm and sector in steering box
2. Check or replace steering spindles
3. Check steering
4. Lubricate the power steering
5. Lubricate the steering box and linkage
6. Rebuild power steering cylinder
7. Repair or replace manual steering components
8. Repair or replace power steering components
9. Repair or replace power steering pumps
10. Replace pilot points on power steering linkage
11. Replace pivot points on steering linkage

M. MAINTAINING AND REPAIRING BRAKING SYSTEMS

1. Adjust and/or replace hand brake linkage
2. Adjust and/or replace hand brake external band
3. Bleed and/or adjust brakes
4. Check and/or replace brake pads (disc brakes)
5. Check and turn rotor if necessary (disc brakes)
6. Inspect or repair brake air compressors
7. Inspect or turn brake drums
8. Inspect and service air tanks and valves
9. Perform operational brake inspections
10. Reline brake shoes
11. Repair air brake systems
12. Repair disc brakes
13. Repair or replace master cylinder
14. Repair or replace hydraulic power brake units
15. Repair or replace hydraulic control valves
16. Repair or replace hydraulic lines and fittings
17. Repair or replace hydraulic power cylinders
18. Repair or replace wheel cylinder
19. Replace brake hoses and lines
20. Replace brake shoes

N. MAINTAINING AND REPAIRING FRONT ENDS

1. Adjust or replace torsion and trunion bars
2. Adjust and repack front wheel bearing
3. Balance wheels and tires
4. Check and align front end
5. Check and align rear end
6. Check and replace steering damper
7. Check or inspect wheel bearings
8. Inspect and repair front suspension systems
9. Lubricate ball joints
10. Lubricate the front and rear suspension
11. Perform visual inspections of suspension systems
12. Rebush king pins or link pins
13. Repair or replace rear suspension system
14. Replace ball joints
15. Replace front wheel bearings grease seal
16. Replace front suspension control arms and/or bushings
17. Replace shock absorbers and/or mounting

O. MAINTAINING AND REPAIRING AUTOMOBILE AIR CONDITIONERS

1. Check and/or refill system with freon
2. Diagnose air conditioning malfunctions
3. Install air-conditioners in vehicles
4. Repair and/or replace air conditioning compressor
5. Replace condenser in air conditioning unit
6. Replace air conditioner fan motor
7. Replace evaporator in air conditioning unit
8. Replace dryer in air conditioning unit
9. Replace expansion valve in air conditioning unit
10. Replace freon control valve and/or diaphragm in air conditioning unit
11. Service air conditioner control cables and switches

P. MAINTAINING AND REPAIRING AUTOMOBILE HEATERS

1. Diagnose heating system malfunctions
2. Inspect and/or replace thermostat
3. Inspect and replace defroster hose
4. Replace heater water control units
5. Remove, repair and/or replace heater core
6. Service heater control components
7. Service or replace circulating heaters
8. Service or replace gas heaters

Q. LUBRICATING AND MAINTAINING

1. Change oil and filters
2. Inspect, clean and/or repair automobile interiors
3. Lubricate vehicles and equipment
4. Remove, repair or replace tires
5. Perform road service
6. Pick up stalled vehicles
7. Service vehicles with fuel or oil

8. Maintain tire removal equipment
9. Maintain washrack equipment
10. Winterize vehicles

APPENDIX D

Revised Automotive Mechanics Task Inventory

APPENDIX D

REVISED AUTOMOTIVE MECHANICS TASK INVENTORY

A. ORGANIZING AND PLANNING

1. Conduct personnel meetings
2. Construct organizational or functional charts
3. Develop troubleshooting procedures for use in locating vehicle malfunctions
4. Develop plans for performing maintenance
5. Establish equipment or special tool requirements
6. Establish shop inspection system
7. Establish local procedures for preparing records and reports
8. Establish local production standards
9. Establish methods to improve maintenance procedures
10. Establish operational procedures
11. Establish personnel requirements
12. Establish stock level of supplies
13. Inspect vehicles for compliance with local laws
14. Participate in personnel meetings
15. Plan and establish operational budgets
16. Plan emergency procedures for use during unusual maintenance loads
17. Plan shop safety programs
18. Plan on-job-training programs
19. Prepare job descriptions
20. Prepare payroll
21. Schedule appointments
22. Schedule outside shop work

B. SUPERVISING

1. Allocate space and equipment
2. Assign individuals to job positions
3. Complete mechanic proficiency ratings
4. Complete work order form
5. Conduct safety briefings
6. Control flow of work
7. Coordinate release of special equipment for testing and adjustment
8. Draft correspondence
9. Evaluate vehicle maintenance for compliance with warranty policies
10. Keep manuals and special bulletins up to date
11. Implement changes in maintenance procedures
12. Implement plans to check compliance with maintenance
13. Implement plans to report work stoppages
14. Implement training programs
15. Initiate personnel actions
16. Monitor safety programs
17. Orient newly hired personnel
18. Prepare requests for shop maintenance
19. Prepare requisitions for equipment

20. Resolve personnel problems
21. Resolve technical problems
22. Schedule vacations
23. Schedule work assignments
24. Supervise contract maintenance programs
25. Supervise mechanic specialist (such as, front end, transmission, brake and tune-up)
26. Supervise general mechanics
27. Supervise vehicle body and fender repairman
28. Supervise servicing and preparation personnel

C. EVALUATING AND INSPECTING

1. Analyze causes of vehicle failures
2. Analyze maintenance reports on vehicles
3. Conduct spot checks on malfunctions
4. Direct quality checks of vehicles after maintenance
5. Estimate cost of vehicle repairs
6. Evaluate individuals for promotions, or reassignment
7. Evaluate safety programs
8. Evaluate suggestions
9. Evaluate training programs
10. Inspect equipment inventories
11. Inspect maintenance procedures
12. Inspect vehicles sold by organization
13. Inspect vehicles sold by organization
14. Inspect vehicles and apply materials for corrosion and rust control
15. Inspect and test windshield-wiper motors, blades, and arms
16. Inspect tires and wheels
17. Inspect vehicles for mirrors
18. Prepare inspection reports
19. Perform inspections of vehicle conditions

D. TRAINING

1. Brief personnel on changes in methods and procedures
2. Counsel individuals on changes in methods and procedures
3. Counsel newly-assigned employees on promotion and educational opportunities
4. Demonstrate operation of equipment
5. Determine training requirements
6. Evaluate need for individual or group training
7. Evaluate training standards
8. Maintain training progress and qualification records
9. Monitor on-job-training programs
10. Obtain training manuals
11. Rate progress of individuals in training
12. Rotate duty assignments of personnel for training purposes
13. Supervise training programs
14. Train individuals on the job

E. PERFORMING MAINTENANCE CONTROL FUNCTIONS

1. Annotate and process records on vehicles being serviced and repaired
2. Complete forms when servicing vehicles
3. Complete labor time cards
4. Complete requests for procurement of parts

5. Complete unsatisfactory reports
6. Compute average cost rates for mechanics
7. Determine actual cost of vehicle repairs
8. Enter work performed on work orders
9. Establish or maintain correspondence files
10. Follow up on requisitions
11. Initiate and complete work orders
12. Initiate request for parts
13. Inspect lubrication and service guide
14. Maintain charts, tables, and graphs on maintenance trends
15. Maintain daily work control logs or status boards
16. Maintain publication files
17. Maintain vehicle warranty records
18. Monitor workload and downtime of vehicles in shop for repairs
19. Plan, schedule, and control maintenance of vehicles
20. Prepare medical or accident reports
21. Prepare reports of vehicle defects
22. Prepare time and attendance or personnel rosters
23. Prepare vehicle deadline and work stoppages reports
24. Review commercial credit slips
25. Review records to see that maintenance is accomplished according to priority
26. Spot check service orders
27. Verify and complete operator's inspection guide and trouble report

F. PERFORMING — ENGINE OVERHAUL ACTIVITIES

1. Adjust valves
2. Clean engines
3. Clean engine parts and check for condition
4. Diagnose valve train and head malfunctions
5. Disassemble engines
6. Fit piston pins
7. Grind valves
8. Inspect and correct bearing fit
9. Inspect exhaust systems
10. Inspect head for warp
11. Inspect or replace exhaust manifolds
12. Inspect crankshaft and connecting rod assembly using micrometers and other equipment
13. Machine valve guides for special seals
14. Perform cylinder balance test
15. Perform cylinder leakage test
16. Perform operational inspections of positive crankcase ventilation systems
17. Perform operational inspections of engine lubrication systems
18. Rebuild cam followers
19. Rebuild rocker boxes
20. Remove engines from vehicles
21. Repair oil pumps
22. Replace connecting rods and bearings
23. Replace crankshaft and bearings
24. Replace engine mounts
25. Replace flywheel
26. Replace flywheel ring gears
27. Replace gaskets and seals
28. Replace muffler
29. Replace oil pumps

30. Replace pan and valve covers
31. Replace pistons
32. replace rings on pistons
33. Replace tail pipe assemblies
34 Replace timing gears and chains
35. Replace valves
36. Replace valve guides
37 Replace valve seats
38 Repair or service crankcase ventilation systems
39 Replace valve lifters
40 Resurface valve seats
41 Replace camshaft
42. Replace camshaft bearings
43. Run compression test
44. Weld small holes and cracks in blocks

G. MAINTAINING AND REPAIRING POWER TRAINS

1 Adjust external shift linkage on manual transmissions
2 Adjust mechanical-type clutch
3. Analyze and repair electrical control circuit and components for overdrive unit
4. Balance drive shaft (in-car)
5. Inspect slafting
6. Inspect drive shaft
7. Inspect drive shafts, u-joints, and center bearings
8. Lubricate speedometer cable, drive gear, and housing
9 Lubricate universal joints
10. Perform operational inspections of differentials
11. Perform operations of drive shafts, u-joints, and center bearings
12. Perform operational manual transmission inspections
13. Rebuild overdrive unit
14. Rebuild manual transmission (major repairs)
15 Repair hydraulic-type clutch
16. Repair or replace differentials
17. Repair or replace spider gear
18. Repair or replace slip joints or universal joints
19. Repair, replace, or adjust front-drive axle assemblies
20. Replace mechanical-type clutch
21. Replace drive line seals
22. Replace a manual transmission
23 Replace manual transmission gaskets and seals (in-car repairs)
24. Replace pinion seal
25. Replace pilot bearings
26. Replace rear-axle shaft, bearings and seal
27. Replace speedometer cable, drive gear, and housing
28. Replace throw-out bearings
29. Replace transmission mounts
30. Road test inspections of differentials
31. Straighten rear housing damaged in accidents
32. Straighten rear housing to correct excessive tire wear
33. Test and replace out-of-round shaft

H. MAINTAINING AND REPAIRING AUTOMATIC TRANSMISSIONS

1. Adjust floor shift linkage
2. Adjust linkage from steering column to automatic transmission

3. Adjust linkage from engine to automatic transmission
4. Clean and visually inspect transmission
5. Diagnose, replace or adjust modulators
6. Inspect and repair transmission cooling system
7. Inspect and repair converter
8. Inspect and repair front pump and components
9. Install automatic transmission coolers
10. Make external adjustment of bands on automatic transmissions
11. Make internal repairs and adjustments on automatic transmissions
12. Perform operational automatic transmission inspections
13. Remove and install automatic transmission
14. Replace external seals, gaskets, and lines on automatic transmissions
15. Replace or adjust neutral switch
16. Service automatic transmission
17. Service filter and check transmission cooling system

I. MAINTAINING AND REPAIRING ELECTRICAL SYSTEMS

1. Adjust headlights
2. Adjust, repair, or replace backup light switches
3. Analyze cause of electrical fires
4. Analyze or adjust engine performance using engine analyzer
5. Analyze malfunctions in the cranking system
6. Clean, gap, and test spark plugs
7. Evaluate alternator, generator, and regulator output
8. Inspect secondary circuit leads, plug wires, distributor cap, and rotor
9. Inspect and repair ignition switch, resistor, wiring, coil, points, and condenser of the primary circuit
10. Locate and repair shorts and open circuits in wiring
11. Measure resistance in plug wires
12. Perform operational inspections of electrical systems
13. Perform operational inspections of lighting systems
14. Repair or replace charging system regulators
15. Repair distributors
16. Repair generators or alternators
17. Repair or replace fuse block assembly
18. Repair or replace lighting system components
19. Repair or replace switches
20. Repair solenoids
21. Repair starters
22. Repair windshield wiper mechanisms or controls
23. Replace and adjust distributors
24. Replace chassis and under hood wiring
25. Replace flasher units
26. Replace generators or alternators
27. Replace light bulbs
28. Replace starters
29. Replace stop-light switch
30. Replace turn signal switches
31. Service or replace batteries, cables, and battery boxes
32. Service the generator
33. Set ignition timing
34. Strobe distributors, modify or correct advance curves
35. Test and repair cruise control units
36. Test and repair turn-signal units
37. Test and rewire dash units

J. MAINTAINING AND REPAIRING FUEL SYSTEMS

1. Adjust carburetor
2. Adjust governors
3. Analyze for moisture or foreign particle level in fuel system
4. Analyze fuel injection problems by means of electrical diagnostic equipment
5. Clean carburetor
6. Clean or replace fuel filter units
7. Inspect, clean and adjust choke unit (automatic and manual)
8. Inspect, service, or replace carburetor air cleaner
9. Inspect, service, or replace gas tank, cap and sending unit
10. Install carburetors
11. Measure fuel flow and pressure
12. Perform operational checks of governors
13. Perform operational inspections of exhaust emission control system
14. Perform operational inspections of fuel systems
15. Remove, service, or replace fuel pumps
16. Repair governors
17. Repair or replace electrical fuel injection computer
18. Repair or replace fuel injectors
19. Repair or replace fuel injector pumps
20. Repair or replace fuel lines and hoses
21. Repair or replace wiring harness for electronic fuel injection system
22. Repair or service carburetors
23. Repair or service exhaust emission control systems
24. Service or repair turbocharger
25. Service or replace manifold head controls
26. Service or replace units in vacuum systems

K. MAINTAINING AND REPAIRING COOLING SYSTEMS

1. Check coolant freezing point
2. Check coolant temperature
3. Check overflow tank and accessories
4. Chemically clean and flush cooling system
5. Inspect, adjust, and replace fan
6. Inspect and repair blowers on air-cooled engines
7. Inspect water hoses
8. Remove and reinstall radiators
9. Replace freeze plugs
10. Replace heater hoses
11. Replace radiator hoses
12. Replace variable-speed fan
13. Replace water pump
14. Solder minor leaks in radiator
15. Test and replace coolant pressure caps
16. Test and replace thermostat

L. MAINTAINING AND REPAIRING STANDARD AND POWER STEERING UNITS

1. Adjust worm and sector in steering box
2. Inspect and replace steering spindles
3. Inspect steering
4. Lubricate the power steering
5. Lubricate the steering box and linkage

6. Rebuild power steering cylinder
7. Repair or replace manual steering components
8. Repair or replace power steering components
9. Repair or replace power steering pumps
10. Repair or replace tilt and telescoping and collapsible mast jackets
11. Replace belts and set tension
12. Replace pivot points on power steering linkage
13. Replace pivot points on steering linkage
14. Service filter in power steering

M. MAINTAINING AND REPAIRING BRAKING SYSTEMS

1. Adjust brakes
2. Adjust hand brake linkage
3. Adjust hand brake external band
4. Bleed brakes
5. Free up parking brake cables
6. Inspect and repair brake air compressors
7. Inspect and replace brake pads (disc brakes)
8. Inspect and turn rotor if necessary (disc brakes)
9. Inspect and turn brake drums
10. Inspect and service air tanks and valves
11. Inspect, repair or replace self adjusters
12. Perform operational brake inspections
13. Recondition backing plates
14. Reline brake shoes
15. Repair air brake systems
16. Repair disk brakes
17. Repair or replace master cylinder
18. Repair or replace hydraulic power brake units
19. Repair or replace hydraulic control valves
20. Repair or replace hydraulic lines and fittings
21. Repair or replace hydraulic power cylinders
22. Repair or replace wheel cylinder
23. Replace brake hoses and lines
24. Replace brake shoes
25. Replace hand brake linkage
26. Replace hand brake external band

N. MAINTAINING AND REPAIRING FRONT ENDS

1. Adjust or replace torsion and trunion bars
2. Adjust and repack front wheel bearing
3. Balance wheels and tires
4. Inspect and align front end
5. Inspect and align rear end
6. Inspect and replace steering damper
7. Inspect wheel bearings
8. Inspect and repair front suspension systems
9. Lubricate ball joints
10. Lubricate the front and rear suspension
11. Perform visual inspections of suspension systems
12. Rebush king pins or link pins
13. Repair or replace rear suspension system
14. Replace ball joints

15. Replace front wheel bearings grease seal
16. Replace front suspension control arms and bushings
17. Replace shock absorbers and mounting

O. MAINTAINING AND REPAIRING AUTOMOBILE AIR CONDITIONERS

1. Inspect and refill system with freon
2. Diagnose air conditioning malfunctions
3. Install air-conditioners in vehicles
4. Pressure test, performance test, and leak test system
5. Repair or replace air conditioning compressor
6. Repair automatic a/c and heater systems vacuum and electrical circuits
7. Repair compressor shaft seals
8. Replace compressor seals
9. Replace condenser in air conditioning unit
10. Replace air conditioner fan motor
11. Replace evaporator in air conditioning unit
12. Replace dryer in air conditioning unit
13. Replace expansion valve in air conditioning unit
14. Replace freon control valve or diaphragm in air conditioning unit
15. Service air conditioner control cables and switches

P. MAINTAINING AND REPAIRING AUTOMOBILE HEATERS

1. Diagnose heating system malfunctions
2. Inspect and replace thermostat
3. Inspect and replace defroster hose
4. Replace heater water control units
5. Remove and repair or replace heater core
6. Service heater control components
7. Service or replace circulating heaters
8. Service or replace gas heaters

Q. LUBRICATING AND MAINTAINING

1. Change oil and filters
2. Inspect and clean automobile interiors
3. Lubricate vehicles and equipment
4. Remove, repair or replace tires
5. Perform road service
6. Pick up stalled vehicles
7. Service vehicles with fuel or oil
8. Maintain tire removal equipment
9. Maintain washrack equipment
10. Winterize vehicles

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