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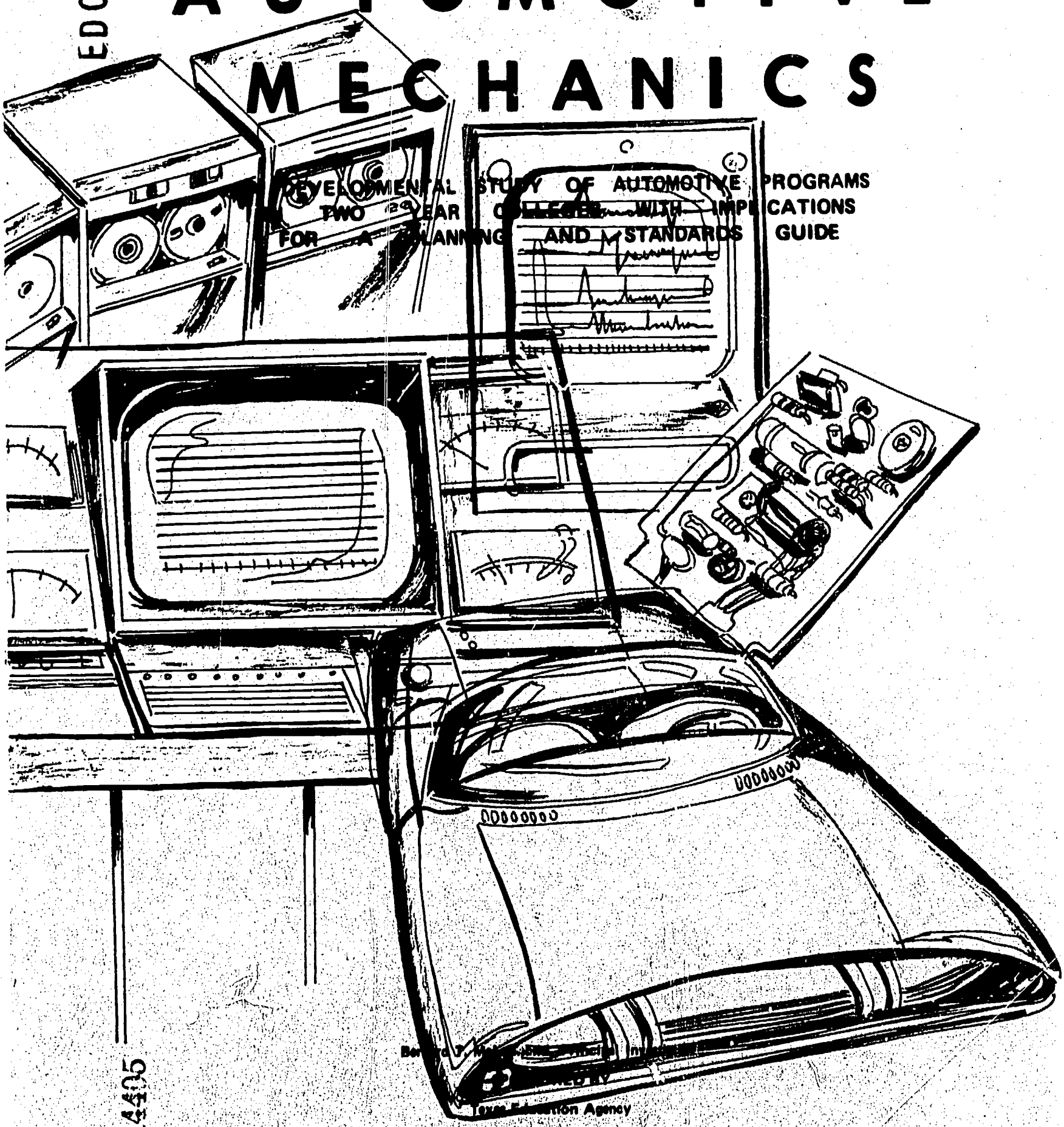
ABSTRACT

The purpose of this study was to obtain information necessary to determine specific minimum guidelines to be used to evaluate automotive programs in postsecondary schools. Participants were personnel from selected junior or community colleges offering automotive programs and from automotive service and repair organizations. Answers to pertinent questions useful for developing the proposed planning and standards guide include: (1) Of the 25 2-year colleges participating in the study, 44 percent did not believe that their facilities and equipment were adequate, (2) Of the executives of organizations in the automotive service and repair industry, 70 percent disagreed that programs in their state were sufficiently equipped, (3) Of the 16 2-year colleges in Texas having automotive programs, 87.5 percent do not offer the considered minimum of 1,200 student contact hours, (4) A maximum class size of 12-16 students was recommended by 80 percent of the respondents, (5) 95 percent recommended the use of an advisory committee, and (6) The maximum recommended teaching load per week was 24 hours. Complete results of the study and proposed guides are appended. (GEB)

AUTOMOTIVE MECHANICS

DEVELOPMENTAL STUDY OF AUTOMOTIVE PROGRAMS
TWO YEAR COLLEGES WITH IMPLICATIONS
FOR PLANNING AND STANDARDS GUIDE



Texas Education Agency
June, 1971

A DEVELOPMENTAL STUDY OF AUTOMOTIVE PROGRAMS IN TWO-YEAR COLLEGES WITH IMPLICATIONS FOR A PLANNING AND STANDARDS GUIDE

Bernard T. McLennand, Principal Investigator

Sponsored By
Texas Education Agency

The increasing need for qualified personnel in the automotive service and repair industry due to the sophistication of the mechanics of the automobile has made it imperative to have proper curricula, tools, equipment, training aids, and facility size to implement the preparation of a person to become an automotive mechanic. The results of this study are to provide information which may be used (1) by the Texas Post-Secondary Vocational Program Development Office in establishing guidelines and standards for automotive programs, (2) by two-year colleges in planning curriculum development programs, (3) for state-wide in-service curriculum studies, and (4) in a proposed industrial survey to determine employers' criteria for graduates of vocational-technical schools. This study was performed for and funded by the Texas Education Agency.

Appreciation is extended to the following for participating in the survey: the heads of automotive departments and automotive instructors of selected two-year colleges; the executives and selected members of the Texas Automobile Dealers Association, the Texas Oil Jobbers Association, the Independent Garagemen Association of Texas, the Independent Garage Owners of America, Inc., and department stores having automotive service centers.

The findings, conclusions, and recommendations are those of the principal investigator and do not necessarily reflect the views of the Texas Education Agency.

Bernard T. McLennand
Principal Investigator

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In Texas, the Office of Post-Secondary Program Development does not have specific minimum standards or guidelines by which public post-secondary automotive programs may be evaluated. This lack of specific guidelines makes it difficult to make a comparison between programs which are supposedly equivalent. In addition, it greatly increases the difficulty of evaluating proposals for establishing new programs.

The Texas Education Agency Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] was reviewed for standards required for vocational-technical programs. The following was noted:

1020 - Application for New Programs.

Applications for new programs . . . .

Applications for approval of new programs must be made for each campus of multi-campus systems or districts. Each program must contain the recommendations of the local advisory committee.

Each course proposed for a program for which application is being made must be fully described so that its major instruction in lecture and laboratory must be shown for each course.

1030 - Standards.

In terms of student contact hours, each program will meet the minimum standards specified under each major program area heading.

1031 - Student Contact Hours.

A student contact hour is one hour in which a student has contact with an instructor. (For example, 20 students x 18 weeks x 3 hours per week would equal 1080 student contact hours per semester.) Lecture and laboratory hours are counted in this manner.

In cooperative programs, the hours a student spends in a

training station or internship, which is supervised by a college coordinator or instructor are counted as student contact hours. The hours a student spends on-the-job non-supervised apprenticeship programs may not be counted as student contact hours.

1032 - Curriculum Sequence.

In any two-year program, the sequence of the curriculum will be such that the students will develop some basic marketable skill during the first year.

1050 - Preparatory Classes.

2. Classes may be integrated or specialized in terms of subject matter. For example, students may attend a number of specialized content classes, or a block-of-time approach may be followed in which students receive all their instruction from one instructor during a multi-houred session.

3. Class size will not exceed 24 students for lab or shop except in those experimental or other type programs having prior approval of the Texas Education Agency. If fewer than 24 student stations are provided enrollment will be limited to the number provided.

6. Cooperative classes will consist of 24 or fewer students.

1052 - Internship.

In an internship, cooperative, practicum, or other meaningful work experience program, ... the hours of internship should normally be between 8:00 a.m., and 6:00 p.m., Monday through Friday. If the student works before 8:00 a.m., and after 6:00 p.m., or on Saturday, Sunday, or holidays, the time may be counted as internship only if a full-time faculty member, fully qualified in the program, is on duty and coordinating the work experience of each student. Only students working toward a degree or certificate will be counted in determining the contact hours generated in the internship portion of the program.

1610 - Minimum Contact Hours.

INDUSTRIAL EDUCATION:

Each institution must structure the curriculum for each program in Industrial Education so the program will have a clearly defined occupational objective. Each program should also have the minimum number of contact hours to

enable students to gain the necessary cognitive and manipulative skills in that occupational area. The following schedule of contact hours is a suggested minimum for specialized and closely related instruction in each program.

Auto Mechanics, Entry Level . . . . . 1200 hours
Auto Mechanics, Journeyman . . . . . 2000 hours

As each two-year college in the southern region should be accredited by the Southern Association of Colleges and Secondary Schools, a review of The College Blue Book[3] for accrediting standards set by the Association noted the following:

STANDARDS FOR JUNIOR COLLEGES

Standard Three - JUNIOR COLLEGE CURRICULA. Four curricula are recognized as valid for any junior college.

2. A program of one or more years of terminal or vocational work which may include short occupational or other courses. Courses offered at the junior college level in departments of vocational-technical education should be worthy of consideration as a part of the college curricula.

Standard Five - FACULTY.

9. The standard teaching load in semester hours or their equivalent is recognized to be sixteen. The maximum teaching load is eighteen semester hours, and only a small percentage of the faculty may be permitted to carry this maximum. The teaching schedule should be arranged so that the total teaching load per week of each instructor will not ordinarily exceed 450 student credit hours. Two hours of laboratory work shall be counted as one credit hour. In three-year or four-year junior colleges, the teaching of a high school class meeting five hours a week will be considered the equivalent of three hours in an instructor's load.

Faculty committee assignments, sponsorship of extra-curricular activities and other non-teaching duties shall be given consideration in the teaching load.

Standard Nine - LABORATORIES. The science laboratories and laboratories for vocational-technical and semi-professional courses should be equipped for individual instruction

in each laboratory course offered. If the fine arts, including drawing, dramatics, painting, and music are offered, the equipment in these departments shall be considered in accrediting the junior college.

Each laboratory and vocational shop shall be judged upon its own merits with regard to its adequacy:

1. The room shall be large enough to properly house the equipment and to provide safe, comfortable, working space for the students.

2. The shop or laboratory shall be provided with proper equipment with regard to quality, quantity, and recency of design. Shops shall provide adequate work experience in the vocational-technical field of training to correspond with work experience after finishing the course.

3. The number of work-stations provided in a shop must be at least equal to ninety percent of the total number of students enrolled in a shop section.

The Guide For Planning Occupational Education And Technology Programs In Texas[2] notes that the curriculum sequence should be such that the student will develop some basic marketable skill during the first year of school and that the minimum student contact hours for Auto Mechanics, Entry Level, is 1200 hours. There must be a direct correlation between the two standards for an automotive program. The minimum student contact hours should be in automotive subjects only and should be completed within a one year period. The curriculum sequence should be such that the subjects taught provide for developing the basic marketable skills during the first year of school.

Standards were set by both agencies for student-instructor ratio and student work-station ratio. The Southern Association Of Colleges And Secondary Schools[3] stipulates that the laboratory or

shop shall be provided with proper equipment with regard to quality, quantity, and recency of design to provide adequate work experience and large enough to properly house the equipment and to provide safe, comfortable, working space for the students, but neither agency qualified the minimum equipment or space requirements per student work-station which would be acceptable for accreditation. These requirements are necessary, for if students in an automotive program are to acquire the knowledge and skills necessary for them to function as a mechanic, the tools, equipment, training aids, and work area must be provided. A work-station may be defined as follows:

Work Station:

> The floor space in which a student will perform certain functions in a subject area to acquire the knowledge and skills required of an automotive mechanic by using the appropriate tools, equipment, and training aids which will be made available to him. The floor space requirements for each subject area may be determined by the equipment and training aids required.

The results of the developmental study conducted should provide the information which will assist in determining specific minimum guidelines to be used to evaluate automotive programs in post-secondary schools.

The names of the participating two-year colleges are listed in alphabetical order in the Appendix, pp. 31 and 32.

PROCEDURE

In order to not be parochial, two-year colleges and automotive service and repair organizations outside the state of Texas were requested to participate in the program. To maintain the population used during the study at a minimum, yet having a high degree of knowledge and proficiency about automotive programs and the automotive service and repair industry in that population, the following procedure was used:

1. Select junior and/or community colleges (two-year colleges) offering automotive programs.
   a. From the Directory of Post-Secondary Technical-Vocational Programs in Texas, 1968-69[1] (16 colleges).
   b. By requesting from each State Department of Education that a two-year college having an automotive program be recommended to participate in the research.
2. Executives and selected members of the Texas Automobile Dealers Association, the Texas Oil Jobbers Association, the Independent Garagemen of Texas, the Independent Garage Owners of America, Inc., and department stores having automotive service centers were invited to participate.
3. The Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] and The College Blue Book[3] were reviewed for guidelines and standards pertaining to vocational-technical programs.
4. Information necessary for the completion of the survey

was requested from the participants. The data received were compiled and guidelines and standards were derived for evaluation.

5. The components of the proposed planning and standards guide were developed from the evaluation.

SUMMARY

From the data compiled during the survey, answers to certain questions provide pertinent information about automotive programs in the two-year colleges.

1. Of the 25 two-year colleges participating in the study (9 in Texas) 44 percent of the respondents do not believe that the tools, equipment, training aids, and facility size are sufficient to implement the automotive programs at their college. In Texas 44 percent of the respondents do not believe that their automotive programs are sufficiently implemented.

2. Executives of organizations in the automotive service and repair industry (23 respondents) located in the various states including Texas were asked if they believed that all the automotive programs being offered in the schools in their state were sufficiently implemented with tools, equipment, training aids, and facility size. There were 70 percent in disagreement with such a belief.

3. In Texas 56 percent of the two-year college participants have less than the minimum number of student contact hours (1200) required by the Texas Education Agency for Auto Mechanics, Entry Level, in either one or two-year programs. The answers from respondents of colleges in other states showed that 38 percent did not have 1200 hours of automotive subjects in their programs.

4. The minimum number of student contact hours (1200) required for Auto Mechanics, Entry Level, is considered to be that necessary for a student to develop basic skills for job entry. The sequence of the curriculum should be such that basic skills will be be developed during the first year. Eighty-seven and one-half percent of the 16 two-year colleges in Texas having automotive programs do not offer 1200 student contact hours of automotive subjects in one year. Of the two-year colleges from the other states which are participating in the survey, 87.5 percent do not offer 1200 contact hours of automotive subjects in one year.

5. Of the two-year colleges in Texas participating in the study 66 percent agree that Option I, "Automotive Service and Repair", with 1308 student contact hours of automotive subjects only, is sufficient to prepare a man to function as an automotive mechanic. Option I was approved by 75 percent of the remaining two-year college respondents.

6. Of the executives and selected members of the organizations in the automotive service and repair industry (46 respondents) who were participants in the preference survey between Option II, "Automotive Service and Management" and an "Automotive Technology" program offered by a two-year college in Texas, 93 percent preferred to have the graduates of Option II to those of the "Automotive Technology" course of study.

7. A maximum class size of 12 - 16 students for an automotive subject was recommended by 80 percent of all the two-year college participants. In Texas 66 percent of the respondents noted that 15 - 16 students should constitute a maximum class size.

8. The maximum teaching load per week recommended by 46 percent of all the college participants was 24 hours. In Texas 44 percent of the respondents recommended 24 hours as the maximum teaching load per week.

9. When asked if they believed that the trade of automotive mechanic was s skilled trade such as that to the journeyman machinist, carpenter, or electrician, 100 percent of the respondents (23 executives of the automotive service and repair industry) noted that they do believe that the automotive mechanic trade is a skilled trade.

10. Ninety-five percent of the respondents from the automotive service and repair industry believe that an automotive program advisory committee should be established at the state level.

11. Ninety-five percent of the respondents from the automotive service and repair industry believe that periodic examinations of automotive programs in educational institutions should be accomplished to determine the efficacy of the programs.

12. When asked if a minimum number of contact hours per student in automotive subjects only required to complete a course of instruction in automotive service and repair should be established, 87 percent of the participants from the automotive service and repair industry agreed.

13. Ninety-one percent of the respondents of the automotive service and repair industry believe that automotive programs in schools should have the tools, equipment, and training aids necessary to implement a course of instruction in automotive mechanics.

DEVELOPMENT OF THE PROPOSED PLANNING AND STANDARDS GUIDE 10

The development of the proposed planning and standards guide was divided into three phases: (1) the curriculum; (2) the tools, equipment, and training aids; and (3) the facility.

The determination of what is to be taught is of primary consideration in an occupational curriculum. In vocational-technical education continuity of instruction and continuity of learning effort with repetitive work in some areas are very desirable, and in many instances necessary, for students to understand and retain the idea of certain functions of the mechanics of equipment and tools. The development of the program should be based on the requirements of the knowledge and skills a student should have to work as an automotive mechanic. To have complete training of the individual, the total participation of each student in all phases of job operation is necessary. The inventory of tools, equipment, and training aids is established by this premise. From the course of study and the number of students per class, the tools, equipment, and training aids required to implement the curriculum are resolved. The facility is then designed to provide the instructional area.

CURRICULUM

In 1967 the attorney general of the state of Texas handed down the opinion that students in vocational-technical curricula which are approved by or subject to the approval of the State Board of Vocational Education are not required to have American History or American Government courses.[6] The opinion allows adherence to the premise of assisting a student to acquire a

marketable skill in automotive mechanics in one year by having a core curriculum of automotive subjects only. To provide the knowledge and skills, the content of the course of study must be rigid to cover the necessary material. A Wisconsin Five-Year Follow-Up Study[5] conducted by the Madison Area Technical College indicated that the more rigid the curriculum is that the students complete, the higher salary they can expect to receive.

The parameters for curriculum development in a post-secondary occupational education program as set forth in the Guide For Planning Post-Secondary Occupational Education And Technical Programs In Texas[2] are as follows:

1. Each course proposed for a program for which application is made must be fully described so that its major contents can be determined. The number of hours of instruction in lecture and laboratory must be shown for each course.

2. Minimum standards specified under each major program area heading in student contact hours will be met.

3. In any two-year program, the sequence of the curriculum will be such that the students will develop some basic marketable skill during the first year.

4. The minimum number of student contact hours for automotive programs are as follows:

   a. Auto Mechanics, Entry Level . . . . . 1200 hours

   b. Auto Mechanics, Journeyman . . . . . 2000 hours

The course of study content may be based on the description of an auto mechanic as noted in the 1970-71 Information Guide And Directory Of Vocational-Technical Programs In Post-Secondary Institutions In Texas.[4]

Auto Mechanic: This program is to develop an individual through classroom and shop experiences to use hand tools,

> power tools, diagnostic and testing equipment and technical manuals in all phases of automotive maintenance and repair. Skills and techniques are provided the individual by practice in disassembly of units, parts inspection, and replacement of parts involving engine overhaul and repair, ignition systems, carburetion, brakes, transmissions, front-end alinement, air conditioning systems, and the installation of accessories on all types of automotive vehicles.

When designing a curriculum for an automotive program, one must acknowledge the fact that an automotive mechanic is a skilled workman. His ability to determine the cause of a malfunction and to use tools to effect repairs to a machine is developed through study and considerable practice. After acquiring the necessary knowledge and skills he may become a journeyman automotive mechanic. The Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] does not note an automotive program as a technical program. It is in the industrial education field. A graduate of an automotive program course of study is an automotive mechanic - not an automotive technician.

Two automotive curricula options were designed with adherence to (1) the parameters set down by the Texas Education Agency directives, and (2) the answers to a questionnaire (Appendix, p. 33) which had been mailed to the executives and selected members of organizations in the automotive service and repair industry. They are as follows:

OPTION I (Appendix, p. 45)

Automotive Service and Repair

> A one-year program designed to train the student to a degree of proficiency whereby he may function as an automotive mechanic upon completion of the course. A "Certificate of Completion" is awarded upon completion.

OPTION II (Appendix, p. 46)

Automotive Service and Management

> A two-year course of study designed to prepare a student to function as a service station manager, as an assistant shop foreman, as a car salesman, or as an automotive parts store assistant manager. An "Associate Degree in Applied Science" is awarded upon completion.

The one-year option is a core curriculum. Each student in the automotive program will have the same first year course of study. The Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] notes that in any two-year program the sequence of the curriculum will provide for the development of some basic marketable skills during the first year. The minimum contact hours per student for Auto Mechanics, Entry Level, is 1200 hours. The core curriculum fulfills that stipulation.

The one-year program provides for year-round use of the automotive facility. The Option I course of study is designed to function six hours per day, five days per week, for two semesters of 15 weeks and a summer session of 12 weeks. The total number of contact hours per student is 1308: 450 contact hours per student for the fall and spring semesters and 408 contact hours per student during the summer session. One or two full-time classes may be scheduled for a year's work. If it is feasible to have a new class start each semester, the summer session (12 weeks) is designed to have 450 contact hours per student (Appendix, p. 44). A person registering for the automotive course of study will register for a semester's work in automotive subjects. The

related areas of machine shop and welding are hours in addition to the core curriculum of automotive subjects. The necessary mathematics, physics, and chemistry will be taught within the course content.

The Option I curriculum is outlined in lecture and laboratory hours (Appendix, p. 43) and in block hours (Appendix, p. 45). The lecture and laboratory outline complies with the application for new programs as required by the Guide For Planning Occupational Education And Technology Programs In Texas.[2] It also assists the instructor to determine the actual credit hours of work he is accomplishing in accordance with the standards set by the Southern Association Of Colleges And Secondary Schools.[3] The block hours outline is the format by which the automotive course of study should be presented.

An opinion was requested from the two-year college respondents about Option I, "Automotive Service and Repair", as to their belief about the sufficiency of the number of student contact hours, 1308 in a one-year course of study in automotive subjects only, to train a man to function as an automotive mechanic. Information pertaining to the design of the curricula, course of study outlines, and course descriptions (Appendix, pp. 39 to 53) were mailed to the participants. The results of the tabulation of answers received were that 68 percent of the total population of two-year college respondents (66 percent in Texas) agreed that the Option I curriculum total student contact hours were sufficient.

Seventy-five executives and selected members of the

automotive service and repair industry were requested to answer a preference questionnaire (Appendix, p. 34). Two courses of study were presented; Option II, "Automotive Service and Management" (Appendix, p. 46), and an "Automotive Technology" curriculum (Appendix, p. 47), offered by a two-year college in Texas. Of the 75 persons contacted, 46 replied to the questionnaire with 93 percent of the respondents preferring those graduates having had Option II, "Automotive Service and Management" to those having had the "Automotive Technology" program.

The hours designated in Option I and Option II as on-the-job-training could be considered internship in accordance with the Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas.[2] Internship is considered to be between the hours of 8:00 a.m., and 6:00 p.m., Monday through Friday, and only students working toward a degree or a certificate will be counted in determining the contact hours generated in the internship portion of the program.

The one day per week on-the-job-training was included to provide the student with the time to work in the automotive service and repair industry. He would acquire knowledge of the actual working conditions which would assist him in the transition from the school to the shop. Also, the instructor would be in a position to determine the ability of the student to function during actual working conditions prior to his completing the course of study. This would provide for evaluating the student and the curriculum. The efficacy of the course content and skill

development would be accomplished on a continuing basis.

The present rate of reimbursement by the Texas Education Agency per student contact hour for an automotive mechanics program is $0.71. Option I, with a class of 18 students, would have a reimbursement of about $17,000 per year.

TOOLS, EQUIPMENT, AND TRAINING AIDS

There are no standards set by either the Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] or the Southern Association Of Colleges And Secondary Schools[3] which designate the number of tools, equipment, and training aids which may be considered necessary to implement a course of instruction in automotive mechanics. The Southern Association Of Colleges And Secondary Schools[3] stipulates only that the laboratory shall be provided with proper equipment with regard to quality, quantity, and recency of design.

To have total participation of each student in all phases of job operation, the tools, equipment, and training aids should be sufficient to permit each student to function at an individual work station. When a man is being trained in a skill trade such as an automotive mechanic, he does not acquire manipulative skills in all areas of job operation while working in or with a group of students.

The period the student is enrolled in the automotive program may be the only time and place he will find the diversity of equipment and tools with which he should be familiar. Everything

manufactured for the automotive service and repair industry will not be available, but what there is should provide the student with an insight to the variety of tools and equipment available to assist a mechanic to perform more efficiently and more effectively the repair work on a vehicle.

The director-instructor of the automotive program in a two-year college should be employed in sufficient time prior to the opening of the facility to ascertain the availability of and to acquire the tools, equipment, and training aids necessary to implement the course of study. A teacher should not be faced with the discouraging battle of piece-by-piece acquisition of equipment. When a situation exists where the teacher must teach without sufficient tools, equipment, and training aids, the student does not receive proper preparation in the trade. If these items are not available when the automotive facility is opened for instructional purposes, it takes years to acquire them. The idea that if you have done without for a year you can continue to do so becomes standard operating procedure with the administration.

When asked if the tools, equipment, and training aids available at their school were sufficient to properly implement a program in automotive mechanics, the disagreement of the respondents in Texas and for the total population of the two-year college participants was 44 percent. The same question was asked of selected participants from the automotive service and repair industry and 70 percent of the respondents believe that the schools in their state are not properly equipped.

A compilation of tools, equipment, and training aids was made which would implement an automotive program in which a class of 36 students would be enrolled. The class would be divided into two groups of 18 students each. The list was submitted to the 25 two-year college respondents for their consideration. A listing of those items agreed to by a plurality of the participants plus some of the items recommended by them, with unit prices noted for the majority of the items, is contained in the Appendix, pp. 54 to 95. For some of the items contained in the training aids lists, prices could not be ascertained with any degree of parity; therefore, they were not noted. It is believed that the majority of those pieces may be acquired by donation. Item costs are not to be considered the best prices available. The range of unit costs for tool, equipment, and training aids made the using of approximate prices a necessity for some items. The prices noted were obtained from vendors' price lists and automobile dealers parts departments. A listing of vendors is in the Appendix, pp. 100 to 104.

The facility designed for this program will accommodate 216 students per semester in two six hour per day classes. If the student population is sufficient to accomplish the enrollment of 216 students, the number of training aids and tool boxes must be increased accordingly.

The majority of the tools noted in the tool lists should be located in the tool room on tool boards where they will be on display at all times when not in use. The displaying of the tools will assist the student in becoming familiar with the variety

he shall be using.

This list of tools, equipment, and training aids for use in an automotive program is not to be considered complete. It should be reviewed biennially by a committee of instructors of automotive programs. To have a thorough examination of the listing, the committee should separate the compilation into subject areas for study.

The tool boxes for each student should be bought on a replacement type bid. Bidding the tool boxes should bring the total price for each box down considerably. Each student should be held responsible for the contents of the tool box issued to him. If he wishes to buy it, he may pay for it during the school year. This would provide the man who completes the course of instruction and takes a job in the automotive service and repair industry with a well equipped tool box at a reasonable price.

All training aids (engines, transmissions, generators, carburetors, starters, etc.) must be in operable condition or be placed in operable condition after having been received. The learning effort of the student should not be with inoperable equipment because poor working habits can develop. A man trained with operable units which will be tested upon assembly may be more careful about proper disassembly and assembly procedures. Work on live automotive vehicles should not be accomplished by the student until he has become proficient in his work in the subject areas.

The cost of equipping the automotive facility designed for this program is about $225,000. This cost may be reduced by

careful bidding procedures and/or by donations from the automotive industry and automotive wrecking facilities. An amortization policy should be initiated to provide for the replacement of the tools, equipment, and training aids.

FACILITY

Neither the Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] nor the Southern Association Of Colleges And Secondary Schools[3] define a work station in terms of the space required for each student. The Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] notes that the class size will not exceed 24 students for laboratory or shop and that the number of students enrolled will be limited to the number of students stations provided. The Southern Association Of Colleges And Secondary Schools[3] notes that the number of work stations must be at least equal to ninety percent of the total number of students enrolled in a shop section and that the room shall be large enough to properly house the equipment and to provide safe, comfortable, working space for the student.

When asked if the facility size was sufficient to properly implement a program in automotive mechanics, the disagreement of the respondents in Texas and for the total population of the two-year college participants was 44 percent. The same question was asked of selected participants from the automotive service and repair industry. Of the respondents, 70 percent believe that the

automotive programs in the schools in their states do not have proper facility size.

Using the automotive subjects of Option I and the tools, equipment, and training aids as criteria for developing space requirements per student, the following work stations were designed:

1. Work Station Number 1 (Appendix, p. 96)
   Automotive Engines
   Emission, Carburetion, and Lubrication
2. Work Station Number 2 (Appendix, p. 97)
   Automotive Electrical Systems
   Automotive Accessories
3. Work Station Number 3 (Appendix, p. 98)
   Engine Trouble Diagnosis and Tune-Up
   Steering, Brakes, Chassis, and Suspension
   Power Transmission
   Automotive Air Conditioning
4. Work Station Number 4 (Appendix, p. 99)
   Automotive Service and Repair

These work stations relate to the general standards set by the Southern Association Of Colleges And Secondary Schools[3] which stipulates that there shall be a safe, comfortable, working space for the student.

The work stations, the number of students to be enrolled in the automotive program, and the scheduling of the classes were used as criteria for developing space requirements per shop area. The shop areas were designed around 18 individual work stations.

The format of the curriculum determined the number of shops necessary to implement the program. Six shops were needed, four of which are the same size. The engine and the service and repair shops are larger because of the nature of the job operation and the equipment and training aids required.

Each shop was designated as an area in which certain subjects were to be taught. The designation per subject(s) is as follows:

1. Shop Number 1 (Work Station Number 1)
   Automotive Engines
   Emission, Carburetion, and Lubrication
2. Shop Number 2 (Work Station Number 3)
   Power Transmission
3. Shop Number 3 (Work Station Number 3)
   Engine Trouble Diagnosis and Tune-Up
   Steering, Brakes, Chassis, and Suspension
4. Shop Number 4 (Work Station Number 2)
   Automotive Electrical Systems
   Automotive Accessories
5. Shop Number 5 (Work Station Number 3)
   Automotive Air Conditioning
6. Shop Number 6 (Work Station Number 4)
   Automotive Service and Repair

The rooms included to ensure the effectiveness of the shops and to provide for the comfort of the students are the:

1. Tool Room
2. Training Aids Storage Room
3. Classroom
4. Washroom

The library was placed in Shop Number 6, Automotive Serivce and Repair, to contain the manuals, periodicals, texts, brochures, etc., which should be available to the students for reference purposes when they are working on live cars and for informative reading. The Proposed Automotive Building drawing is in the Appendix, p. 105.

This automotive facility is to be operated year-round. A new class of 36 students may be enrolled each semester and the summer session. If the enrollment is sufficient, two six-hour full-time classes may be held. With full-time enrollment, not including part-time evening students, the number of students who may be enrolled is 216.

By scheduling the subjects in block hours, the class of 36 students may be divided into two groups of 18. This will permit the utilization of each shop for two classes per semester. The number of training aids required in each shop will be those necessary for 18 students. If there are two full-time classes, the number of training aids required in each shop will be those necessary for 36 students.

The approximate area covered by the building is 32,000 square feet. A steel building similar to those constructed by the Butler Manufacturing Company, Kansas City, Missouri, may be erected at a cost of $6 to $10 per square foot. The land area to contain the program should be on one and one-half acres. This would allow for the building including the offices, the security storage, and the parking lot.

The following assumptions are based on personal opinions which have been developed from the experiences and ideas of the principal investigator. Some may be resolved through research.

1. If a respondent is willing to make the assertion that the institution of which he is a member does not have the tools, equipment, training aids, and facility size to properly implement an automotive program, two factors which may be causal are:

   a. Administrators who lack the knowledge of and/or lack the interest in the proper implementation of an automotive program.

   b. Lack of funds.

2. If administrators and/or teachers who are in automotive programs had participated in the study and they were asked the question about the effectiveness of their program, the answers received from the total population may be divided into five groups:

   a. Those who know their program is deficient and will admit it.

   b. Those who know their program is deficient, but will not admit it.

   c. Those who know their program is good and will admit it.

   d. Those who do not know what constitutes a good program, but will say that it is good if questioned.

   e. Those who will state what they believe the administrators want them to say.

3. Within the vocational-technical programs, the two-year college should not be considered an adjunct of the four-year institution nor a continuation of the secondary school. It is an entity and should function as one. Therefore, it is not necessary that general education be considered a part of the curriculum for basic training in a skill trade in the two-year institution.

4. The concept that a school shall provide only for the needs of the community should not apply to the two-year college. The mobility of the population due to job

availability makes it imperative that a man be trained so that he may function whereever he may choose or have to live.

5. Advertising an automotive program as "Automotive Technology" when the equipment necessary to accomplish the research and testing is not available adds status to the program, but not much stature.

6. Either the two-year college should have academic excellence with excellent vocational programs, or they should seek academic excellence and drop the vocational programs. A two-year college should not be permitted to have token (hobby shop) type vocational programs and advertise them as being sufficient to prepare a man to function in a trade.

7. An automotive program which would provide for each student is expensive. These costs would be exhorbitant if a proliferation of automotive programs is permitted. Some factors which should justify the implementation of an automotive program similar to the one described in this study are:

   a. Population density.

   b. Other schools in the area offering an automotive program.

   c. The number of high schools in the district too small to offer vocational-technical programs.

   d. The student population necessary to support an automotive mechanics program.

8. The vocational automotive program at the high school level is usually three hours per day, five days per week, for two school years. The possibility of having those students who are interested in becoming an automotive mechanic completing all school subjects except the vocational program hours by the end of their junior year should be investigated. This should provide an input of persons into an automotive program at an institution which, if properly designed, would provide for each student.

   The Option I curriculum, "Automotive Service and Repair", provides for six hours per day, five days per week, for one year (42 weeks) of intensive training in a skill trade. The course would provide the high school student who successfully completes the program with job entry

skills. It may assist in reducing the drop-out rate. A redesigning of the convential high school program is essential for the development of such a plan. If it functions, the work involved should be worth the effort.

From the information received about automotive programs and the parameters set by the Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas[2] and the Southern Association Of Colleges And Secondary Schools[3] within which some of those programs would function, the following conclusions were derived:

1. In the automotive industry the automotive technician is usually a graduate of a four-year institution. The trade of automotive mechanic is not in the technical field. It is a skill trade in which a man must have the knowledge to diagnose a malfunction and have the skills to effect repairs to the vehicle within a period of time sufficient to make money for himself and/or his employer.

2. The majority (87.5 percent) of the two-year colleges have automotive programs which do not provide job entry skills in automotive mechanics within a one-year period.

3. Too many two-year colleges (44 percent) do not have sufficient tools, equipment, training aids, and facility size to properly implement a course of study in automotive mechanics.

4. Specific minimum requirements for curricula, tools, equipment, training aids, and facility size are needed to assist in determining the efficacy of automotive programs being offered by the two-year colleges.

Recommendations for improving the automotive programs in the two-year colleges in Texas are as follows:

1. The Texas Education Agency should establish specific minimum standards and guidelines for curriculum, equipment, training aids, and facility size for the automotive programs in the two-year colleges.

2. A feasibility study should be made to determine the proper location within a district for an automotive program. A proliferation of automotive programs within a certain area produces the "hobby shop" type plan. Monies should be made available for the establishing of one good automotive program within a certain area which would provide more benefits for the individual student.

3. The two-year colleges having automotive programs which do not meet the specific minimum standards set by the Texas Education Agency should be required to upgrade their plan or drop it.

4. A state advisory automotive program committee should be established within the framework of the Texas Advisory Council for Technical and Vocational Education to assist the Texas Education Agency in determining where automotive programs should be established and to determine the efficacy of automotive programs already established.

5. Investigate the possibility of the core curriculum, Option I, "Automotive Service and Repair", being used as a two-year course of study for Auto Mechanics, Journeyman, program which requires 2000 student contact hours. Some students may pass the journeyman test upon the completion of the one-year program. Those who do not may repeat the course of study. The repeat will reinforce that which they have learned and the added skills and knowledge acquired during the second year may help them to pass the test. If those who do not pass the journeyman test at the end of one year do not repeat the course, they will have had more than the Auto Mechanics, Entry Level, 1200 student contact hours, requirement for basic skills development.

6. The arbitrary number of 24 students in a laboratory or shop program should be dropped and a more realistic number for each occupational program should be determined in accordance with the program requirements.

7. The number of hours in each of the Auto Mechanics, Entry Level, 1200 hours, and the Auto Mechanics, Journeyman,

2000 hours, should be considered the minimum student contact hours in automotive subjects only required for those programs.

8. A review of the Southern Association Of Colleges And Secondary Schools Standards for Junior Colleges, Standard Five, Faculty, Item 9, and Standard Nine, Laboratories, Items i, 2, and 3, should be made by the Texas Education Agency for possible acceptance into the Guide For Planning Post-Secondary Occupational Education And Technology Programs In Texas.[2]

APPENDIX

AUTOMOTIVE MECHANICS

QUESTIONNAIRE

31/32/33

Below are noted possible reasons which may cause a man not to do well in or to leave the automotive service and repair industry. If you do not believe the list to be complete, please add the reason/s you consider should be included.

Please indicate an order of magnitude of these reasons by numerical sequence in the space provided. (i.e., 1, 2, 3, etc., 1 indicating the major reason.)

1. Lack of knowledge of control of income and outgo of monies and goods. (Bookkeeping and/or accounting) _____

2. Lack of knowledge of marketing, sales promotion, and advertising. _____

3. Lack of knowledge of the fundamentals of the economics of the automotive service and repair industry. _____

   Note: The word "economics" is used in reference to the following definition:

   "Deals with the material welfare of mankind and problems of capital, labor, wages, prices, tariffs, taxes, production, distribution, consumption, etc.")

4. Inability to understand and to work personnel. (Supervisory ability) _____

5. Insufficient knowledge about or the inability to handle the diagnostic and/or mechanical requirements of an automotive service and repair shop. _____

6. Poor location of business. _____

TABULATION OF RESULTS

Order of Magnitude	Reason Number
1	3
2	1
3	2
4	4
5	5
6	6

AUTOMOTIVE MECHANICS

QUESTIONNAIRE

The majority of students pursuing vocational-technical studies attend a junior college to obtain sufficient training in a certain area to become a marketable product within a two year period. Some cannot remain two years - many do not want subjects other than their main interest.

At present "Automotive Technology" is the only automotive curriculum offered by Central Texas College. Two curricula have been designed to provide the student with more training for employment in the automotive service and repair industry.

Attached are three curricula - a one-year certificate of completion in "Automotive Service and Repair", a two-year associate degree in applied science in "Automotive Service and Management", and a two-year associate degree in applied science in "Automotive Technology". Also attached are course descriptions.

1. Please review the attachments.

2. The abbreviation (OJT) means On-The-Job-Training.

3. In the center of each curricula form you will find a judgement by which you may note the degree of marketability. The range is from one to five--five being the highest degree. Please circle the number you believe will best represent the attitude of your company toward employing a graduate of any of these programs.

4. Please designate your preference between the two two-year curricula, and, if you wish, comment below as to why you prefer one to the other.

Automotive Service and Management_____

Automotive Technology . . . . . ._____

Upon completion, please return the enclosures to me in the stamped, addressed, envelope that is enclosed with the material for your convenience.

Thank you for your participation.

Bernard T. McLennand

COMMENT:

AUTOMOTIVE MECHANICS

Questionnaire

Note: If there are questions you do not wish to answer please write "No Comment" or "NC" in the space provided for the answer.

1. How many automotive instructors are employed at this college? _____

2. How many automotive instructors are on a nine/ten-month contract? _____

3. How many automotive instructors are on a 12-month contract? _____

4. How many part-time automotive instructors are employed? _____

5. How many hours per week is this automotive facility in use? _____

6. Is this automotive facility in use year-round? _____

7. Approximately how many full-time students are enrolled in the automotive program? _____

8. Approximately how many part-time students are enrolled in the automotive program? _____

9. What is the average number of students per automotive class per instructor? _____

10. Approximately how many contact hours must each student have (in automotive subjects only) to complete your automotive program? _____

11. Approximately how many lecture and laboratory hours does an automotive instructor average per week? _____

12. Do the full-time automotive instructors have duties other than teaching? _____

13. Approximately how many hours per week are necessary to perform these other duties required of the full-time automotive instructors? _____

Note: Questions 14 and 15 presuppose that sufficient tools, equipment, and training aids are available.

14. What do you believe should be the maximum number of teaching hours per week if an automotive instructor has:

    a. One preparation or one class per day? _____

    b. Two preparations or two classes per day? _____

    c. Three preparations or three classes per day? _____

15. What do you believe should be the maximum number of students one instructor should have per automotive class if he has:

    a. One preparation or one class per day? _____

    b. Two preparations or two classes per day? _____

    c. Three preparations or three classes per day? _____

16. Do you believe that the facility size, tools, equipment, and training aids available at your school are sufficient to properly implement your course of instruction in automotive mechanics or automotive technology? _____

17. How many out-of-town professional conventions are full-time automotive instructors permitted to attend each year? _____

18. Does the school pay or assist in paying the cost of the full-time automotive instructors to attend professional conventions? _____

19. Are 12-month contract automotive instructors permitted time off each year to attend special schools or classes to upgrade their skills? _____

20. Does the school pay or assist in paying the cost of the 12-month contract and/or full-time (nine/ten month) automotive instructors to attend special schools or classes to upgrade their skills? _____

Note: Please read the "Automotive Curricula" enclosure before answering questions 21 and 22.

21. Do you consider the total contact hours per student (1,308) for an automotive mechanics program (automotive subjects only) as indicated in the enclosed curricula sufficient to train a man to function as a general automotive mechanic if he successfully completes the course of study? _____

22. If your answer to question 21 is "no", what do you consider should be the minimum total contact hours per student to implement such an automotive program (automotive subjects only). _____

Note: I would appreciate any comment you may wish to make about the efficacy of the enclosed curricula.

AUTOMOTIVE MECHANICS

Questionnaire

The following questions are presented in an effort to determine the beliefs and/or feelings of members of the automotive service and repair industry about the automotive programs being offered by educational institutions in their state. This questionnaire has been sent to you because you represent the membership of an association whose members are in the automotive service and repair industry.

Please write "Yes" or "No" to the following questions in the space provided. If you wish to comment about the questionnaire, please do so on the second sheet.

1. Do you believe that all automotive service and repair programs being presented by the educational institutions in your state are sufficient in curricula design, equipment and facility size to properly train students for employment in the automotive service and repair industry? _____

2. Should an automotive program advisory committee composed of selected members of the automotive service and repair industry, staff members of the vocational-technical division of the state board of education, and directors and/or instructors of automotive programs in educational institutions be established at the state level? _____

3. Because monies provided for vocational-technical education are allocated by the state, should the state automotive program advisory committee have the authority to recommend the approval or disapproval of the location, design, and operation of the automotive program? _____

4. Should a periodic examination of automotive programs in educational institutions be accomplished to determine the efficacy of the programs? _____

5. Do you believe the trade of automotive mechanic to be a skilled trade such as that of the journeyman machinist, carpenter, or electrician? _____

6. Do you believe school programs should have available for use by the students all the tools, equipment, and training aids necessary to implement the course of instruction? _____

7. Should a minimum standard be set as to the number of contact hours per student in automotive subjects only required to complete a course of instruction in automotive service and repair? _____

8. If your answer to question seven is yes, what do you consider to be a minimum number of contact hours a student should have in automotive subjects only to complete a course in automotive service and repair?

I realize there are many ramifications to this question because of the varied abilities of the students, but I would still like to have your opinion. Please indicate your choice of the number of hours by a check in the space provided to the right of the numbers noted.

400 to 800 hours - one year _____

801 to 1200 hours - one year _____

1201 to 1600 hours - one year _____

1601 to 2000 hours - two years _____

2001 to 2400 hours - two years _____

Your choice _____ _____ _____

Information Pertaining To Design

The automotive curricula attached were designed to function within the following parameters:

1. To provide the opportunity for a greater number of persons to acquire a substantial education in automotive mechanics.
2. To provide for year-round use of the automotive facility.
3. That the facility size, tools, equipment and training aids are sufficient to provide each student with that which is necessary for him to acquire manipulative and diagnostic skills in automotive service and repair.

The student attending a two-year college for a vocational-technical automotive program has one or more of the following identities:

1. An adult 18 years of age or older.
2. Is (is not) married.
3. Did (did not) graduate from high school.
4. Has (has not) had college experiences.
5. Is (is not) a veteran.
6. Has (has not) had automotive service and repair experiences.
7. Is taking the course to have a facility and tools available to repair his car.
8. Desires to become an automotive mechanic.
9. Desires to increase his knowledge of automotive mechanics to improve his position in the field of automotive service and repair.
10. Would like to acquire, in a minimum amount of time, the knowledge and skills necessary to get and hold a job in the automotive service and repair industry.
11. Would like to continue his education in a four-year institution upon completion of a course of study in a two-year college.
12. Figures automotive mechanics to be an easy course from which he may acquire a sufficient background in automotive service and repair to get a job.

In 1967 the attorney general of the state of Texas gave the opinion that students in vocational-technical curricula which are approved by or subject to the approval of the State Board of Vocational Education are not required to have American History or American Government courses. This course of study has been designed with the realization that all men do not have the same mental ability, that many vocational-technical students do not want to become involved in subjects other than those in the field in which they wish to participate, and that the two-year college

may be the final chance for a person to acquire the training that will permit him to become a productive member of our society. It may provide many students with a chance to compete in and to complete a vocational-technical program. It may assist in providing in one year a person who can function as an automotive mechanic for an industry which needs mechanics, and retain on campus only those who wish to stay and who have the ability to progress in advanced education.

The one-year program is a core curriculum. Each student majoring in automotive mechanics will have the same first year course of study. This course of study has been designed to be in session six hours per day, five days per week, for one year. There is no summer break. In vocational-technical education continuity of instruction and continuity of learning effort are very desirable, in many instances necessary, for students to understand and retain the idea of certain functions of the mechanics of equipment and tools. The program is noted in two formats: one showing the hours in a subject area per semester with the total hours per semester noted (block hours) and one showing the lecture, credit, laboratory hours per subject area per week with the total hours per week noted. Either format may be used. The number of hours noted per subject is not absolute. They may be changed. The total number of hours per year is minimal. The format noting the lecture, credit, laboratory hours has been designed to allow the student the opportunity of having credit transferability.

This scheduling approximates 42 weeks of instruction, or 1,308 contact hours per day student. The total number of hours is within the minimal range of the number of hours of instruction suggested by various vocational-technical groups as that necessary to properly implement a course of study in automotive mechanics. Two six-hour classes may be scheduled if there are enough students to warrant the additional class. If the student population is sufficient, the scheduling may be changed to 1350 contact hours per day student in a 42 week period, or 450 contact hours per semester and summer session, to allow the input of a new class each semester and summer session. Evening classes may be scheduled four hours per night, four or five nights per week. Facility usage would approximate 46 to 76 hours per week. One class of 18 day students would have 8,100 contact hours during the fall and spring semesters and 7,344 contact hours during the summer session- a total of 23,544 contact hours per year. This information is included because in Texas the college is allowed $0.71 per contact hour by the Texas Education Agency for an automotive program.

When an institution offers a course of instruction in automotive mechanics, the number of students enrolled should be determined by the size and layout of the facility and the tools, equipment, and training aids available to properly implement the course of study. The curriculum may be presented by dividing the class

into two groups. Unit or block teaching reduces the material needed to properly present the subject. The learning process in enhanced because the student receives more exposure to the equipment. No live cars should be allowed in the shop unless the work to be accomplished on them is within the content of the subject being taught at that time. A student should know how to function in a subject area before he is permitted to work on a live car.

The design of the one-year curriculum in block hours is such that a combination of subject areas allows the following plan to be used for group instruction.

Fall			Spring			Summer		
Group No.		Courses	Group No.		Courses	Group No.		Courses
1	2	Auto. Eng. Em. Carb.	1	2	Eng. Diag. Brakes, Susp.	1	2	Auto. Air Cond.
2	1	Auto. Elec. Auto. Acc.	2	1	Power Trans.	2	1	Auto. Ser. Rep.
225 hours each group			225 hours each group			144 hours each group		

Summer Session 120 Hours OJT

On-the-job-training during the summer session would be worked on Friday of each week. The two-hour lecture period for the class would be on a time-by-appointment schedule.

Two course options are offered to those students majoring in automotive mechanics. The decision to continue on to Option II may be decided after the student has completed Option I. It is suggested that the student desiring to become a shop foreman be advised to work in the automotive service and reapir industry for a period of time before matriculating for the second year of Option II, the "Automotive Service and Management" program.

OPTION I

Automotive Service and Repair

A one-year program designed to train the student to a degree of proficiency whereby he may function as an automotive mechanic upon completion of the course. A "Certificate of Completion" is awarded upon completion.

OPTION II

Automotive Service and Management

A two-year course of study designed to prepare a student to function as a service station manager, as an assistant shop foreman, as a car salesman, or as an automotive parts store assistant manager. An "Associate Degree in Applied Science" is awarded upon completion.

The one-year "Automotive Service and Repair" and the two-year "Automotive Service and Management" curricula have one-day per week on-the-job-training. This has been included to provide the student with the time to work in the industry. He would acquire knowledge of the actual working conditions which would assist him in the transition from the school to the shop. Also, the instructor would be in a position to determine the ability of the student to function during actual working conditions prior to completing the course of study. This would provide for evaluating the student and the curriculum. The efficacy of the course content and skill development would be accomplished on a continuing basis.

The attached curricula were presented to 55 automotive program students at Central Texas College to determine their preference between these courses of study and the "Automotive Technology" curriculum then offered by the college. Option I and Option II were preferred 100 percent. A preference survey of Option I to Option II was also conducted. Option I was preferred by 34 students, or 62 percent, over Option II.

A survey was conducted to determine the preference of selected employers of automotive mechanics to one of two curricula: the "Automotive Service and Management" curriculum designed for this program and the "Automotive Technology" course of study formerly offered by Central Texas College. There were 75 employers requested by letter to participate in the survey. The number who agreed to be respondents totaled 46. Of those who agreed, 43, or 93 percent, preferred the "Automotive Service and Management" curriculum. Respondents were obtained from the Texas Automobile Dealers Association, the Texas Oil Jobbers Association, the Independent Garage Owners of Texas, and managers of department stores having automotive repair centers.

AUTOMOTIVE MECHANICS DEPARTMENT

Curriculum - Automotive Service and Repair 43
Degree Awarded - Certificate of Completion

FRESHMAN YEAR

First Semester		Second Semester	
Subject	Hours	Subject	Hours
Automotive Engines 151	150	Engine Trouble Diagnosis and Tune-Up 141	120
Automotive Electrical Systems 152	150	Steering, Brakes, Chassis, and Suspension 131	105
Emission, Carburetion, and Lubrication 121	75	Power Transmission 171	225
Automotive Accessories 122	75		
Total Automotive Hours	450	Total Automotive Hours	450
Machine Shop Practices 141	90	Welding	105

SUMMER SESSION (TWELVE WEEKS)

Subject	Hours	
Automotive Air Conditioning 161	144	
Automotive Service and Repair 162	144	
Service Station Operation 153	120(OJT)	(Optional By Student)
Automotive Service and Repair Center 154	120(OJT)	(Optional By Student)(Must Take One)
Automotive Parts Store Service 155	120(OJT)	(Optional By Student)
Total Automotive Hours	408	

Total automotive hours noted (1308) for single class enrolled in fall semester to complete in summer session.

AUTOMOTIVE MECHANICS DEPARTMENT

Curriculum - Automotive Service and Repair 44
Degree Awarded - Certificate of Completion

FRESHMAN YEAR

First Term

Subject	Hours
Automotive Engines 151	150
Automotive Electrical Systems 152	150
Emission, Carburetion, and Lubrication 121	75
Automotive Accessories 122	75
Total Automotive Hours	450
Machine Shop Practices 141	90

Second Term

Subject	Hours
Engine Trouble Diagnosis and Tune-Up 141	120
Steering, Brakes, Chassis, and Suspension 131	105
Power Transmission 171	225
Total Automotive Hours	450
Welding	105

Third Term

Subject	Hours		
Automotive Air Conditioning 161	165		
Automotive Service and Repair 162	165		
Service Station Operation 153	120(OJT)	(Optional By Student)	
Automotive Service and Repair Center 154	120(OJT)	(Optional By Student)	(Must Take One)
Automotive Parts Store Service 155	120(OJT)	(Optional By Student)	
Total Automotive Hours	450		

Total automotive hours noted (1350) for single class enrolled each semester and summer session to complete in three 450 contact hour terms.

AUTOMOTIVE MECHANICS DEPARTMENT

45

Curriculum - Automotive Service and Repair
Degree Awarded - Certificate of Completion

FRESHMAN YEAR

First Semester

Subject	Hours Credit Lect	Lab	
Automotive Engines 151	2	5	8
Automotive Electrical Systems 152	2	5	8
Emission, Carburetion, and Lubricants 121	1	2	4
Automotive Accessories 122	1	2	4
Machine Shop Practices 141	2	4	4
	8	18	28

Second Semester

Subject	Hours Credit Lect	Lab	
Engine Trouble Diagnosis and Tune-Up 141	2	4	6
Steering, Brakes, Chassis, and Suspension 131	1	3	6
Power Transmission 171	3	7	12
Welding 131	1	3	6
	7	17	30

SUMMER SESSION (TWELVE WEEKS)

Subject	Hours Credit Lect	Lab		DEGREE OF MARKETABILITY 1 2 3 4 5
Automotive Air Conditioning 161	3	6	9	
Automotive Service and Repair 162	3	6	9	
Service Station Operation 153	2	5	8(OJT)	(Optional By Student)
Automotive Service and Repair Center 154	2	5	8(OJT)	(Optional By Student)(Must Take One)
Automotive Parts Store Service 155	2	5	8(OJT)	(Optional By Student)
	8	17	26	

AUTOMOTIVE MECHANICS DEPARTMENT

Curriculum - Automotive Service and Management 46
Degree Awarded - Associate Degree in Applied Science

FRESHMAN YEAR

First Semester

Subject	Hours Credit Lect	Lab	
Automotive Engines 151	2	5	8
Automotive Electrical Systems 152	2	5	8
Emission, Carburetion, and Lubricants 121	1	2	4
Automotive Accessories 122	1	2	4
Machine Shop Practices 141	2	4	4
	8	18	28

Second Semester

Subject	Hours Credit Lect	Lab	
Engine Trouble Diagnosis and Tune-Up 141	2	4	6
Steering, Brakes, Chassis, and Suspension 131	1	3	6
Power Transmission 171	3	7	12
Welding 131	1	3	6
	7	17	30

SUMMER SESSION (TWELVE WEEKS)

Subject	Hours Credit Lect	Lab		DEGREE OF MARKETABILITY 1 2 3 4 5
Automotive Air Conditioning 161	3	6	9	
Automotive Service and Repair 162	3	6	9	
Service Station Operation 153	2	5	8(OJT)	(Optional By Student)
Automotive Service and Repair Center 154	2	5	8(OJT)	(Optional By Student) (Must Take One)
Automotive Parts Store Service 155	2	5	8(OJT)	(Optional By Student)
	8	17	26	

SOPHOMORE YEAR

First Semester

Subject	Hours Credit Lect	Lab	
Approved English 131b	3	3	
Bookkeeping 131	2	3	2
Business Mathematics 131b	3	3	
Economics 231	3	3	
Service Station Operation and Management 251(OBS)	2	5	8(OJT)
Automotive Service and Management 253(OBS)	2	5	8(OJT)
Automotive Parts Store Service and Management 255(OBS)	2	5	8(OJT)
Automotive Sales 257(OBS)	2	5	8(OJT)
	13	17	10

Second Semester

Subject	Hours Credit Lect	Lab	
Approved English 132b	3	3	
Bookkeeping 132	2	3	2
Supervision 131	3	3	
Marketing, Sales Promotion, and Advertising 231	3	3	
Service Station Operation and Management 252(OBS)	2	5	8(OJT)
Automotive Service and Management 254(OBS)	2	5	8(OJT)
Automotive Parts Store Service and Management 256(OBS)	2	5	8(OJT)
Automotive Sales 258(OBS)	2	5	8(OJT)
	13	17	10

CENTRAL TEXAS COLLEGE
AUTOMOTIVE TECHNOLOGY DEPARTMENT

Curriculum - Automotive Technology
Degree Awarded - Associate Degree in Applied Science

FRESHMAN YEAR

First Semester

Subject	Hours Credit	Lect	Lab
History 131		3	3
Approved English		3	3
Automotive Engines 141		2	4 4
Basic Technical Mathematics 131T		3	3
Basic Electricity 141		3	4 3
Psychology 111		1	1
Physical Education 111			1 2
		15	19 9

Second Semester

Subject	Hours Credit	Lect	Lab
History 132		3	3
Approved English		3	3
Fuels and Combustion 142		2	4 4
Automotive Electrical Systems 143		2	4 4
Mechanical Power Transmission 144		2	4 4
Physical Education 112			1 2
		12	19 14

SOPHOMORE YEAR

First Semester

Subject	Hours Credit	Lect	Lab
Government 231		3	3
Report Writing 133		3	3
Fundamentals of Air Conditioning 141		3	4 3
Motor Tune-Up and Analyzing 242		2	4 4
Introduction to Business 131		3	3
Physical Education 211			1 2
		14	18 9

Second Semester

Subject	Hours Credit	Lect	Lab
Government 232		3	3
Advanced Theory and Design 244		2	4 4
Automotive Service and Repair 243		2	4 4
Industrial Psychology 234		3	3
Approved Elective			3
Physical Education 212			1 2
		10	18 10

DEGREE OF MARKETABILITY

1 2 3 4 5

COURSE DESCRIPTIONS

Course		Lect Hours	Credit Hours	Lab Hours
121	Emission, Carburetion, and Lubricants	1	2	4

A course designed to provide an understanding of the various fuels, lubricants, and emission controls used in the operation of an automotive vehicle; the theory and fundamentals of operation and the construction of the various types of carburetors, using established procedures, measuring tools, hand tools, and special equipment; the testing and adjusting of overhauled carburetors using test stand engines and gasolines of various ratings with appropriate testing equipment. The necessary mathematics, physics, and chemistry will be taught within the course content.

122	Automotive Accessories	1	2	4

A course designed to provide an understanding of the operation and service application of power operated automotive accessories not included in other areas of this curriculum, such as seats, windows, tops, decks, headlights, door locks, antennas, windshield washers and wipers, sending units and gages, signaling and warning devices, and speed controls, using testing equipment as necessary in accordance with established procedures when trouble-shooting.

131	Steering, Brakes, Chassis, and Suspension	1	3	6

A course designed to provide an understanding of the nomenclature, theory of operation, and service procedures, on passenger cars and light trucks, of the suspension systems, brakes and brake systems, wheels and tires, steering gears and related components. The use of the brake drum and disc lathe, the front-end alining unit, and other equipment necessary to effect repairs, will be taught by demonstration and student participation. The necessary mathematics and physics will be taught within the course content.

141	Engine Trouble Diagnosis and Tune-Up	2	4	6

A course designed to provide an understanding of diagnosis and tune-up procedures and the use of testing equipment as they pertain to the function and control of the engine, with emphasis on the fuel, ignition, starting, and charging systems. The use of testing equipment will be taught by demonstration and student participation.

151	Automotive Engines	2	5	8

A course designed to provide an understanding of the gasoline fueled, internal combustion engine with emphasis on the operation, maintenance, and overhaul of the power plant and its component parts and systems. The proper use of measuring tools, hand tools, and other equipment necessary to effect either repairs to or the rebuilding of the engine with established procedures, using appropriate testing equipment, to acquire a proficiency in trouble-shooting the engine. The necessary mathematics and physics will be taught within the course content.

Course		Lect Hours	Credit Hours	Lab Hours
152	Automotive Electrical Systems	2	5	8

A course designed to provide an understanding of A.C. and D.C. power generation and rectification based on electrical fundamentals and practical application; acquire an understanding of the component parts of the ignition, starting, and charging circuits and their function within the circuit; acquire a knowledge of and an ability to read chassis and body wiring diagrams as they apply to diagnosis; acquire proficiency in trouble-shooting and using testing equipment in accordance with established procedures. The necessary mathematics and physics will be taught within the course content.

153	Service Station Operation (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the service station industry through lectures by and discussions with persons from that industry and by on-the-job-training in a service station.

154	Automotive Service and Repair Center (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the automotive service and repair industry through lectures by and discussions with persons from that industry and by on-the-job-training in an automotive service and repair center.

155	Automotive Parts Store Service (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the automotive parts industry through lectures by and discussions with persons from that industry and by on-the-job-training in an automotive parts store.

161	Automotive Air Conditioning	3	6	9

A course designed to provide classroom, laboratory, and practical experiences in the principles, design, construction, installation, removal, temperature control, air distribution, and trouble-shooting of automotive air coolers; teach safe service practices; understand and use testing equipment in accordance with established procedures. The necessary mathematics and physics will be taught within the course content.

162	Automotive Service and Repair	3	6	9

A course designed to provide the student with experiences in maintenance and service jobs on live automotive vehicles. These service operations would include all areas of repairs, lubrication, adjustment, trouble-shooting, new car delivery service, and the state safety inspection. The use of the time, rate, and parts manuals will be demonstrated to and used by the students.

Course		Lect Hours	Credit Hours	Lab Hours
171	Power Transmission	3	7	12

A course designed to provide an understanding of the function, construction, operation, maintenance, and servicing techniques of driveline units such as the clutch assembly, standard transmissions, automatic transmissions, propeller shaft and joints, final drives and differentials, by lecture, demonstration, and student participation. Disassembly and assembly of the components will be done in accordance with standard procedures, using measuring tools, hand tools, special tools, and testing equipment. The fundamentals of hydraulics and gearing will be introduced. The necessary mathematics and physics will be taught within the course content.

251 252	Service Station Operation and Management (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the service station operation and management industry. From lectures by and discussions with personnel from the industry and by on-the-job-training, the student will receive a firm background in management techniques and operations.

253 254	Automotive Service and Repair Center Operation and Management (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the automotive service and repair center operation and management. From lectures by and discussions with personnel from the industry and by on-the-job-training, the student shall receive a firm background in management techniques and operations.

255 256	Automotive Parts Store Service and Management (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about the automotive parts supply warehouse and supply store operation and management. From lectures by and discussions with personnel from the industry and by on-the-job-training, the student shall receive a firm background in management techniques and operations.

257 258	Automotive Sales (OBS)	2	5	8(OJT)

A course designed to provide the student with up-to-date information about automotive sales and automotive dealership operation and management. From lectures by and discussions with personnel from the automotive sales industry and by on-the-job-training, the student shall receive a firm background in management techniques and operations.

COURSE DESCRIPTIONS

Course		Lect Hours	Credit Hours	Lab Hours
131	Beginning Welding	1	3	6

Electric, oxy-acetylene welding and torch cutting. Making fusion welds in all positions with both the electric and oxy-acetylene welding. Using the hand cutting torch and cut-a-line machine.

141	Machine Shop Practice	2	4	4

Theory and practice in basic metal working, hand and machine tool operation and maintenance. Includes related instruction in blue print reading and precision measurement.

CENTRAL TEXAS COLLEGE
BUSINESS ADMINISTRATION DEPARTMENT

COURSE DESCRIPTIONS

Course		Lect Hours	Credit Hours	Lab Hours
131b	Business English	3	3	

Fundamentals of grammar, punctuation, and sentence structure as employed in written business communications. Work study; sentence analysis; punctuation; paragraphing; planning.

132b	Letter Writing	3	3	

A course designed to teach effective business writing and to give practice in composing all types of business letters, including the letter of application as a practical personal help.

131	Bookkeeping	2	3	2

Elementary principles of bookkeeping; journalization; posting; statements; special journals; subsidary ledgers.

132	Bookkeeping	2	3	2

Analysis and recording of business transactions; use of journal and ledger; trial balance and work sheet; adjusting and closing entries; accounting statements; payroll records and payroll taxes; introduction to partnership accounting; special journals and ledgers; business papers and business procedures relating to accounting; voucher system.

131b	Business Mathematics	3	3	

Application of arithmetic processes to particular business problems. Percentages; discounts; prices; profit and loss; commissions; interest.

231	Principles of Economics	3	3	

A course designed to introduce the student to the study of macro-economic analysis and policy. Topics include price level changes, the creation of money, the Federal Reserve System and monetary policy, the theory of income determination, interest rates, the accelerator, taxation and public expenditure, fiscal policy (including analysis of the public debt), theory of economic growth, and population problems. Students are introduced to the mechanics of futures markets. Examples used in instruction include the contracts in liquified petroleum gases.

131	Supervision	3	3	

A course designed to provide an understanding of the complex job of leading men, planning work, and mediating between the policy-setting management on the one hand and the rank-and-file workers on the other. Emphasis is placed upon the planning and formalizing courses of action for problems that face the supervisor. The decision making process will also be studied - especially the man-to-man contact and direction

Course		Lect Hours	Credit Hours	Lab Hours
131	Supervision (Cont'd)			

that eliminates production bottlenecks and makes profitable operations possible. The control functions of measuring, restraining, and changing - deciding when things are out of line and taking the necessary action to bring them back under control - are also emphasized.

232	Marketing, Sales Promotion, and Advertising	3	3	

A course designed to develop an understanding of what must be done in order to bring the wheels of production and consumption in the United States into mesh. The business activities that direct the flow of goods and services from the producer to the ultimate consumer are analyzed. Coordination of personal selling, advertising, product design, marketing research, and customer services are the individual ingredients of sales promotion and each is examined in detail. Advertising is studied as the force that creates prospects for countless products, converts these prospects into customers, and keeps customers returning and buying.

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
1	Bar, pry, 24" x 3/4" round		2	$ 5.95	$ 11.90
2	Bar, pry, rolling head, 16"		2	5.25	10.50
3	Bearing removing and installing set,				
4	camshaft, engine		2	99.50	199.00
5	Bench, work, steel, with sliding doors		18	150.00	2700.00
6	Blackboard, 6' x 12'		1	100.00	100.00
7	Blowgun, air, duster		18	3.35	60.30
8	Boards, tool, peg board, 4' x 8' x ¼"		14	6.50	51.00
9	Boring bar, cylinder, with vacuum attach		1	2055.00	2055.00
10	Brush, hand, steel wire		6	1.10	6.60
11	Brush, parts, cleaning		6	2.40	14.40
12	Boards, bulletin, 4' x 4'		7	12.00	84.00
13	Cabinet, filing, 4 drawer, with lock		3	132.00	396.00
14	Cabinet, goggle storage, metal		1	110.00	110.00
15	Cabinet, safety storage of flammables		1	300.00	300.00
16	Cabinet, storage, metal, lock		8	94.50	756.00
17	Can, gasoline, 1 gallon		2	3.00	6.00
18	Can, gasoline, 5 gallon		1	10.00	10.00
19	Can, oil, 5 gallon		3	10.00	30.00
20	Can, waste, flammables, covered, metal		12	13.10	157.20
21	Can, water, radiator filling, plastic		2	5.00	10.00
22	C clamps, 4"		2	3.70	7.40
23	C clamps, 6"		2	4.20	8.40
24	Carburetor cleaner, 5 gallon vat		2	20.00	40.00
25	Chains, utility, 3/8" D., x 24"		2	00.75	1.50
26	Chains, utility, 3/8" D., x 36"		2	00.75	2.25

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
27	Chains, utility, 3/8" D., x 72"		2	$ 00.75	$ 4.50
28	Chains, utility, 3/8" D., x 12', w/hooks		2	15.00	30.00
29	Chair, desk		3	85.00	255.00
30	Chair, office		3	75.00	225.00
31	Chair, stool, height adjustable		20	12.00	240.00
32	Charger, battery		2	160.00	320.00
33	Chuck, air		12	1.50	18.00
34	Cleaner, steam, portable		1	895.00	895.00
35	Clothing, welding, pair		1	12.00	12.00
36	Compressor, air		1	915.00	915.00
37	Connecting rod alining set		1	495.00	495.00
38	Cords, extension, 25' lengths, 3 cond.		3	8.75	26.25
39	Cords, extension, 50' lengths, 3 cond.		3	15.60	46.80
40	Crane, floor, mobile, 2000lb capacity		2	700.00	1400.00
41	Creeper		8	12.50	100.00
42	Cylinder head holding fixture, pair		18	14.20	255.60
43	Desk, office, two pedestal		2	194.00	588.00
44	Desk, shop, standing		4	248.00	248.00
45	Drain, lift, oil, waste		1	26.00	26.00
46	Engine holding device, (engine stand)				
47	infinite position, 2000 lb capacity		18	485.00	8730.00
48	Freeze plug installing set		1	15.00	15.00
49	Filter oil remover tool		2	3.95	7.90
50	Fire extinguisher, CO_2, type 35LB		4	75.00	300.00
51	Funnel, 4", flexible spout		2	2.88	5.76
52	Funnel, transmission filler, flex. spout		2	9.49	18.98

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
53	Gage, air pressure, inflator, portable		1	$ 8.50	$ 8.50
54	Gloves, welding, leather		2	3.70	7.40
55	Goggles, safety		20	2.00	40.00
56	Goggles, welding		2	2.60	5.20
57	Grinder, pedestal mounted, 10" wheel		2	359.00	718.00
58	Grinder, portable, 4" wheel		1	150.00	150.00
59	Grinder, valve seat, set		3	250.00	750.00
60	Grinding machine, valve face, automatic		1	975.00	975.00
61	Hone, cylinder, heavy duty, 2" to 5¼"		2	12.02	24.04
62	Helmet, welding		2	11.85	23.70
63	Hose, air, extension, 20' lengths		3	9.30	27.90
64	Hose, air, retractile, reel		18	25.00	450.00
65	Hose, water, 50' lengths		2	10.49	20.98
66	Hydrometer, anti-freeze		2	4.00	8.00
67	Jack, floor, hydraulic, 1½ ton capacity		2	167.00	334.00
68	Jack, floor, hydraulic, 2 ton capacity		2	259.00	518.00
69	Jack, floor, hydraulic, 4 ton capacity		2	297.00	594.00
70	Lathe, bench		1	950.00	950.00
71	Lift, two-post, automobile		1	1212.00	1212.00
72	Light, extension, 25' lengths, 3 cond.		3	3.19	9.57
73	Light, retractile, cable, reel, 3 cond.		18	32.25	580.50
74	Lockers, storage, clothing, single		20	309.00	6180.00
75	Oiler, pistol type, fixed spout, 6 oz.		3	2.74	8.22
76	Oiler, pistol type, flexible spout, 6 oz		3	2.82	8.46
77	Pan, drain		3	2.63	7.98
78	Pan, drain, radiator		3	7.00	21.00

CURRICULUM,- AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
79	Pencil, etching		1	$ 12.95	$ 12.95
80	Plate, surface, 18" x 24"		1	75.00	75.00
81	Press, drill, floor mounted, ½" cap.		1	625.00	625.00
82	Press, hydraulic, floor mounted, 30 ton		1	848.20	848.20
83	Protractor, bevel, precision		1	18.95	18.95
84	Puller, clutch pilot bearing		1	33.50	33.50
85	Pullers, gear, bearing, shaft, set		2	340.95	681.90
86	Removers, valve guide, set		1	25.50	25.50
87	Sander, disc, heavy duty		1	107.00	107.00
88	Shelving, book storage, steel,		2	89.00	178.00
89	Sling, load positioning		1	48.50	48.50
90	Spout, oil can, puncture		2	1.22	2.44
91	Stamping set, steel, alphabet, ¼"		1	8.90	8.90
92	Stamping set, steel, numbers, ¼"		1	3.00	3.00
93	Stands, car, adjustable, short, pair		16	11.45	183.20
94	Stands, car, adjustable, long, pair		4	15.00	60.00
95	Storage cabinet, small parts, steel		1	104.00	104.00
96	Tables, classroom, steel		8	50.00	400.00
97	Torch, propane, kit		2	11.00	22.00
98	Trucks, dolly, 4 wheel		1	25.00	25.00
99	Vat, cleaning, large		1	950.00	950.00
100	Vat, cleaning, small parts		2	415.00	830.00
101	Vee-block, set, with clamp		3	12.20	24.40
102	Vise, drill press, 5"		1	39.26	39.26
103	Vise, 3", swivel base, table mounted		18	68.77	1237.86
104	Vise, 5", swivel base, utility		2	86.26	172.52

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
105	Welder, electric arc, portable		1	$ 360.00	$ 360.00
106	Welder, oxy-acetylene, portable, w/o cyl		1	194.50	194.50
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
131	Alining set, clutch, universal		1	$ 7.00	$ 7.00
132	Awl, scratch		3	1.60	4.80
133	Calipers, hermaphrodite, 6"		2	4.00	8.00
134	Calipers, inside, 6"		2	4.00	8.00
135	Calipers, outside, 6"		2	4.00	8.00
136	Carburetor kit, universal repair		18	24.75	445.50
137	Chisel, cape, 6", 5/16" cut		2	1.50	3.00
138	Chisel, diamond point, 6", 5/16" cut		2	1.50	3.00
139	Chisel, flat, 5", 5/16" cut		2	1.50	3.00
140	Chisel, flat, 6-3/4", ½" cut		2	1.75	3.50
141	Chisel, flat, 9", 3/4" cut		2	2.50	5.00
142	Chisel, flat, long, 20", 3/4" cut		2	5.00	10.00
143	Chisel, round nose, 6¼", 5/16" cut		2	2.00	4.00
144	Cleaner, valve guide		2	1.95	3.90
145	Compressor, valve spring, "C" clamp		6	10.75	64.50
146	Dial indicator		2	30.75	61.50
147	Dividers, 6"		2	4.00	8.00
148	Drift, brass, ½" D., 10" long		2	00.75	1.50
149	Drift, brass, 3/4" D., 15" long		2	1.00	2.00
150	Drill, ¼", electric		2	38.50	77.00
151	Drill, 3/8", electric		2	65.00	130.00
152	Drill, 3/8", angle, electric		1	65.00	65.00
153	Drill, ½", electric		1	87.50	87.50
154	Drill bits, set, A to Z		2	42.70	85.40
155	Drill bits, set, 1 to 80		2	41.15	82.30
156	Drill bits, set, fractions, 1/16" to ½"				

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
157	by 1/64"		2	$ 54.25	$ 108.50
158	Drill bits, fractions, set, ½" to 1"				
159	by 1/32"		2	74.50	149.00
160	Driver, stud		1	3.25	3.25
161	Driver, valve guide, set		1	9.95	9.95
162	Extractors, broken stud, set		2	12.90	25.80
163	Extractors, broken tap, set		2	15.00	30.00
164	File cleaner		3	1.35	4.05
165	File, half-round, 6"		2	1.55	3.10
166	File, half-round, 10"		2	2.25	4.50
167	File, mill, 6"		2	1.00	2.00
168	File, mill, 10"		2	1.40	2.80
169	File, round, 6"		2	00.95	1.90
170	File, round, 10"		2	1.40	2.80
171	File, square, 6"		2	1.20	2.40
172	File, square, 10"		2	1.90	3.80
173	File, three-square, 6"		2	1.50	3.00
174	File, three-square, 10"		2	2.25	4.50
175	File, needle, set		2	8.30	16.60
176	File, ignition		12	00.30	3.60
177	File, handles, wood, Nos. 1, 2, 3		24	00.30	3.60
178	Gage, cylinder bore, set		1	115.00	115.00
179	Gage, depth, micrometer		1	10.50	10.50
180	Gage, small hole, set		1	19.10	19.10
181	Gage, telescoping, set		1	16.55	16.55
182	Gage, thickness, 26 leaves		4	9.30	37.20

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students 9	18	Unit Price	Total Price
183	Gage screw pitch		2	$ 4.40	$ 8.80
184	Gage, spark plug, wire, with bender		2	00.90	1.80
185	Hacksaw, frame, adjustable, 10" to 12"		4	4.75	19.00
186	Hammer, ball pein, 12 oz.		2	3.60	7.20
187	Hammer, ball pein, 16 oz		2	3.90	7.80
188	Hammer, ball pein, 2 lb.		2	4.70	9.40
189	Hammer, ball pein, 3 lb		2	5.70	11.40
190	Hammer, brass, 1 lb.		2	3.75	7.50
191	Hammer, lead, 2 lb.		2	1.90	3.80
192	Hammer, plastic tip, ½ lb.		2	3.65	7.30
193	Hammer, plastic tip, 1 lb.		2	4.20	8.40
194	Lifter, hydraulic valve, puller		10	8.50	85.00
195	Micrometer, depth gage, set		2	33.75	67.50
196	Micrometer, inside, set, 1½" to 8"		2	38.75	77.50
197	Micrometer, outside, set, 1" to 6"		2	174.35	348.70
198	Mirror, inspection, 1" x 2-9/16" x 17½"		6	2.75	16.50
199	Nut buster		2	6.25	12.50
200	Nut driver, set of 10		2	8.20	16.40
201	Piston fitting feeler and scale		4	24.05	96.20
202	Piston groove cleaner		10	4.30	43.00
203	Piston pin fitting machine		1	315.00	315.00
204	Piston ring compressor, hand clamp, set		2	13.50	27.00
205	Piston ring compressor, ratchet type,				
206	2-1/8" to 5" capacity		10	3.60	36.00
207	Piston ring expander		10	3.35	33.50
208	Pliers, battery, angle nose		2	2.74	5.48

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
209	Pliers, battery terminal clamp spreader				
210	and cleaner		2	$ 3,35	$ 6.70
211	Pliers, channel lock, 8"		2	5.40	10.80
212	Pliers, combination, slip joint, 6"		2	3.00	6.00
213	Pliers, combination, slip joint, 8"		2	3.50	7.00
214	Pliers, corbin hose clamp		2	2.95	5.90
215	Pliers, diagonal, 5"		2	3.80	7.60
216	Pliers, duck bill, 8"		2	4.00	8.00
217	Pliers, ignition, high tension		2	4.50	9.00
218	Pliers, keystone-type hose clamp		2	4.95	9.90
219	Pliers, Pliers, lock-ring, set, internal				
220	external		2	8.95	17.90
221	Pliers, long nose, 6½", side cutters		2	4.98	9.90
222	Pliers, needle nose, 6"		2	4.25	8.50
223	Pliers, needle nose, 8"		2	5.50	11.00
224	Pliers, needle nose, bent, 6"		2	4.50	9.00
225	Pliers, needle nose, bent, 8"		2	5.75	11.50
226	Pliers, vise grip, 6"		2	3.80	7.60
227	Pliers, vise grip, 8"		2	4.80	9.60
228	Punch, center, 5"		2	00.70	1.40
229	Punch, gasket, set		1	14.70	14.70
230	Punch, prick, 5"		2	00.90	1.80
231	Punch, pin, 4", 1/16" end		2	00.80	1.60
232	Punch, pin, 4", 3/32" end		2	00.80	1.60
233	Punch, pin, 4", 1/8" end		2	00.80	1.60
234	Punch, pin, 7", 3/16" end		2	00.80	1.60

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
235	Punch, pin, 7", ¼" end		2	$ 1.40	$ 2.80
236	Punch, pin, 7", 5/16" end		2	1.70	3.40
237	Punch, tapered, 5", 1/8" end		2	1.40	2.80
238	Punch, tapered, 6", 5/32" end		2	1.60	3.20
239	Punch, tapered, 7", 3/16" end		2	1.80	3.60
240	Punch, tapered, 8", 7/32" end		2	1.80	3.60
241	Punch, tapered, 9", 9/32" end		2	2.00	4.00
242	Punch, tapered, 10", 5/16" end		2	2.00	4.00
243	Punch, tapered, 15", ¼" end		2	2.00	4.00
244	Punch, tapered, 15", 3/8" end		2	2.10	4.20
245	Ratchet, flex-handle, 3/8" drive		2	9.36	18.72
246	Reamers, adjustable, set, A to K		1	200.00	200.00
247	Reamers, ridge, cylinder		6	18.95	113.70
248	Reamers, straight, set, ¼" to 1" by 32's		1	150.00	150.00
249	Reamers, taper, set, 0 to 10, spiral				
250	flute		1	125.00	125.00
251	Remover, stud		1	7.10	7.10
252	Scale, flexible, steel, 6" long, ¼" wide		4	00.85	3.40
253	Scraper, carbon		2	2.40	4.80
254	Scraper, machinist, three side, hollow				
255	ground		2	1.70	3.40
256	Screwdriver, clutch head, 3/32" x 3¼"		2	1.50	3.00
257	Screwdriver, clutch head, 1/8" x 3¼"		2	1.50	3.00
258	Screwdriver, clutch head, 5/32" x 4"		2	1.75	3.50
259	Screwdriver, clutch head, 3/16" x 4"		2	1.75	3.50
260	Screwdriver, clutch head, ¼" x 4"		2	1.75	3.50

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students 9	18	Unit Price	Total Price
261	Screwdriver, clutch head, 3/8" x 6"		2	$ 2.66	$ 5.32
262	Screwdriver, offset, standard, 4"		2	00.85	1.70
263	Screwdriver, offset, Phillips, 1 and 2		2	00.85	1.70
264	Screwdriver, Phillips, 1 x 1"		2	00.90	1.80
265	Screwdriver, Phillips, 1 x 3"		2	1.39	2.78
266	Screwdriver, Phillips, 2 x 1½"		2	1.44	2.88
267	Screwdriver, Phillips, 2 x 4"		2	1.71	3.42
268	Screwdriver, Phillips, 3 x 6"		2	2.40	4.80
269	Screwdriver, Phillips, 4 x 8"		2	2.85	5.70
270	Screwdriver, standard tip, 1/8" x 4"		2	00.75	1.50
271	Screwdriver, standard tip, 1/8" x 6"		2	00.85	1.70
272	Screwdriver, standard tip, 3/16" x 3"		2	1.10	2.20
273	Screwdriver, standard tip, 3/16" x 4"		2	1.20	2.40
274	Screwdriver, standard tip, 3/16" x 6"		2	1.35	2.70
275	Screwdriver, standard tip, 3/16" x 8"		2	1.50	3.00
276	Screwdriver, standard tip, ¼" x 4"		2	1.55	3.10
277	Screwdriver, standard tip, ¼" x 6"		2	1.70	3.40
278	Screwdriver, standard tip, ¼" x 8"		2	1.80	3.60
279	Screwdriver, standard tip, ¼" x 10¼"		2	1.90	3.80
280	Screwdriver, standard tip, 5/16" x 4"		2	1.75	3.50
281	Screwdriver, standard tip, 5/16" x 6"		2	1.90	3.80
282	Screwdriver, standard tip, 5/16" x 8"		2	2.05	4.10
283	Screwdriver, standard tip, 3/8" x 8"		2	2.75	5.50
284	Screwdriver, standard tip, 3/8" x 12"		2	3.50	7.00
285	Screwdriver, standard tip, 7/16" x 10"		2	4.25	8.50
286	Screwdriver, standard tip, 7/16" x 18"		2	5.33	10.66

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
287	Seal extractor and installer, upper			$	$
	rear main bearing, set		2	8.45	16.90
288	Snips, metal, combination, 3" cut		1	7.90	7.90
289	Snips, metal, left hand, 10", aviation		1	4.25	4.25
290	Snips, metal, right hand, 10", aviation		1	4.25	4.25
291	Socket set, ¼" drive, 21 pieces		2	19.50	39.00
292	Socket set, 3/8" drive, 47 pieces		2	108.37	216.74
293	Socket set, ½" drive, 74 pieces		2	239.41	478.82
294	Socket set, impact, 3/8" drive, standard		2	7.98	15.96
295	Socket set, impact, 3/8" drive, deep		2	16.50	33.00
296	Socket set, impact, ½" drive, standard		2	7.98	15.96
297	Socket set, impact, ½" drive, deep		2	16.50	33.00
298	Socket set, metric, ¼" drive		1	14.79	14.79
299	Socket set, metric, 3/8" drive		1	24.98	24.98
300	Socket set, metric, ½" drive		1	43.99	43.99
301	Socket, spark plug, rubber insert, 3/8"				
302	drive, 5/8"		3	2.10	6.30
303	Socket, spark plug, rubber insert, 3/8"				
304	drive, 13/16"		3	2.30	6.90
305	Soldering gun, electric, 110 volts		2	13.95	27.90
306	Spark plug cleaner and tester		1	78.50	78.50
307	Stethescope		6	7.65	15.30
308	Straight edge, inspection grade, 36"		1	19.90	19.90
309	Switch, starter, remote control		2	5.25	10.50
310	Tap and die set, N.C. and N.F., 40 piece		1	48.76	48.76
312	Tape, measuring, 10', power return		1	2.95	2.95

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
313	Tape, measuring, 50', wind-up return		1	$ 6.25	$ 6.25
314	Tap set, spark plug		1	2.62	2.62
315	Thread chaser, N.C., die-nut, set		1	4.76	4.76
316	Thread chaser, N.F., die-nut, set		1	4.76	4.76
317	Tool flexible, mechanical finger		2	3.00	6.00
318	Tool, magnetic pick-up, 3/16" D., 17"				
319	flexible		2	3.00	6.00
320	Tool, magnetic pick-up, 13" to 17"		2	3.25	6.50
321	Tool, power, small, 34 accessories		1	54.88	54.88
322	Tool spark plug gap		4	4.48	17.92
323	Tool, overhead valve adjusting		2	2.50	5.00
324	Tool, valve key		3	2.65	7.95
325	Trammel, adjustable, 10" beam		1	29.05	29.05
326	Tube flaring tool set, with benders, 9				
327	pieces		1	9.97	9.97
328	Turner, flywheel		2	4.75	9.50
329	Wrench, allen, metric, set, 2 to 10		1	1.46	1.46
330	Wrench, allen, standard, set, 1/16" to				
331	3/8"		1	4.10	4.10
332	Wrench, combination, set, 1/8" to 3/8"		1	22.67	22.67
333	Wrench, combination, set, 3/8" to 1¼"		1	39.95	39.95
334	Wrench, combination, set, metric, 6mm				
335	to 19mm		1	19.38	19.38
336	Wrench, distributor, removing, 2 per set		2	13.00	26.00
337	Wrench, double-end open-end, set,				
338	¼" x 5/16" to 1-1/16" x 1-1/8"		2	13.45	26.90

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
339	Wrench, flare nut, set, 3 piece		2	$ 5.89	$ 11.98
340	Wrench, impact, air, 3/8" drive, power				
341	regulating, reversing		2	169.50	339.00
342	Wrench, impact, air, ½" drive, power				
343	regulating, reversing		2	155.00	310.00
344	Wrench, multispline, set, 10 pieces		1	3.60	3.60
345	Wrench, pipe, external, 10"		2	6.25	12.50
346	Wrench, pipe, external, 14"		2	8.35	16.70
347	Wrench, pipe, external, 18"		1	12.00	12.00
348	Wrench, chain, ratcheting		1	7.25	7.25
349	Wrench, torque, kg-cm, 3/8" drive		2		
350	50-1000 kg-cm		2	45.70	91.40
351	Wrench, torque, kg-m, ½" drive, 35 kg-m		2	48.50	97.00
352	Wrench, torque, lbs-in, ¼" drive,				
353	5-200 lbs-in		4	47.00	188.00
354	Wrench, torque, lbs-ft, ½" drive,				
355	10-250 lbs-ft		4	48.50	194.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
365	Air-fuel flow measurement, GO-POWER		2	$ 295.00	$ 590.00
366	Batteries, 12 volt		6	12.00	72.00
367	Belt tension gage		2	23.15	46.30
368	Charts, training, engine, set		1		
369	Combustion analyzer		2	82.95	165.90
370	Crack detection equipment, set		1	170.00	170.00
371	Cylinder compression gage		6	14.75	88.50
372	Cylinder leakage tester		2	27.95	55.90
373	Distributor tester		1	695.00	695.00
374	Dwell-tach meter, portable		3	78.50	235.50
375	Dynamometer, engine, 500hp, portable,				
376	GO-POWER		1	1995.00	1995.00
377	Exhaust gas analyzer		1	169.50	169.50
378	Engine, cutaway, portable		1		
379	Engine, 6 cylinder, single barrel carbu-				
380	retor, operating condition, complete				
381	with radiator, starter, generator,				
382	flywheel, and clutch assembly, on a				
383	portable stand		1	450.00	450.00
384	Engine, V-eight, 2 barrel carburetor,				
385	operating condition, see item 379				
386	for equipment		1	550.00	550.00
387	Engine, V-eight, 4 barrel carburetor,				
388	operating condition, see item 379				
389	for equipment		1	550.00	550.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students 9	18	Unit Price	Total Price
391	Engine, 6 cylinder, operable, for			$	$
392	assembly and disassembly, portable				
393	stand		10	250.00	2500.00
394	Engine, V-eight, operable, for assembly				
395	and disassembly, portable stand		10	350.00	3500.00
396	Engine, 1 cylinder, 2 stroke cycle		10	30.00	300.00
397	Engine, 1 cylinder, 4 stroke cycle		10	30.00	300.00
398	Engine, experimental, Megatech Mark III				
399	Brodhead-Garrett		1	395.00	395.00
400	Film, 8mm, loop, engine series		1		
401	Film, 16mm, engine series		1		
402	Fuel pump tester		2	15.95	31.90
403	Manuals, engine, 1 each for a set		1	200.00	200.00
404	Manual, Motors, latest edition, set		1	100.00	100.00
405	Manuals, Mitchell, latest edition, set		1	158.00	158.00
406	Manuals, service, automotive vehicles,				
407	1 each automotive vehicle for a set		1	200.00	200.00
408	Oil pressure gage, 0 - 80 lbs		4	2.67	10.68
409	Oil pressure gage, 0 - 200 lbs		4	2.67	10.68
410	Oil pressure gage, 0 - 300 lbs		4	2.67	10.68
411	Projector, 16mm		1	700.00	700.00
412	Projector, 8mm, loop film		8	176.50	1412.00
413	Projector, opaque		1	353.00	353.00
414	Projector, overhead		1	174.00	174.00
415	Projector, slide film		1	138.00	138.00
416	Pump, lubricating oil, cutaway		1		

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
417	Pump, water, cutaway		1	$	$
418	Radiator, for test stand		6	65.00	390.00
419	Radiator block leak tester		1	24.95	24.95
420	Radiator flow tester with test tank		1	300.00	300.00
421	Radiator cooling system tester, pressure		1	19.10	19.10
422	Repair kit, small engine		10	25.00	250.00
423	Screen, projection, tripod		1	86.95	86.95
424	Scope analyzer		2	1895.00	3790.00
425	Slide series, engine, set		1	70.35	70.35
426	Strobmeter, with power pack		1	169.90	169.90
427	Tachometer, hand		2	15.35	30.70
428	Temperature meter, engine, 12 sensors				
429	GO-POWER		2	299.50	599.00
430	Test stand, portable		6	299.50	1797.00
431	Thermostat tester		1	12.00	12.00
432	Thermometer, hand, mercury, 0-250 F		2	4.95	9.90
433	Timing light		4	38.95	155.80
434	Transparencies, engine series, set		1	122.35	122.35
435	Vacuum gage		2	79.50	159.00
436	Valve lifter tester, hydraulic		2	79.50	159.00
437	Valve spring compression tester		2	54.60	109.20
438	Vehicle, automotive, full power, used		1	2500.00	2500.00
439	Volt-ohmmeter		2	85.95	171.90
440	Volkswagen engine, carburetor type		2	300.00	600.00
441	Volkswagen engine, fuel injection		2	500.00	1000.00
442	Wankel engine, cutaway, portable		1	185.00	185.00

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ENGINES

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
443	Wankel engine, analysis system,			$	$
444	GO-POWER		1	799.50	799.50
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ELECTRICITY

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
469	Alternator universal service kit		6	$ 149.50	$ 897.00
470	Armature turner, set		2	48.75	97.50
471	Armature undercuter		2	45.00	90.00
472	Battery cart		1	19.95	19.95
473	Bench, work, steel, with sliding doors		18	150.00	2700.00
474	Booster cables, set		2	14.85	29.70
475	Charger, battery		2	200.00	400.00
476	Regulator service kit		6	6.20	37.20
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ELECTRICITY

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
495	Battery clamp puller, universal		3	$ 4.75	$ 14.25
496	Battery pliers		3	3.05	9.15
497	Battery post cleaner		3	2.57	7.71
498	Battery terminal clamp spreader		3	3.72	11.16
499	Crimcut tool (plier)		2	3.50	7.00
500	Distributor point adjusting tool		2	3.25	6.50
501	Distributor cap terminal cleaner		4	1.03	4.12
502	Flexstones		6	00.20	1.20
503	Horn adjusting wrench		2	00.60	1.20
504	Hydrometer, battery		2	2.49	4.98
505	Ignition file		12	00.40	4.80
506	Ignition point aligning tool		2	5.45	10.90
507	Ignition wrench set, 8 pieces		2	13.75	27.50
508	Spark plug socket, universal, 3/8" drive				
509	13/16"		6	3.50	21.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ELECTRICITY

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students 9	18	Unit Price	Total Price
521	Alternator rectifier tester, portable		3	$ 26.95	$ 80.95
522	Ammeter, voltmeter, ohmmeter, portable		3	58.00	174.00
523	Ammeter, D.C.		18	7.15	128.70
524	Ampere-voltage regulator tester,				
525	portable		3	59.95	179.85
526	Adapters, set of 4 (for GART)		2	35.20	70.40
527	Battery, cutaway		1		
528	Battery, serviceable, use with				
529	electrical training modules, 12 volt		10	12.00	120.00
530	Alternator diagnosis tester		3	22.40	67.20
531	Battery, 6 volt (for GART)		4	10.00	40.00
532	Battery, 8 volt (for GART)		2	23.95	47.90
533	Battery, 12 volt (for GART)		2	12.00	12.00
534	Battery post switch		3	8.95	26.85
535	Cadmium tip tester, battery cell		3	15.50	46.50
536	Chassis schematics, electrical		assrtd		
537	Circuit tester, portable		3	2.60	7.80
538	Coils (transformers)		18	5.99	107.82
539	Cranking motor		18	14.95	269.10
540	Cruise control		4	100.00	400.00
541	Detector, electrical leakage		3	94.50	283.50
542	Distributors		18	15.00	270.00
543	Distributor tester		1	695.00	695.00
544	Distributor pulse amplifier		3	25.00	75.00
545	Generator, A.C.		10	29.49	294.90
546	Generator, D.C.		10	14.85	148.50

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE ELECTRICITY

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
547	Generator, alternator, regulator, test			$	$
548	bench (GART)		2	750.00	1500.00
549	Growler		3	59.95	179.85
550	Ignition, starting, charging systems				
551	and circuit panel training modules		10	1300.00	13000.00
552	Ignition system tester, portable		2	89.95	179.90
553	Loop film, 8mm, electrical component				
554	function and overhaul, set		10		
555	Projector, loop film, 8mm		10	176.50	1765.00
556	Regulator, A.C.		18	5.98	107.64
557	Regulator, D.C.		18	5.79	104.22
558	Relay, horn		18	2.50	45.00
559	Rheostat, variable		3	14.20	42.60
560	Seat, front, powered		2		
561	Solenoid		18	5.59	100.62
562	Spark plugs		18	00.55	9.90
563	Switch, pressure, oil		18	2.50	45.00
564	Switch, thermo, water		18	2.50	45.00
565	Switch, stop light		18	3.75	67.50
566	Switch, ignition		18	5.50	99.00
567	Test leads, 24"		36	1.35	48.60
568	Test leads, 36"		36	1.75	63.00
569	Thermometer, voltage regulator		2	3.75	7.50
570	Voltmeter, A.C.		18	5.50	99.00
571	Voltmeter, D.C.		18	4.75	85.50
572	Windshield wiper motor assembly, elec.		10	45.00	450.00

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - CARBURETION AND EMISSION

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
573	Carburetor adjusting screwdriver		18	3.10	55.80
574	Universal carburetor repair kit		18	24.75	445.50
575	Universal carburetor stand		18	11.95	215.10
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - CARBURETION AND EMISSION

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
599	Air pump, emission control		10	$ 45.05	$ 450.50
600	Carburetor, Autolite, one barrel		2	24.05	48.10
601	Carburetor, Autolite, two barrel		2	39.65	79.30
602	Carburetor, Autolite, four barrel		2	66.45	132.90
603	Carburetor, Carter, one barrel		2	31.00	62.00
604	Carburetor, Carter, two barrel		2	34.95	69.90
605	Carburetor, Carter, four barrel		2	90.95	181.90
606	Carburetor, Holley, one barrel		2	42.85	85.70
607	Carburetor, Holley, two barrel		2	87.50	175.00
608	Carburetor, Holley, four barrel		2	107.30	214.60
609	Carburetor, Rochester, one barrel		2	27.85	55.70
610	Carburetor, Rochester, two barrel		2	32.55	65.10
611	Carburetor, Rochester, four barrel		2	86.30	172.60
612	Diverter valve		18	12.20	219.60
613	Film, loop, 8mm, carburetor overhaul		8		
614	Manuals, carburetor overhaul		4	9.00	36.00
615	Manual, emission control		4	12.00	48.00
616	PCV valve		18	1.90	34.20
617	Tester, PCV valve		2	3.60	7.20
618	Thermostatic air cleaner control assem.		10		
619	Thermostatic vacuum switch		10		
620	Transparencies, set		1		
621	Slide series, set		1		
622	Wall charts, set		1		
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - ENGINE TROUBLE DIAGNOSIS AND TUNE-UP

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
625	Compression tester		8	$ 21.95	$ 175.60
626	Cylinder leakage tester		4	27.95	111.80
627	Distributor tester		4	685.00	2740.00
628	Dwell-tachometer, portable		8	75.95	607.60
629	Exhaust gas analyzer		4	159.50	638.00
630	Fuel pump tester and vacuum gage		4	15.95	63.80
631	Ignition simulator		4	250.00	1000.00
632	Scope analyzer, with stand		4	1895.00	7580.00
633	Scope analyzer, portable		2	1295.00	2590.00
634	Spark plug cleaner		1	78.50	78.50
635	Spark plug adapters		18	00.30	5.40
636	Starter-battery tester, portable		4	72.50	290.00
637	Timing light		6	38.95	233.70
638	Volt-ampere regulator tester, portable		4	59.95	239.80
639	Wall charts, automotive testing, set		4		
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - STEERING, BRAKES, CHASSIS, AND SUSPENSION

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
651	Ball joint inspection gage		2	$ 18.90	$ 37.80
652	Bench, work, steel, with sliding doors		18	150.00	2700.00
653	Brake analyzer, dynamic		1	4376.00	4376.00
654	Brake bleeder tank, air operated, com-				
655	plete with adapters for drum and				
656	disc brakes		1	150.00	150.00
657	Brake disc and drum lathe with brake				
658	shoe grinder and adapters		2	2500.00	2500.00
659	Brake disc and drum grinder		2	250.00	500.00
660	Brake drum micrometer		2	46.70	93.40
661	Brake drum micrometer checking gage		1	16.90	16.90
662	Brake pedal depressor		1	10.00	10.00
663	Brake shoe-drum adjusting gage		2	9.80	19.60
664	Front-end alinement unit complete with				
665	accessories and special tools		1	5000.00	5000.00
666	Scuff gage, floor type		1	458.00	458.00
667	Wheel balancer, mechanical, dynamic,				
668	on car		2	250.00	500.00
669	Wheel balancer, bubble type, static,				
670	off car		1	156.00	156.00
671	Wheel bearing grease packer		2	21.70	43.40
672	Wheel spinner, 3 hp		2	250.00	500.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - STEERING, BRAKES, CHASSIS, AND SUSPENSION

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
677	Brake cylinder hone		2	$ 7.45	$ 14.90
678	Brake drum puller set, Chevrolet		2	3.70	7.40
679	Brake hand tool kit consisting of:		10	59.05	590.50
680	Tote tray		1	5.30	
681	Cotter pin puller		1	2.20	
682	Grease cup and hub cap tool		1	4.95	
683	Lock ring pliers		1	6.75	
684	Brake spring pliers, special		1	7.25	
685	Brake spring pliers, universal		1	9.50	
686	Brake adjusting tool, general		1	2.25	
687	Brake adjusting tool, special		1	2.25	
688	Brake piston clamps, pair		1	1.45	
689	Brake shoe retaining spring tool		1	1.65	
690	Brake shoe spring tool for Lockheed		1	2.45	
691	Brake shoe spring tool for Bendix		1	2.45	
692	Brake shoe retaining spring tool,				
693	Ford		1	2.45	
694	Brake bleeder wrench, ¼" - 3/8"		1	2.95	
695	Brake bleeder wrench, 5/16" - 3/8"		1	2.25	
696	Brake bleeder wrench, 3/8" - 7/16"		1	2.95	
697	Brake lining gage, % lining remaining		4	2.95	11.80
698	Brake lining gage, reading in fractions		4	2.95	11.80
699	Coil spring compressor		4	50.00	200.00
700	Disc brake cylinder compressor		4	6.25	25.00
701	Door handle spring clip pliers, G.M.		4	1.95	7.80
702	Door handle spring clip pliers, Chrysler		4	2.35	9.40

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - STEERING, BRAKES, CHASSIS, AND SUSPENSION

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
703	Molding nut tool, reversible shaft		4	$ 3.00	$ 12.00
704	Pitman arm spreaders, 21/32" jaw		2	5.25	10.50
705	Riveted lining and tire tread depth				
706	gage		2	5.10	10.20
707	Tie rod sleeve spreader		4	8.95	35.80
708	Universal molding clip installing tool,				
709	reversible jaw		4	3.35	13.40
710	Universal shock absorber tool		4	1.95	7.80
711	Wheel cover puller and replacer tool		4	4.65	18.60
712	Wheel weight pliers		4	6.50	26.00
713	Window molding clip tool, GM, Ford, AMC		4	1.38	5.52
714	Window molding clip tool, Chrysler		4	2.95	11.80
715	Windshield wiper arm remover		4	3.45	13.80
716	Ball joint spreaders, 15/16" jaw		2	5.10	10.20
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - STEERING, BRAKES, CHASSIS, AND SUSPENSION

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
729	ATE (Volkswagen) disc brake assembly		2	$	$
730	Bellows-type pedal assist power brake				
731	unit assembly		2		
732	Bendix disc brake assembly		4		
733	Bendix-type, self adjusting duo-servo				
734	brake assembly		4		
735	Budd disc brake assembly		2		
736	Cam and lever-type gear box assembly		2		
737	Coaxial power steering gear unit assem.		2		
738	Constant control (Chrysler) power steer-				
739	ing unit assembly		2		
740	Delco-Morraine, self-adjusting duo-				
741	servo brake assembly		4		
742	Dual master cylinder assembly		4	23.15	92.60
743	Film, 8mm, loop, brakes, set		1		
744	Film, 8mm, loop, front end alining, set		1		
745	Front end, vehicle, power steering				
746	assembly		1		
747	Kelsey-Hayes disc brake assembly		4		
748	Linkage-type power steering assembly		1		
749	Manuals, brakes, set		1	75.00	75.00
750	Manuals, automotive steering systems		4	8.50	36.00
751	Piston-type pedal assist power brake				
752	assembly		2		
753	Power steering pump assembly		4		
754					

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - STEERING, BRAKES, CHASSIS, AND SUSPENSION

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
755	Recirculating ball-type steering gear			$	$
756	box assembly		2		
757	Saginaw rotary valve power steering				
758	assembly		2		
759	Self-contained diaphragm-operated power				
760	brake assembly		4		
761	Shock absorber, double-acting, assembly		2		
762	Shock absorber, single-acting, assembly		2		
763	Single master cylinder assembly		8		
764	Slides, brakes, 35mm, disc, set		1		
765	Slides, brakes, 35mm, drum, set		1		
766	Torsion bar power steering assembly		1		
767	Transparencies, steering, set		1		
768	Transparencies, brakes, set		1		
769	Transparencies, suspension, set		1		
770	Wall charts, set		4		
771	Worm and roller gear steering assembly		1		
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - POWER TRANSMISSION

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
781	Differential holding fixtures, GM, set		6	$ 55.70	$ 334.20
782	Hose, air, retractile, reel		10	25.00	250.00
783	Jack, hydraulic, transmission, low		2	196.45	392.90
784	Jack, hydraulic, transmission, high		2	377.00	744.00
785	Light, retractile, cable, reel, 3 cond.		10	32.25	322.50
786	Bench, work, steel, sliding door		20	150.00	3000.00
787	Transmission holding fixtures, GM, set		6	117.00	702.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - POWER TRANSMISSION

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
807	Differential overhaul tools, special,			$	$
808	set, GM		6	150.00	900.00
809	Differential overhaul tools, special,				
810	set, Ford		6	150.00	900.00
811	Differential overhaul tools, special,				
812	set, Chrysler		6	150.00	900.00
813	Transmission overhaul tools, special,				
814	set, GM		6	150.00	900.00
815	Transmission overhaul tools, special,				
816	set, Ford		6	150.00	900.00
817	Transmission overhaul tools, special,				
818	set, Chrysler		6	150.00	900.00
819	Transmission pressure gage, set		2	17.95	35.90
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - POWER TRANSMISSION

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
833	Clutch assembly, diaphragm spring-type		8	$ 51.00	$ 408.00
834	Clutch assembly, release lever type		8	51.00	408.00
835	Clutch disc		4	14.00	56.00
836	Differential, non-slip, assembly		8	160.70	1285.60
837	Differential, standard, assembly		8	113.65	909.20
838	Drive shaft, with universal joints		8		
839	Film, 16mm, transmissions		1		
840	Film, 16mm, drive train		1		
841	Film, 8mm, loop, transmissions, set		1		
842	Film, 8mm, loop, differentials, set		1		
843	Film, 35mm, slide, series, drive train				
844	components		1		
845	Manuals, drive train components, series		4	8.00	32.00
846	Throw-out bearing		4	2.50	10.00
847	Transmission, three-speed, assembly		2	228.95	457.90
848	Transmission, four-speed, assembly		2	424.00	848.00
849	Transmission, hydramatic, 350, assembly		2	493.00	986.00
850	Transmission, hydramatic, 400, assembly		2	493.00	986.00
851	Transmission, powerglide, aluminum case,				
852	assembly		2	355.00	710.00
853	Transmission, mercomatic, cast iron case				
854	assembly		2	401.75	803.50
855	Transmission, cruise-o-matic, late cast				
856	iron, assembly		2	401.75	803.50
857	Transmission, C-4, assembly		2	354.20	708.40
858	Transmission, C-6, assembly		2	422.70	845.40

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - POWER TRANSMISSION

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
859	Transmission, powerflite, assembly		2	$ 475.00	$ 950.00
860	Transmission, torqueflite, aluminum				
861	case, assembly		2	475.00	950.00
862	Transparencies, drive train components,				
863	set		1	108.30	108.30
864	Universal joint, spider and two-yoke		8	14.10	112.80
865	Universal joint, constant velocity		8		
866	Universal joint, ball and trunnion		8		
867	Vehicle performance simulator with				
868	inertia flywheel in tailstock with				
869	adapters, for testing transmissions		1	12000.00	12000.00
870	Wall charts, drive train components, set		1		
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE AIR CONDITIONING

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
885	Air conditioner service center			$	$
886	portable, heated		1	265.00	265.00
887	Bench, work, steel, sliding doors		20	150.00	3000.00
888	Light, retractile, cable, reel, 3 cond.		10	32.25	322.50
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE AIR CONDITIONING

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
911	Flaring and swaging tool kit		10	$ 17.35	$ 173.50
912	Flaring tool set, double flare		4	22.50	90.00
913	Gage adapter, straight		6	1.40	8.40
914	Gage adapter, 90°		6	2.25	13.50
915	Goggles, safety		20	2.50	50.00
916	Humidity tester (sling psychrometer),				
917	wet and dry bulb		2	12.25	24.50
918	Leak detector, electronic		2	109.50	219.00
919	Leak detector, halide torch		3	11.15	33.45
920	Manifold, three gage, complete with				
921	gages and hoses		6	34.65	207.90
922	Psychrometer, motorized, 12 volt		2	70.00	140.00
923	Temperature tester, three lead, two-				
924	range temperature, -50° to +150°F		2	64.00	128.00
925	Temperature control testers and				
926	adapters, automatic air conditioning		2	29.25	58.50
927	Thermometers, metal tube, round head,				
928	indicator, 25° to 125°F		10	11.50	115.00
929	Tools, special, to service six-cylinder				
930	compressors, set		6	69.95	419.70
931	Tools, special, to service reciprocating				
932	compressors, set		6	69.95	419.70
933	Vacuum pump		4	88.75	355.00
934	Tube bender, set of 6		4	3.00	12.00
935	Wrench, flare nut, set, 3 wrenches		10	5.89	58.90
936					

CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE AIR CONDITIONING

TOOLS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
937	Wrench, ratchet, non-reversible, set,			$	$
938	4 wrenches		10	16.50	165.00
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE AIR CONDITIONING

TRAINING AIDS

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
963	Air conditioning and refrigeration			$	$
964	education system, bench top, fully				
965	operational		1	2495.00	2495.00
966	Automotive air conditioning education				
967	system, fully operational, bench				
968	top, electrically powered		1	870.00	870.00
969	Automotive air conditioning education				
970	system assembly kit		18	675.00	12150.00
971	Compressor, reciprocating, refrigerant		9		
972	Compressor, rotary, refrigerant		9		
973	Controls, air conditioning, GM		6		
974	Controls, air conditioning, Ford		6		
975	Controls, air conditioning, Chrysler		6		
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CURRICULUM - AUTOMOTIVE MECHANICS

SUBJECT - AUTOMOTIVE SERVICE AND REPAIR

EQUIPMENT - SHOP, GENERAL

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
989	Air supply system, pressure, 150 lbs.			$	$
990	for building		1		
991	Exhaust system, Shop Number 6, Auto-				
992	motive Service and Repair		1		
993	Front-end alinement unit complete with				
994	accessories and special tools		1	5000.00	5000.00
995	Headlight tester, with track		2	320.00	640.00
996	Jack, bumper, air, 2 ton		2	307.65	615.30
997	Lift, twin-post frame contact		5	1036.00	5180.00
998	Lift, two-post individual, front and				
999	rear, adjustable to wheel base		5	1212.00	6060.00
1000	Chassis and brake dynamometer with				
1001	inertia flywheel, 400 hp		1	9302.00	9302.00
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CURRICULUM - AUTOMOTIVE MECHANICS

STUDENT TOOL BOX

TOOL LIST

Item No.	Description	Recommended Per No. of Students 9	18	Unit Price	Total Price
1015	Student tool box consisting of:		18	$ 317.09	$ 5707.62
1016	Cabinet, 3 drawer, roller		1	62.99	
1017	Brake adjusting tool, universal		1	2.95	
1018	Chisel, cape, 6" length, 5/16" cut		1	1.50	
1019	Chisel, diamond point, 6" length,				
1020	5/16" cut		1	1.50	
1021	Chisel, flat, 5" long, 5/16" cut		1	00.80	
1022	Chisel, flat, 6-3/4" long, ½" cut		1	00.90	
1023	Chisel, round-nose, 6¼" long, 5/16"				
1024	cut		1	1.40	
1025	File, half-round, 6", second cut		1	1.55	
1026	File, mill, 6", second cut		1	1.00	
1027	File, round, 6", second cut		1	00.95	
1028	File, square, 6", second cut		1	1.20	
1029	File, 3-square, 6", second cut		1	1.50	
1030	File, ignition		1	00.40	
1031	File, mill, 10", second cut		1	1.40	
1032	Gage, thickness (feeler)		1	9.30	
1033	Gage, spark plug wire, with bender		1	00.90	
1034	Hacksaw, adjustable, 10 to 12 inch		1	2.15	
1035	Hammer, ball pein, 12 oz.		1	3.45	
1036	Handles, file, small		7	00.30	
1037	Padlock, tool box		1	1.90	
1038	Plier, channel lock, 8"		1	3.50	
1039	Plier, combination, 8"		1	1.45	
1040	Plier, crimcut		1	3.50	

CURRICULUM - AUTOMOTIVE MECHANICS

STUDENT TOOL BOX

TOOL LIST

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
1041	Pliers, diagonal, 6"		1	$ 4.14	
1042	Pliers, needle nose, 6", with cutter		1	4.25	
1043	Pliers, vise grip, 7"		1	2.60	
1044	Punch, center, 6"		1	00.90	
1045	Punch, pin, 3/32" end		1	00.80	
1046	Scraper, carbon		1	2.40	
1047	Screwdriver, clutch head, 3/32" x				
1048	3-¼"		1	1.50	
1049	Screwdriver, clutch head, 1/8" x				
1050	3-¼"		1	1.50	
1051	Screwdriver, clutch head, 3/16" x 4"		1	1.75	
1052	Screwdriver, Phillips, 1 x 3"		1	1.39	
1053	Screwdriver, Phillips, 2 x 1½"		1	1.44	
1054	Screwdriver, Phillips, 2 x 4"		1	1.71	
1055	Screwdriver, Phillips, 3 x 6"		1	2.40	
1056	Screwdriver, standard tip, 1/8" x 4"		1	00.75	
1057	Screwdriver, standard tip, 3/16" x				
1058	6"		1	1.35	
1059	Screwdriver, standard tip, ¼" x 6"		1	1.70	
1060	Screwdriver, standard tip, 5/16" x				
1061	8"		1	2.05	
1062	Screwdriver, standard tip, 3/8" x 8"		1	2.75	
1063	Socket set, ¼" drive, 21 pieces		1	19.50	
1064	Socket set, 3/8" drive, 26 pieces		1	44.50	
1065	Socket set, ½" drive, 23 pieces		1	49.95	
1066					

CURRICULUM - AUTOMOTIVE MECHANICS

STUDENT TOOL BOX

TOOL LIST

Item No.	Description	Recommended Per No. of Students		Unit Price	Total Price
		9	18		
1067	Socket, spark plug, rubber insert,			$	$
1068	3/8" drive, 5/8"		1	2.30	
1069	Wrench, combination, set, 3/8" to				
1070	1-¼"		1	39.95	
1071	Wrench, allen, set, standard, 1/16"				
1072	to 3/8"		1	4.10	
1073	Wrench, ignition, set, with pliers		1	13.10	
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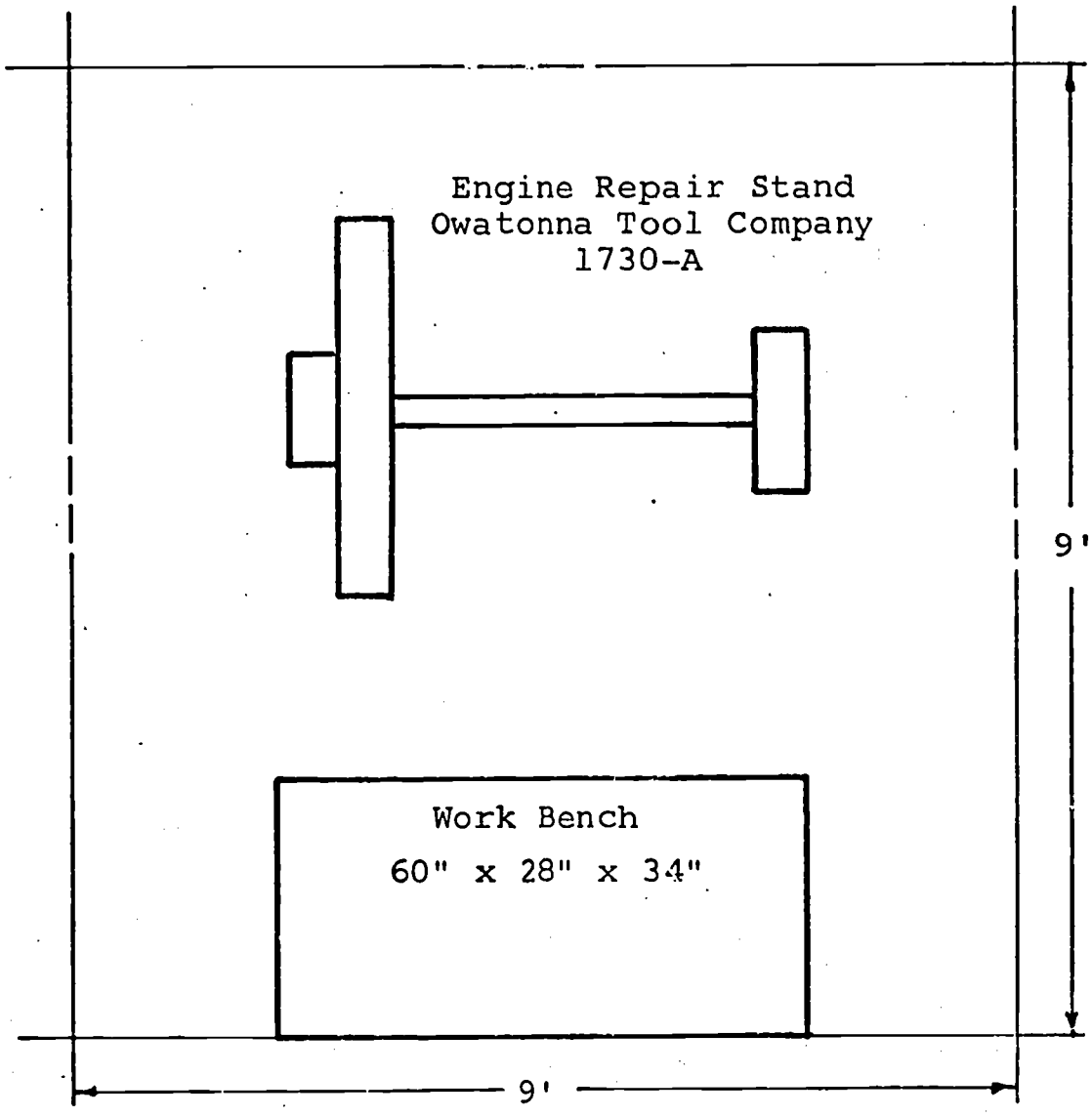
WORK STATION NUMBER 1

One Student - 81 square feet

SUBJECT AREAS

Automotive Engines
Emission, Carburetion, and Lubrication



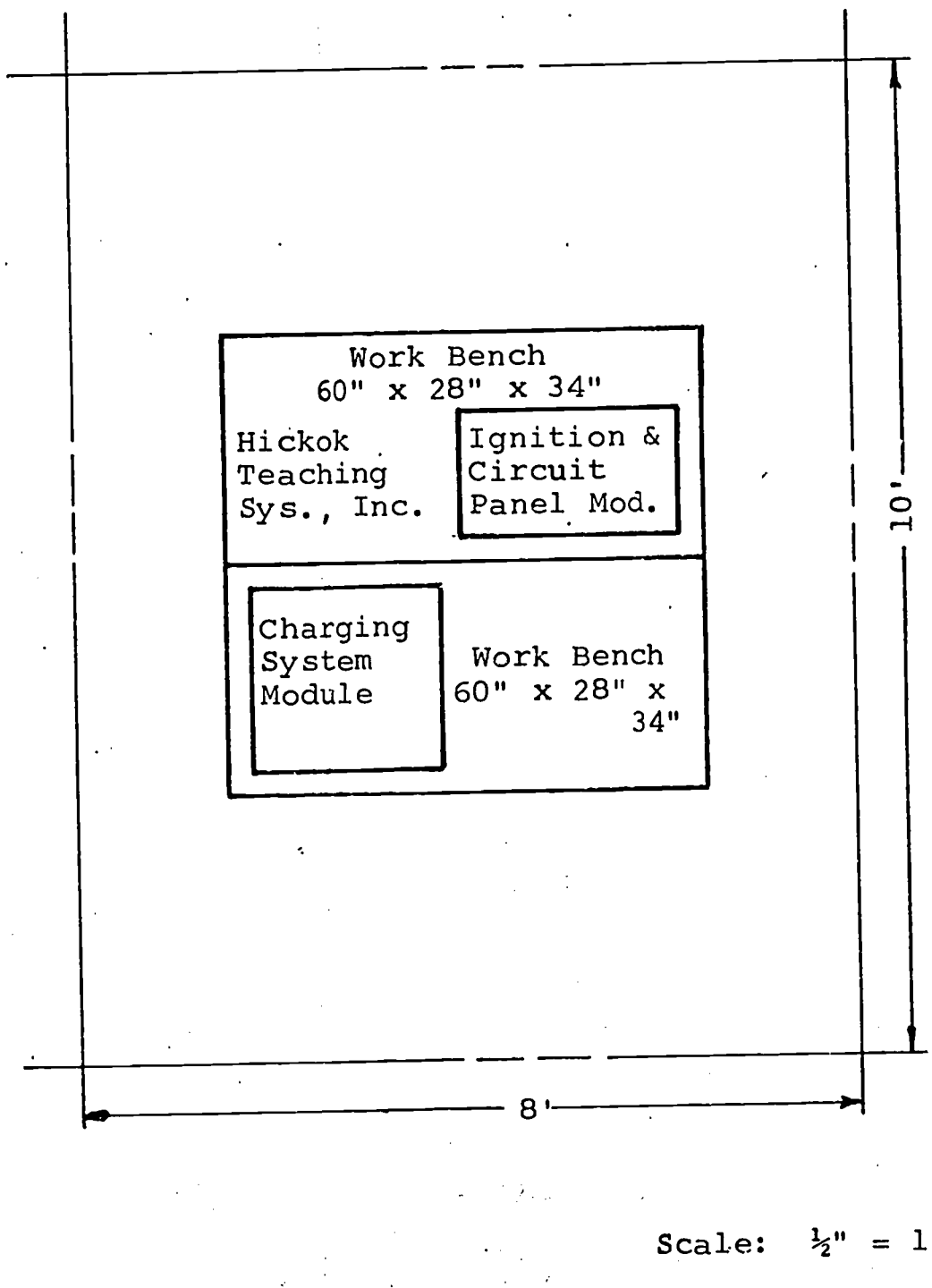
Scale: ½" = 12"

WORK STATION NUMBER 2

Two Students - 80 square feet

SUBJECT AREAS

Automotive Electrical Systems
Automotive Accessories



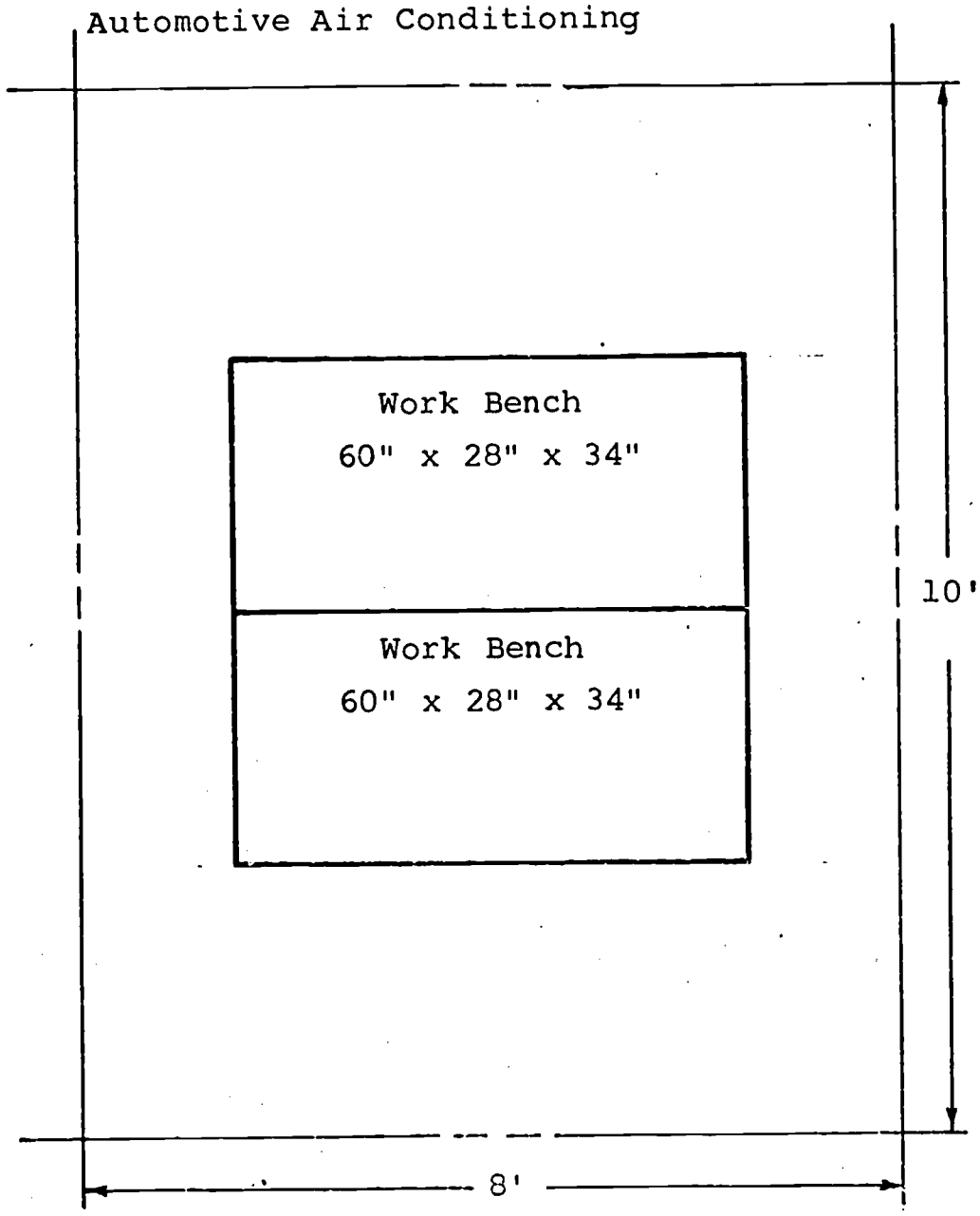
Scale: ½" = 12"

WORK STATION NUMBER 3

Two Students - 80 square feet

SUBJECT AREAS

Steering, Brakes, Chassis, and Suspension
Engine Trouble Diagnosis and Tune-Up
Power Transmission
Automotive Air Conditioning



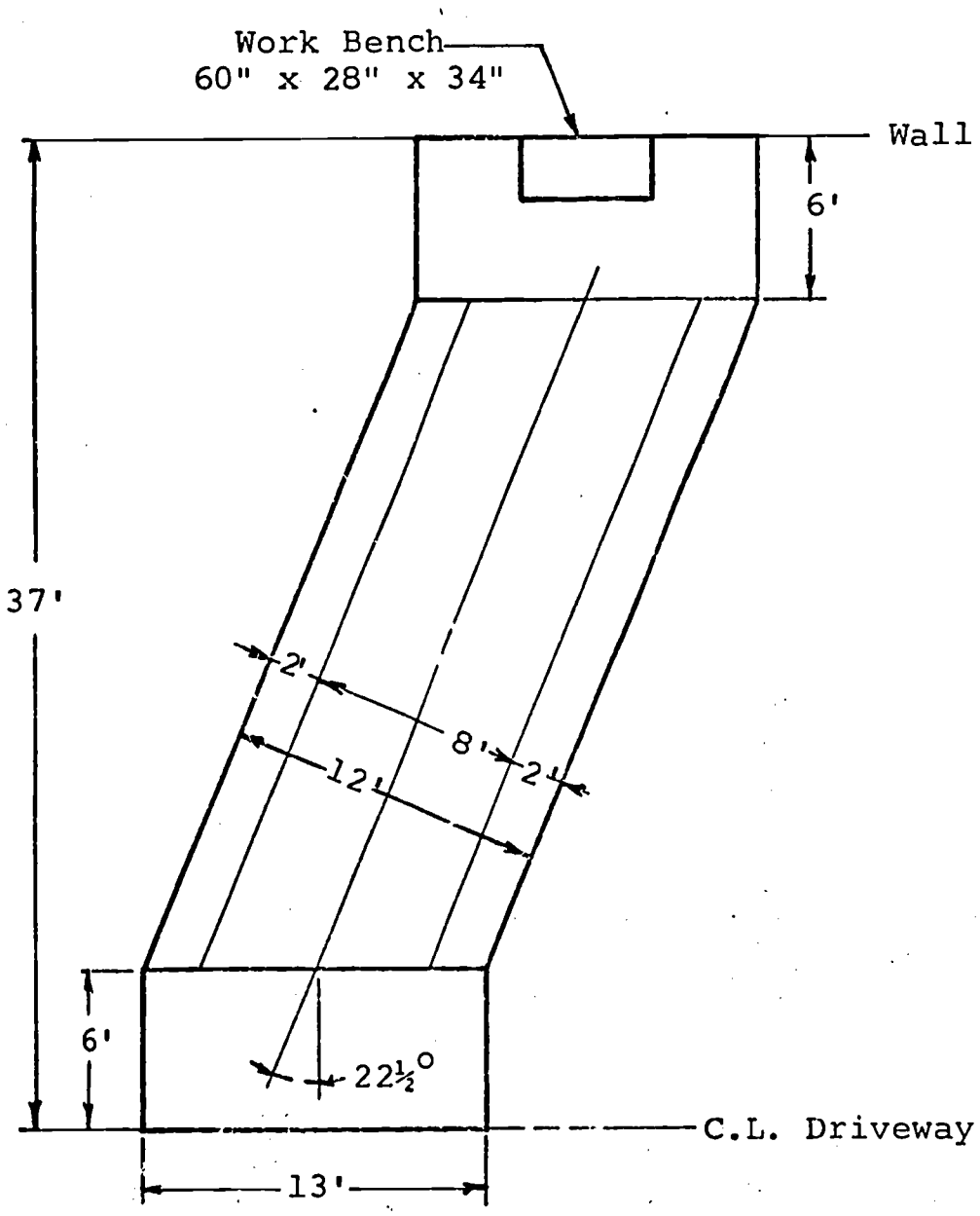
Scale: ½" = 12"

WORK STATION NUMBER 4

One Student - 480 square feet

SUBJECT AREA

Automotive Service and Repair



Scale: 3/8" = 12"

The vendors listed are those from whom list prices for tools, equipment, and training aids were available. There are many other vendors listed in trade magazines.

Alamo Iron Works
1973 W. Gray
Houston, Texas 77019

Allen Electric and Equipment Company
2101 N. Pitcher Street
Kalamazoo, Michigan 49007

Ammco Tools, Incorporated
2100 Commonwealth Avenue
North Chicago, Illinois 60064

Auto Specialties Manufacturing Company
St. Joseph, Michigan 49085

Bear Manufacturing Company
Rock Island, Illinois 61201

Borroughs Tool and Equipment Corporation
2429 North Burdick Street
Lalamazoo, Michigan 49007

Brodhead-Garrett
4560 East 71st Street
Cleveland, Ohio 44105

Brookstone Company
Dept. C-3, Brookstone Building
Peterborough, New Hampshire 03458

Channellock, Inc.
Meadville, Pennsylvania 16335

Chicago Pneumatic
6 East 44th Street
New York, N.Y. 10017

Clayton Manufacturing Company
4213 N. Temple City Boulevard
El Monte, California 91731

Columbian Vise and Manufacturing Company
9021 Bessemer Avenue
Cleveland, Ohio 44104

Coordinator
Education Equipment Sales Program
Chrysler Corporation
P.O. Box 1
Marysville, Michigan 48040

Cornwell Quality Tools Company
Mogador, Ohio 44260

DCA Educational Products, Incorporated
4865 Stenton Avenue
Philadelphia, Pennsylvania 19144

Delco-Remy
Technical Literature Section
Anderson, Indiana 46011

Deltadynamics, Incorporated
Box 2283
Green Bay, Wisconsin 54306

Diamond Tool and Horseshoe Company
Duluth, Minnesota 55807

Excelite, Incorporated
Orchard Park, N.Y. 14127

Ford Service Publications
P.O. Box 7750
Detroit, Michigan 48207

General Motors Corporation
Aids to Education
Public Relations Staff
Room 1-101
General Motors Building
Detroit, Michigan 48202

Glenn Mitchell Manuals
Dept. H 5
P.O. Box 10465
San Diego, California 92110

Go-Power Systems
1880 Embarcadero Road
Palo Alto, California 94307

Halowell Steel Equipment & Shelving
Hatfield, Pennsylvania 19440

Hickok Teaching Systems, Inc.
Woburn, Massachusetts 01801

Hunter Engineering Company
11250 Hunter Drive
Bridgeton, Missouri 63042

Husky Hand Tools
New Britain Machine Company
New Britain, Connecticut 06050

Ingersoll-Rand
28 Kennedy Boulevard
East Brunswick, N.J. 08816

J. H. Williams & Company
400 Vulcan Street
Buffalo, N.Y. 14207

K-D Manufacturing Company
Lancaster, Pennsylvania 17604

Kent-Moore Corporation
28635 Mound Road
Warren, Michigan 48092

Lincoln St. Louis
4010 Goodfellow Boulevard
St. Louis, Missouri 63120

Mark IV Auto Air Conditioning
3800 Commerce
Dallas, Texas 75226

Marquette Corporation
5075 Wayzata Boulevard
Minneapolis, Minnesota 55416

Miller Special Tools
17640 Grand Rivers Avenue
Detroit, Michigan 48227

Milstead Company
201 East Avenue D
P.O. Box 97
Temple, Texas 76502

Milwaukee Hydraulic Products Corporation
Milwaukee, Wisconsin 53214

Montgomery Ward
7th and Carroll Avenues
Fort Worth, Texas 76101

Motor
250 West 55th Street
New York, N.Y. 10019

Owatonna Tool Company
Owatonna, Minnesota 55060

Plews Products Division
Parker-Hannifin Corporation
245 Marquette Avenue
Minneapolis, Minnesota 55401

Rodac Pneumatic Tools
P.O. Box 420
Gardena, California 90247

Scott Engineering Sciences
1400 S.W. 8th Street
Pompano Beach, Florida 33060

Sears, Roebuck and Company
Dallas, Texas 75202

Sioux Tools, Incorporated
2801-2999 Floyd Boulevard
Sioux City, Iowa 51102

S-K Tools
Hand Tool Division
Dresser Industries
3535 West 47th Street
Chicago, Illinois 60632

Skil Power Tools
Skil Corporation
5033 Alston Avenue
Chicago, Illinois 60630

Sun Electric Corporation
Harlem and Avondale
Chicago, Illinois 60631

Van-Norman Machine Company
3640 Main Street
Springfield, Massachusetts 01107

Vermont American Hardware
Tool Division
Lincolnton, North Carolina 28092

Vim Tools
Durston Manufacturing Company
1395 East Palomares
La Verne, California 91750

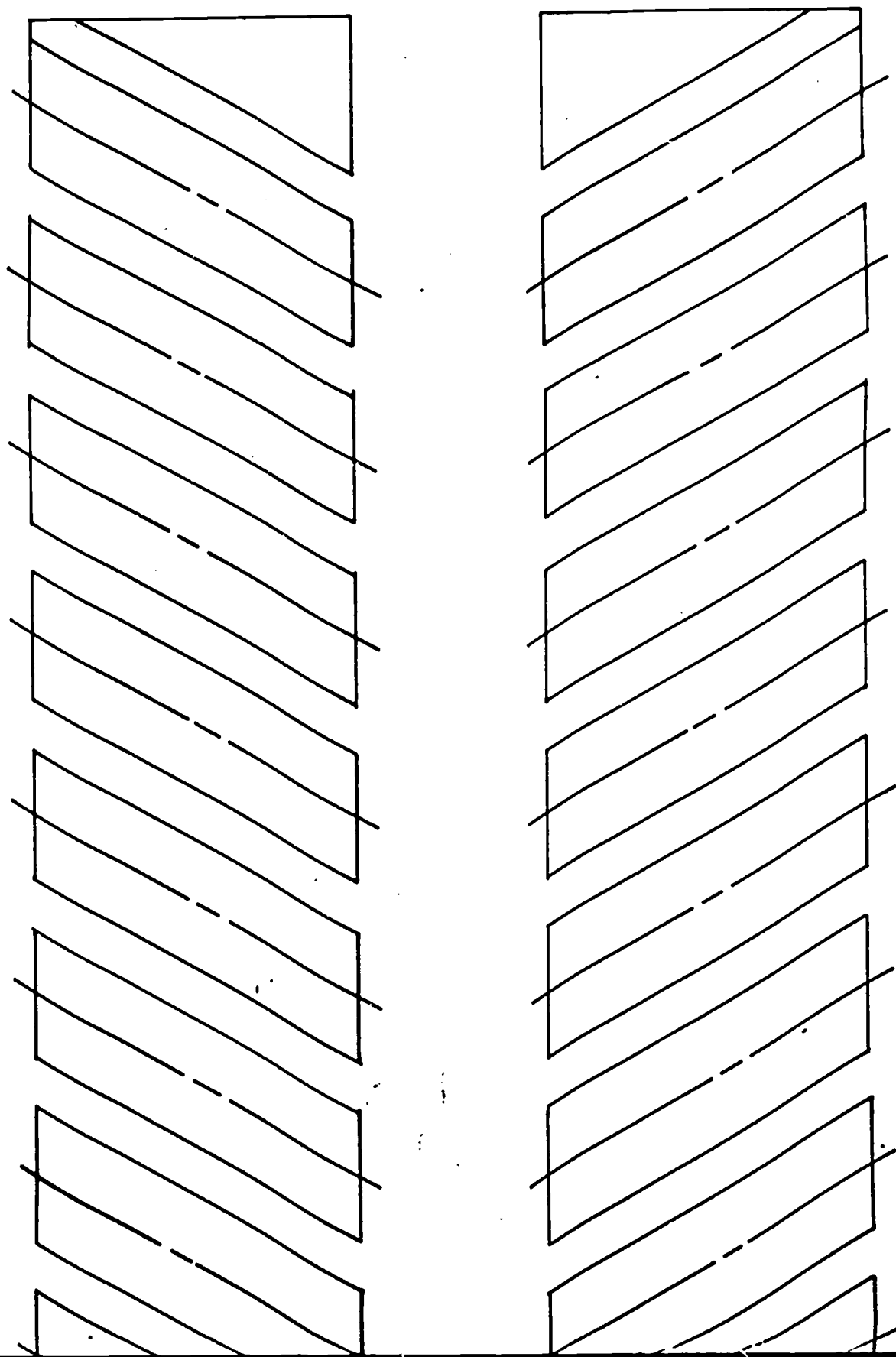
Wilton Corporation
Power Division
Schiller Park, Illinois 60176

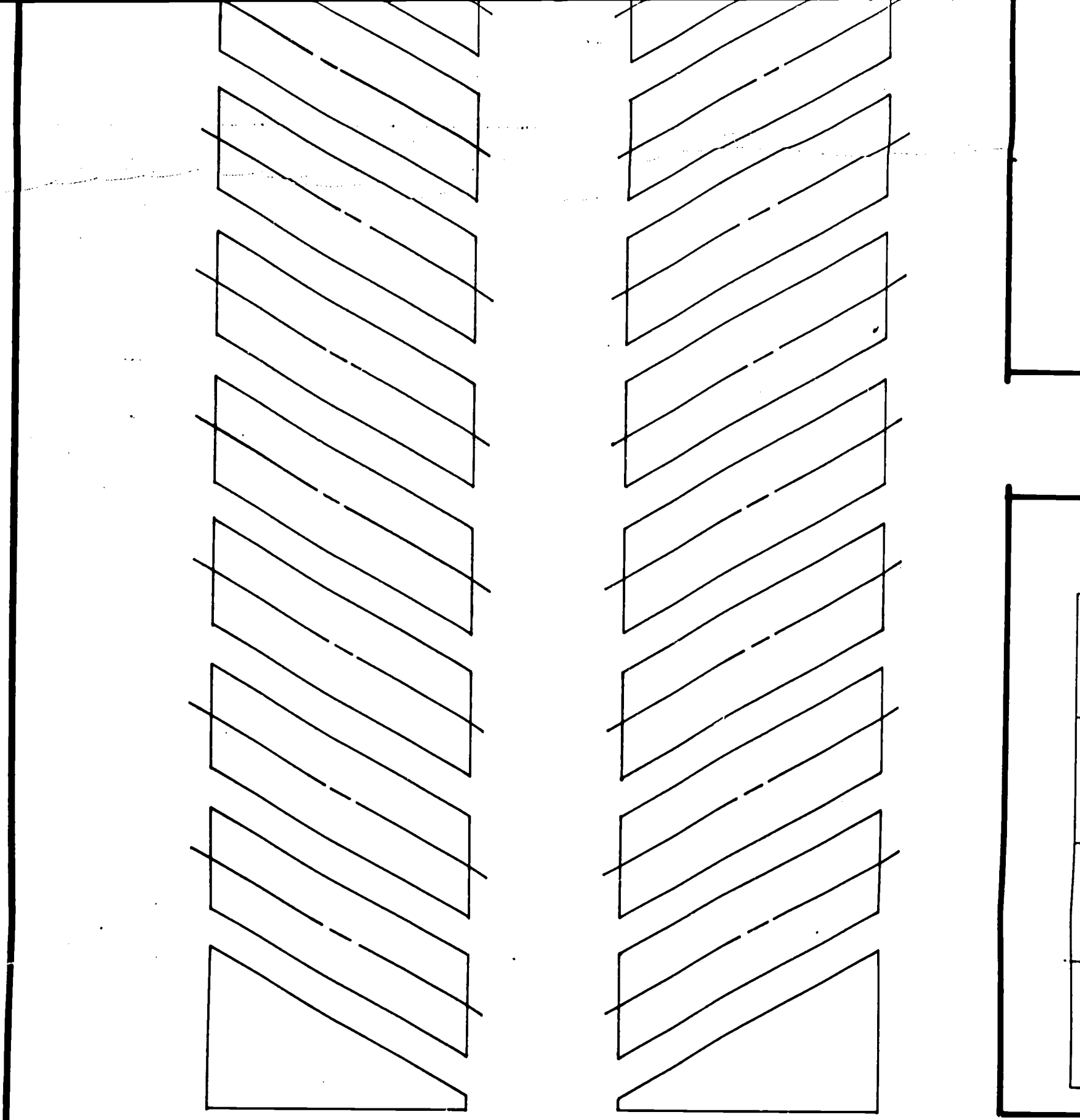
SHOP NUMBER 1 – SEE WORK STATION DRAWING No. 1

AUTOMOTIVE ENGINES
EMISSION, CARBURETION, AND LUBRICATION

SHOP NUMBER 2 – SEE WORK STATION DRAWING No. 3

POWER TRANSMISSION





No. 1 **SHOP NUMBER 3** - SEE WORK STATION DRAWING No. 3

ENGINE TROUBLE DIAGNOSIS AND TUNE-UP
STEERING, BRAKES, CHASSIS, AND SUSPENSION

SHOP N

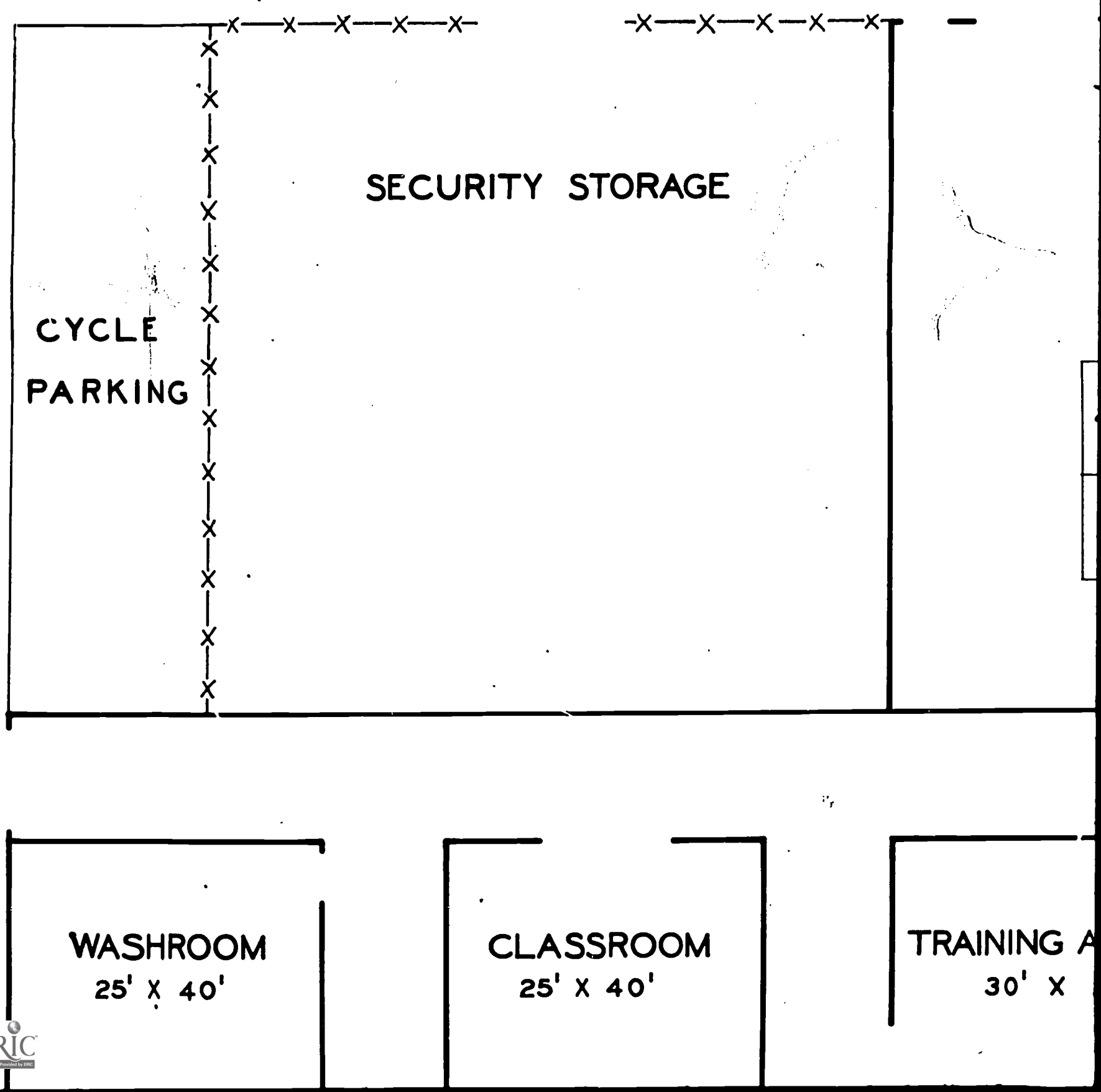
AUTO

0. 3 **SHOP NUMBER 4** - SEE WORK STATION DRAWING No. 2

AUTOMOTIVE ELECTRICAL SYSTEMS
AUTOMOTIVE ACCESSORIES

SHOP N

AUTO

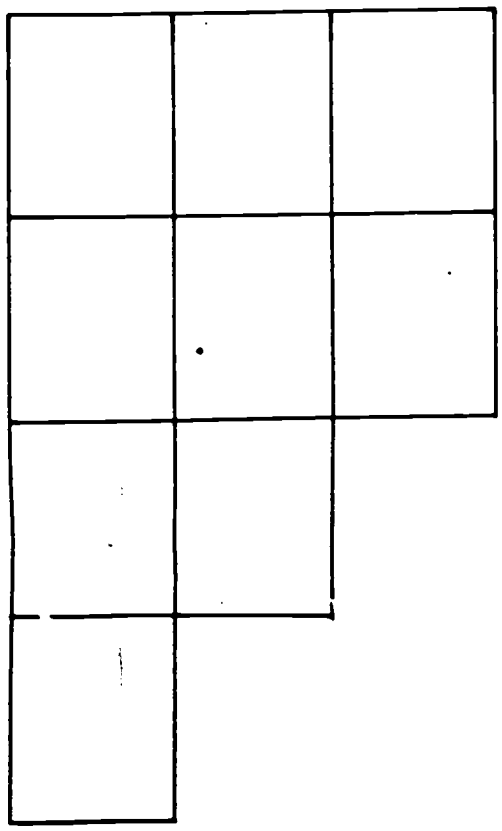


WASHROOM
25' X 40'

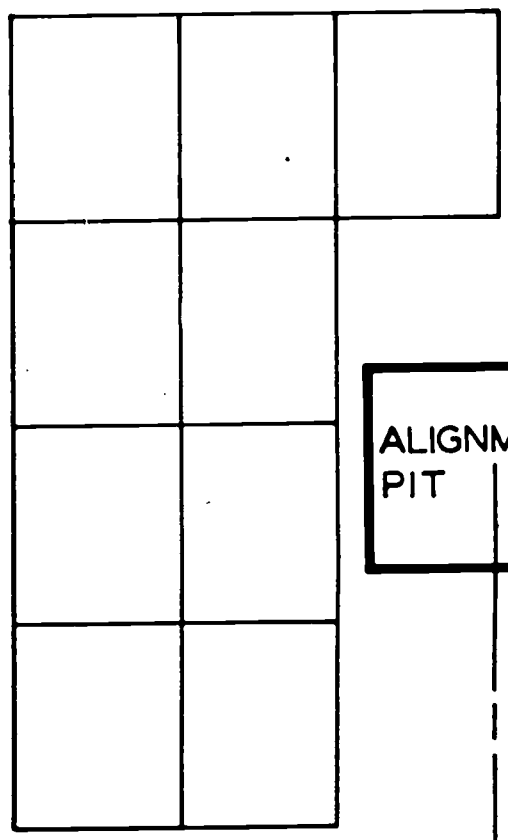
CLASSROOM
25' X 40'

TRAINING A
30' X

SHOP NUMBER 2
35' X 50'

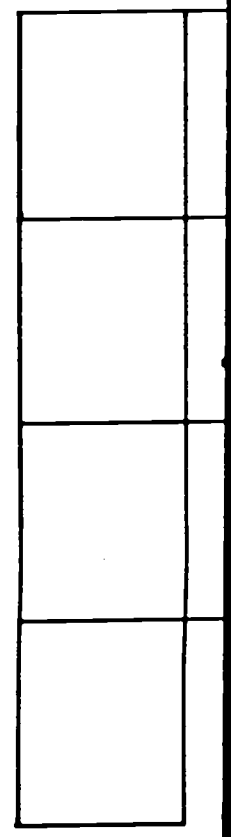


SHOP NUMBER 3
35' X 50'



ALIGNMENT
PIT

SHOP N
35'



NUMBER 5 - SEE WORK STATION DRAWING No. 3

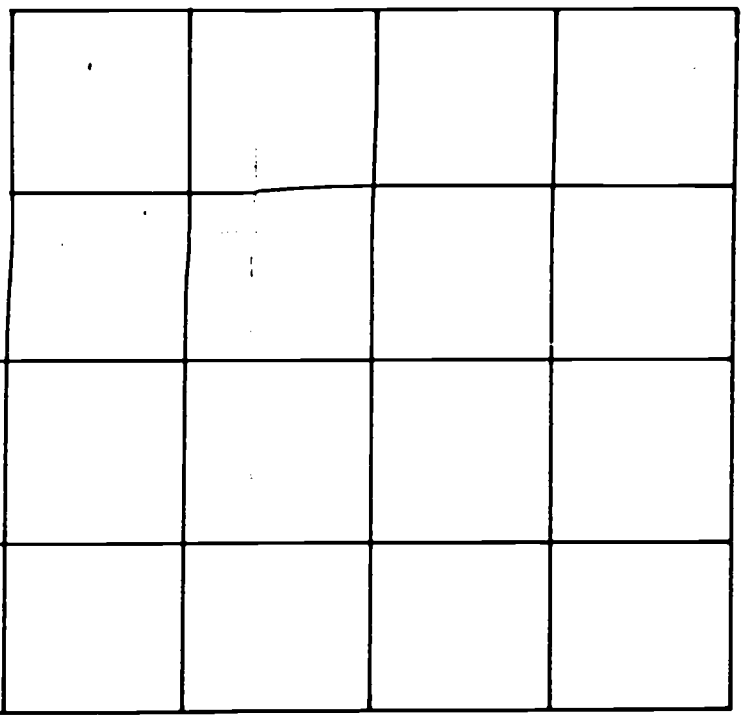
OMOTIVE AIR CONDITIONING

NUMBER 6 - SEE WORK STATION DRAWING No. 4

OMOTIVE SERVICE AND REPAIR

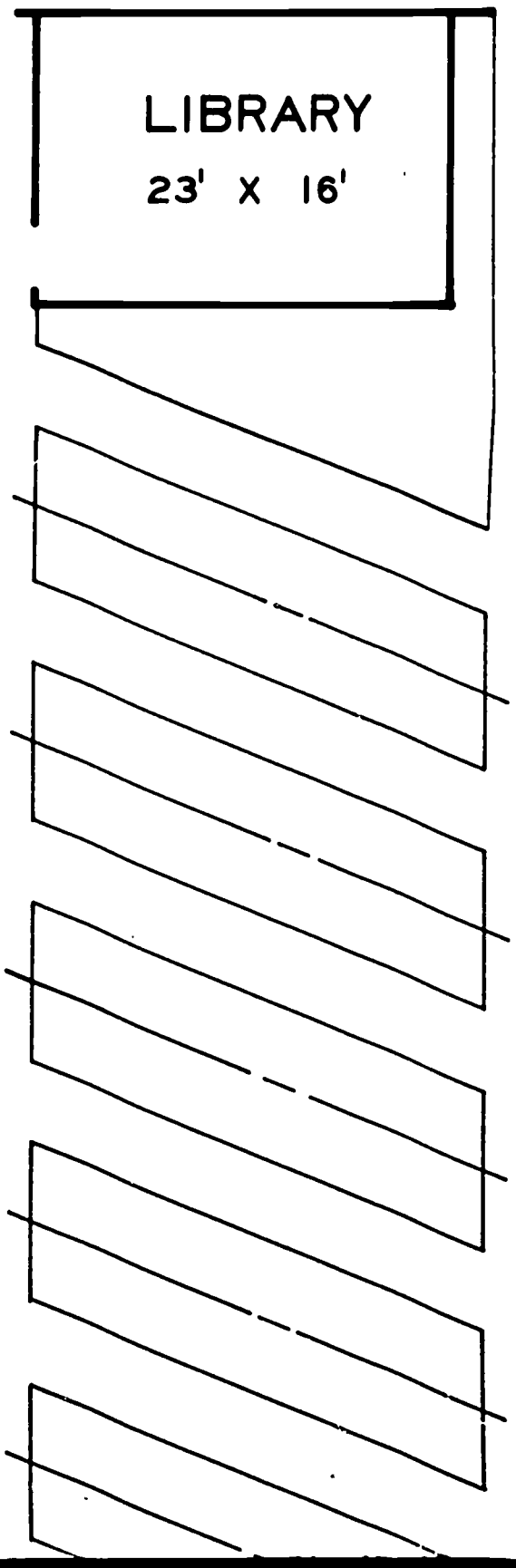
SHOP NUMBER 1

70' X 55'



LIBRARY

23' X 16'

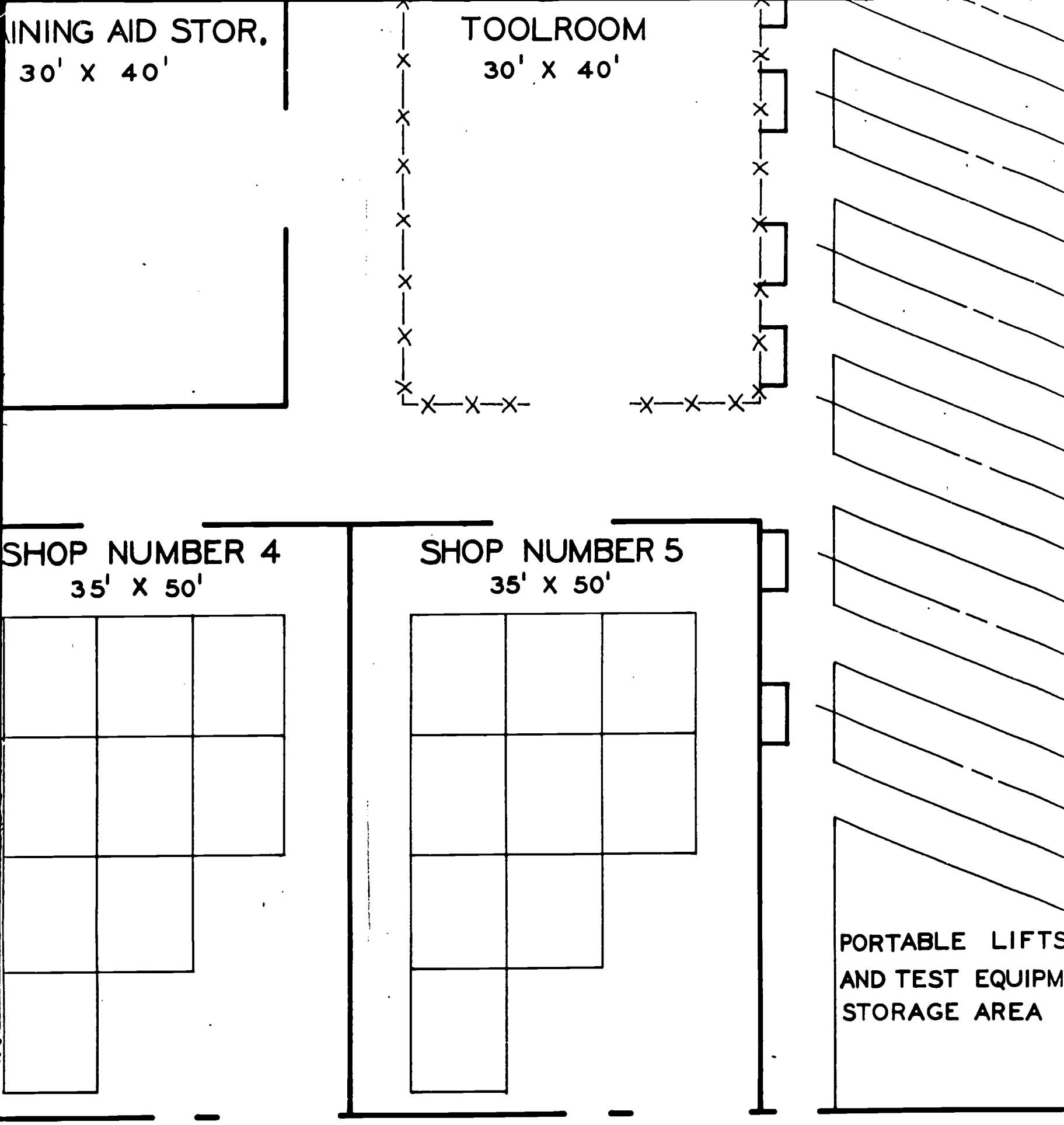


AID STOR.

40'

TOOLROOM

30' X 40'


INING AID STOR.
30' X 40'
TOOLROOM
30' X 40'
SHOP NUMBER 4
35' X 50'
SHOP NUMBER 5
35' X 50'
PORTABLE LIFTS
AND TEST EQUIPM
STORAGE AREA

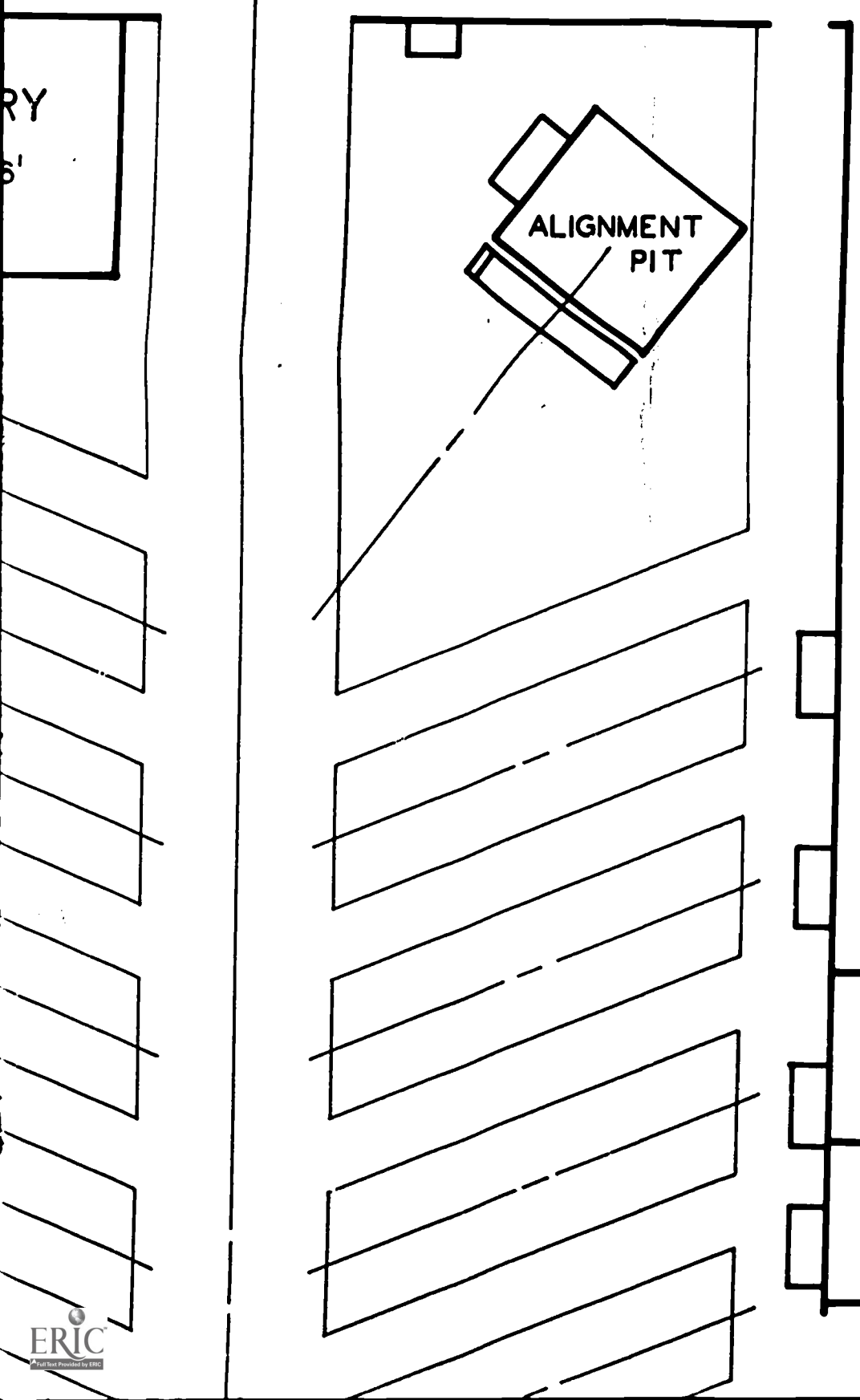
SUBJECT SCHEDULE

FALL			SPRING			
GROUP No.		COURSES	GROUP No.		COURSES	G
1	2	AUTO. ENG. EM. CARB.	1	2	ENG. DIAG. BRAKES, SUSP.	1
2	1	AUTO. ELEC. AUTO. ACC.	2	1	POWER TRANS	2
225 HOURS EACH GROUP			225 HOURS EACH GROUP			1

SUMMER SE

NOTE: THIS FACILI

1. YEAR-RO
2. INPUT O SEMESTE



ORTABLE LIFTS
ND TEST EQUIPMENT
TORAGE AREA

SHOP NUMBER 6
74' X 165'

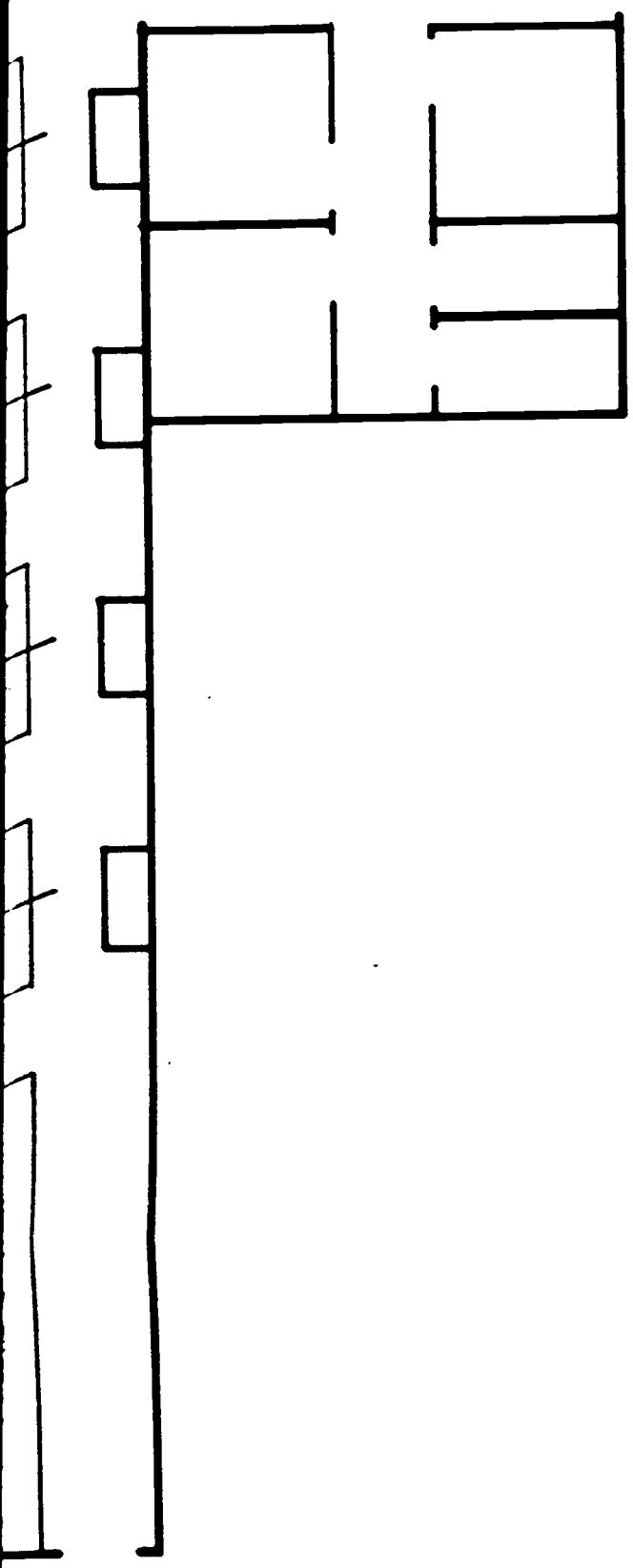
SUBJECT SCHEDULE

L	SPRING		SUMMER	
COURSES	GROUP No.	COURSES	GROUP No.	COURSES
AUTO. ENG. EM. CARB.	1 2	ENG. DIAG. BRAKES, SUSP.	1 2	AUTO. AIR. COND.
AUTO. ELEC. AUTO. ACC.	2 1	POWER TRANS	2 1	AUTO. SER. REP.
ACH GROUP	225 HOURS EACH GROUP		165 HOURS EACH GROUP	

SUMMER SESSION-120 HOURS OJT

NOTE: THIS FACILITY DESIGNED FOR

1. YEAR-ROUND USE
2. INPUT OF 36 STUDENTS PER SEMESTER



PROPOSED AUTOMOTIVE BUILDING		
NOT A WORKING DRAWING	SCALE 3/32"=12"	DESIGNED BY B.J. McLennand
		TRACED BY
DATE 5/71		DRAWING NUMBER 1