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Knowledge and skill requirements of motorcycle mechanics with implications for course development

by

Floyd Emerson Croy Jr.

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of The Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major: Industrial Education

Approved:

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# TABLE OF CONTENTS

**INTRODUCTION**

Motorcycle Industry Overview .......................... 1  
The Service Problem .................................. 4  
Implications for Education ............................. 5  
Problem Statement ..................................... 5  
Assumptions ............................................ 6  
Delimitations ......................................... 7  
Scope of the Study .................................... 7  
Definitions ............................................ 8  

**REVIEW OF LITERATURE** ............................... 11  
Source of Related Information ........................ 11  
The Need for Trained Motorcycle Mechanics .......... 11  
Meeting the Needs of Industry ......................... 14  
Occupational Surveys .................................. 15  
Analysis of the Job .................................... 17  
Legislated needs for Qualified Mechanics ........... 19  
Existing Motorcycle Mechanic Training Facilities ... 22  
Safety .................................................. 26  
Honda - Motorcycle Industry Innovator ............... 28  
The Immediate Future of the Motorcycle Industry ... 32  
Summary ................................................. 33
### METHOD OF PROCEDURE

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Assistance</td>
<td>39</td>
</tr>
<tr>
<td>Sources of Information</td>
<td>40</td>
</tr>
<tr>
<td>Motorcycle Dealers Questionnaire</td>
<td>40</td>
</tr>
<tr>
<td>Motorcycle Owners Questionnaire</td>
<td>43</td>
</tr>
<tr>
<td>Survey of Motorcycle Manufacturers and Consumer Groups</td>
<td>46</td>
</tr>
<tr>
<td>Interviews of Motorcycle Dealers</td>
<td>46</td>
</tr>
<tr>
<td>Motorcycle Mechanic Questionnaire</td>
<td>47</td>
</tr>
<tr>
<td>Shop Service Record Tabulation</td>
<td>48</td>
</tr>
<tr>
<td>Knowledge and Skill Categories</td>
<td>48</td>
</tr>
<tr>
<td>Collection of Data</td>
<td>49</td>
</tr>
<tr>
<td>Analysis of the Data</td>
<td>51</td>
</tr>
</tbody>
</table>

### FINDINGS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Findings</td>
<td>53</td>
</tr>
<tr>
<td>Discussion letter to manufacturers and others</td>
<td>53</td>
</tr>
<tr>
<td>Observations during the dealership interviews</td>
<td>57</td>
</tr>
<tr>
<td>Service record tally</td>
<td>58</td>
</tr>
<tr>
<td>Motorcycle mechanic questionnaire</td>
<td>62</td>
</tr>
<tr>
<td>Owner questionnaire</td>
<td>65</td>
</tr>
<tr>
<td>Dealer questionnaire</td>
<td>73</td>
</tr>
<tr>
<td>Analysis of Findings</td>
<td>83</td>
</tr>
<tr>
<td>Owner questionnaire</td>
<td>83</td>
</tr>
</tbody>
</table>
iv

Dealer questionnaire 95
Motorcycle mechanic questionnaire 116
Composite on certain categories 120

SUMMARY 123

Introduction 123

Questionnaires 124

Discussion Letter 125

Dealer Visits - Service Record Survey 125

Summary of Findings 126

The need for trained motorcycle mechanics in Iowa 126

Things a motorcycle mechanic should be able to do 128

Suggestions for possible instructional areas 132

Background information regarding training programs and the market 133

DISCUSSION 137

Conclusions 143

Recommendations for Further Study 144

BIBLIOGRAPHY 146

APPENDIX A: QUESTIONNAIRES AND COVER LETTERS 149

APPENDIX B: LETTER TO MANUFACTURERS AND RESPONDENTS CREDIT NOTE 154

APPENDIX C: DETAILED TABULATION AND SERVICE RECORD DATA RECORDING FORM 159
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>FOLLOW-UP POST CARD AND LETTERS</td>
<td>170a</td>
</tr>
<tr>
<td>E</td>
<td>COURSE OF STUDY OUTLINES</td>
<td>173</td>
</tr>
<tr>
<td>F</td>
<td>COMMENTS BY DEALERS AND OWNERS</td>
<td>209</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motorcycle registrations by state in 1969</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>Private motorcycle registrations 1945 to 1971</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>Motorcycle imports by quantity and volume</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>Distribution of repairs by major category</td>
<td>61</td>
</tr>
<tr>
<td>5</td>
<td>Motorcycle mechanics opinions regarding skills and knowledge important to their jobs</td>
<td>66</td>
</tr>
<tr>
<td>6</td>
<td>Owner response by area school district</td>
<td>67</td>
</tr>
<tr>
<td>7</td>
<td>Dealer response by area school district</td>
<td>74</td>
</tr>
<tr>
<td>8</td>
<td>Dealer opinions regarding motorcycle mechanics skill needs</td>
<td>81</td>
</tr>
<tr>
<td>9</td>
<td>Dealer opinions regarding motorcycle mechanic characteristics</td>
<td>82</td>
</tr>
<tr>
<td>10</td>
<td>Attitudes of owners who included letters regarding quality of service work done vs years of motorcycling experience</td>
<td>84</td>
</tr>
<tr>
<td>11</td>
<td>Owner years of m/c experience vs size of motorcycle owned</td>
<td>85</td>
</tr>
<tr>
<td>12</td>
<td>Owner attitude toward service work done vs stated usage of vehicle</td>
<td>87</td>
</tr>
<tr>
<td>13</td>
<td>Owner performance of minor repairs vs brand</td>
<td>88</td>
</tr>
<tr>
<td>14</td>
<td>Owner attitudes toward service done vs brand</td>
<td>89</td>
</tr>
<tr>
<td>15</td>
<td>Owner attitude toward service work done vs performance of minor repairs</td>
<td>91</td>
</tr>
<tr>
<td>Page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Owner attitude toward service work done vs specific major service or repair category</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>17. Owner attitude toward service work done vs availability of parts and mechanics</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>18. Owner attitude toward service work done vs merged area of residence</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>19. Dealer employment needs and current employment figures vs merged area</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>20. Number of employed full-time mechanics per dealership vs salary paid</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>21. Dealer attitude regarding very important skills, knowledge and characteristics vs a given number and type of employee</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>22. Dealer attitudes regarding very important skills, knowledge, and characteristics by profit status of service operation</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>23. Dealer shop profit status vs record keeping</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>24. Dealer shop profit status vs salary paid to motorcycle mechanics</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>25. Dealer shop profit status vs those who employ service managers and parts managers</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>26. Dealer attitudes regarding very important m/c mechanic characteristics vs position on need for m/c mechanic training in public schools</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>27. Dealer need for m/c mechanics vs position on need for m/c mechanic training programs</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>28. Dealer shop profit status vs position on need for m/c mechanic training programs</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>29. Dealer position on need for m/c mechanic training vs in-state or out and inclusion of comments</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Summary</td>
<td>Page</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>30</td>
<td>Dealer position on need for m/c mechanic training <em>vs</em> brand sold</td>
<td>115</td>
</tr>
<tr>
<td>31</td>
<td>Dealer shop profit status <em>vs</em> in-state or out</td>
<td>116</td>
</tr>
<tr>
<td>32</td>
<td>Motorcycle mechanics attitudes toward very important skills and knowledge <em>vs</em> highest grade completed by respondents</td>
<td>117</td>
</tr>
<tr>
<td>33</td>
<td>Attitudes regarding very important skills and knowledge by mechanic, service manager, and company school graduate</td>
<td>118</td>
</tr>
<tr>
<td>34</td>
<td>Comparison of weights on important skill and knowledge categories by dealers, mechanics, owners, and service records</td>
<td>121</td>
</tr>
</tbody>
</table>
LIST OF SUMMARIES

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Motorcycle mechanic profile</td>
<td>64</td>
</tr>
<tr>
<td>2.</td>
<td>Motorcycle owner profile</td>
<td>69</td>
</tr>
<tr>
<td>3.</td>
<td>Owner responses pertaining to service</td>
<td>72</td>
</tr>
<tr>
<td>4.</td>
<td>Dealer supplemental information</td>
<td>75</td>
</tr>
<tr>
<td>5.</td>
<td>Motorcycle dealer profile</td>
<td>77</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Private motorcycle registrations in Iowa and the United States</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Participants in the motorcycle industry</td>
<td>41</td>
</tr>
<tr>
<td>3.</td>
<td>Location of motorcycle dealers included in study</td>
<td>42</td>
</tr>
<tr>
<td>4.</td>
<td>Location of motorcycle owners included in study</td>
<td>45</td>
</tr>
<tr>
<td>5.</td>
<td>Iowa merged area school districts</td>
<td>52</td>
</tr>
</tbody>
</table>
INTRODUCTION

Motorcycle Industry Overview

Gottlieb Daimler is credited with the invention of the motorcycle in 1885. Since that time the motorcycle has become increasingly popular although the great popularity in the United States is a relatively new phenomenon. Prior to 1963 only one out of every 106 motor vehicles was a motorcycle. By 1968 this figure had become one out of every forty-eight and early sales figures for 1971 suggest that one of every eleven motor vehicles sold is a motorcycle.

In 1958 the only American manufacturer of motorcycles, Harley-Davidson, had some 60% to 70% of the U.S. market with sales of $20 million. By 1970 Harley had only 5% of the U.S. market yet was expecting to do over $50 million in sales (24).

Generally credited for the two-wheeled revolution is the current largest manufacturer of motorcycles in the world, the Japan based Honda Motor Co., Ltd. When Honda decided to invade the U.S. market in 1960 they waged an impressive advertising war on the negative image surrounding motorcycling. Their "You meet the nicest people on a Honda" has come true. Now those nice people are spending an estimated two billion dollars each year for motorcycles, repairs, and accessories.

The modern motorcycle dealership is a change from past
stereotypes. Well lighted, carpeted and spacious buildings are becoming common. For example, the recent opening of the Slegers-Forbes Agency of New Jersey was attended by the Governor of that state and was covered by the New York Times (16). Hank Slegers is a successful dealer and Malcolm Forbes is the multi-millionaire publisher of Forbes, the leading financial magazine. Forbes, a former senator, described their dealership:

... If you had a chance to visit this huge store in New Jersey you would see ... that we have put our assembly and bike repair and service center on display -- the walls are all windows and the service areas are entirely indoor-outdoor carpeted in blue, with all the mechanics in gold jump suits with name tags. ... customers can see the skills of two dozen service people as they work ... the display floor [contains] the FORBES collection of kinetic art, probably the largest private collection of its kind. ...

This year we will probably do well over $2 million in sales and service.¹

Motorcycle sales are reaching impressive levels in the United States and in Iowa. All indications are that sales will continue at the current high level. Figure 1 shows the growth of motorcycle registrations in Iowa and the United States. It is interesting to note how Iowa's growth curve follows that of the country as a whole.

All of this success is not without controversy; i.e.,

Figure 1. Private motorcycle registrations in Iowa and the United States (22). See Table 2.
motorcycle theft is quite a profitable business. The motorcycle vs ecology is becoming an issue. The outflow of American dollars for Japanese motorcycles is beginning to get federal attention. Motorcycle accidents have outdistanced safety research. Persistent rumors indicate the interest in motorcycle production by American automobile manufacturers. And perhaps most pressing is the serious lack of trained service people for this vast increase of motor vehicles.

The Service Problem

Today's motorcycles are increasingly more sophisticated, a fact that may explain why more and more motorcycle owners expect their dealers to perform repairs and maintenance. Dealers complain that good motorcycle mechanics are very difficult to find and that the shortage is becoming acute. States that have vehicle safety inspection laws require qualified mechanics for the process, increasing pressure on dealers.

Motorcycle manufacturer's "clinics" or short courses are hampered by the current mechanic's lack of theory background. This author has only found two full-time motorcycle mechanic training programs of over six months duration in the United States. These programs are unable to come anywhere close to filling the need for trained motorcycle
mechanics. No documented study of motorcycle service can be found.

Implications for Education

Just as industry turns to various specialists to suggest solutions to technical problems, so it should also be able to turn to specialists in occupational education for suggestions regarding its training problems. Effective training has been one of the best ways to improve the profitable use of manpower and to insure the adequate supply of needed workers. Occupational analysis and assessment of future needs provide the basis for planning adequate training programs. The public vocational-technical facilities can be of service to industrial concerns by using available information to provide initial training, retraining, and upgrading of workers.

Problem Statement

The purpose of this study was to assess the employment opportunities and the need for trained motorcycle mechanics in Iowa. It was further intended to provide information that could be used by those who would like to initiate training programs, or those who would like to examine the motorcycle market more closely.
The objectives of the study were:

1. To determine the extent of need for motorcycle mechanic training in Iowa.

2. To identify the things a motorcycle mechanic should be able to do.

3. To suggest possible instructional areas which may affect the outline of a course of study.

4. To develop instruments and obtain background information to assist those who will develop training programs, or examine the market more closely.

Assumptions

It was assumed the motorcycle industry in the state of Iowa had sufficient volume of sales and service to warrant a study of this nature.

It was further assumed sales would expand or remain at the present high level, creating a need for additional service personnel, and that vocational training could provide these trained workers.
Delimitations

The study was limited to the state of Iowa and those urban areas adjacent to its borders that are within the sphere of influence of local motorcycle dealers of Iowa Merged Area Schools.

Motorcycle dealers involved in the study were limited to those who wholly or mainly sell motorcycles as opposed to those who sell motorcycles as a sideline or who sell primarily scooters or mini-bikes.

The motorcycles involved were limited to the top ten brands in terms of sales and reputation.

Scope of the Study

To insure that the objectives of the study were covered as completely as possible several sources were surveyed.

1. Motorcycle dealers (Questionnaire)
2. Motorcycle owners (Questionnaire)
3. Motorcycle manufacturers and consumer oriented groups (Letter inviting discussion)
4. Dealer interviews
   a. Motorcycle mechanics (Questionnaire)
   b. Shop service records (Visual inspection and recording form)
Definitions

The following definitions are included to standardize communication pertaining to this study.

**Motorcycle** Two-wheeled, motor driven vehicle that is registered and licensed for use on public roads. Usually has an engine displacement of ninety cc. or larger and wheels of seventeen inch diameter or larger.

**Mini-bike** Two-wheeled, motor driven cycle usually having an engine displacement under ninety cc. and wheels of less than seventeen inch diameter. Not generally legal for use on public roads.

**cc.** Cubic centimeter. Standard manner of describing relative size of motorcycles by expressing displacement of the engine in cc.

**Dealer** One who has a franchise from a motorcycle manufacturer for exclusive rights to sell that manufacturer's product. Has a regular place of business, an investment in tools and equipment, a stock of repair parts, and ordinarily a state motorcycle dealers license.

**Distributor** A centrally located supply point to serve a region. A manufacturer may have several distributors throughout the United States, each serving dealers in its specific region.

**Motorcycle mechanic** One who earns his living by
repairing and maintaining motorcycles. At present no means is available to accurately assess the competence of a motorcycle mechanic so that persons with limited knowledge of motorcycles are working under this title.

**Iowa merged area** A geographical boundary consisting of two or more county school systems, or parts thereof, who have merged resources to establish and operate an area vocational school or an area community college in the state.
REVIEW OF LITERATURE

Source of Related Information

Many of the common avenues to background material for scholarly studies were found to be devoid of information on the motorcycle world. This is apparently due to the unexpected growth of the motorcycle industry. For example, although motorcycle monthly periodicals have proliferated, the Iowa State University Library does not shelve any issues. At the same time the Reader's Guide to Periodical Literature (17) does not reference any of the monthly periodicals devoted to motorcycling. As a result much of the background information included in this study is from personal communications or periodicals that may not be readily available to readers. A lack of hardcover texts regarding any phase of motorcycling limits literature review even further.

The Need for Trained Motorcycle Mechanics

No one appears to have done a recorded survey of the needs of motorcycle dealers (for motorcycle mechanics), however, persons in a position to observe the industry
offer their professional opinion on the subject. March\(^1\) states:

We at the American Motorcycle Association definitely feel that there is a need for curricula to be available to the youth of America to study to become motorcycle mechanics. There is a definite need for them in the industry and dealerships throughout the United States.

At this time in America there are approximately 6000 motorcycle dealers. Each one of these dealers is hiring somewhere between two and six mechanics. There is no educational system established at this time that is supplying this demand and, consequently, every dealership in America needs well-trained mechanics. The manufacturers have set up schools at their locations to begin training mechanics, but they can only supply a small amount of the total need that exists.

Without question, one of the best answers to this problem is for state and public vocational schools to offer such a training program. This will afford America's youth the opportunity to train themselves in this area and will give us a chance to provide jobs for these people when they leave our educational system. These jobs are such that they will earn them an above-average income and put them into America's financial stream as assets rather than liabilities.

Editor Cook Neilson (14) wrote:

... there are few vocational schools that offer any courses in basic motorcycle engineering and mechanics, and the ones that do exist (Adult Education Department of Eastern Iowa Community College, Davenport; Los Angeles Trade Technical College, Los Angeles; and American Motorcycle Schools, Highland Park, Illinois) either are setting up courses on an experimental basis or limiting the size of enrollment to a pitiful

handful, or both. ... With the market the way it is, the dealers have a hard time sparing their men for even so much as a week. And vocational schools are so weak motorcycle-wise that neither dealers nor distributors can expect too much performance from anyone who has not had practical experience.

And the market continues to explode.

Editor Bob Braverman (3) states:

With motorcycles becoming more complex and more exotic, dealers are becoming hard-pressed to staff their service departments with personnel who are adequately trained to service these new engineering marvels.

The Occupational Outlook Quarterly (13) has found that most motorcycle or scooter owners rely on the services of skilled motorcycle mechanics. They feel the amount of maintenance requirements per motorcycle may rise during the next decade as a result of a trend to higher powered, more complex engines. Further, the number of motorcycles in use is expected to continue growing through the 1970's. The Quarterly expects employment to grow rapidly in this area through the 1970's. They point out the number of motorcycles on the road increased by 300% between 1960 and 1969.

Forbes (24), looking at the motorcycle business as a part of the fast growing recreation market, points to social acceptance as a reason for the remarkable growth. They state that motorcycling seems now firmly established as a major branch of the wide and wonderful leisure-time industry.
Meeting the Needs of Industry

Several alternatives exist to meet industry's needs for trained manpower. The alternative examined in this study is that of full-time study in our public schools.

In 1965 the General Assembly of Iowa approved the development of a statewide system of post-secondary educational institutions. These were designed as area schools and were to be organized by merged areas of two or more counties. These merged area schools were to offer the first two years of college work, vocational and technical training, programs of in-service training and retraining of workers, and programs for all students of high school age who may best serve themselves by enrolling for vocational or technical training while still enrolled in a local school.

Fifteen of these merged area schools have developed throughout the state and their curriculums include over 300 programs in more than 100 different career areas. The growth of the area schools has been impressive both in terms of total number of students enrolled and program opportunities offered. These schools are continually working to provide better service to community, student, and employer.

The Iowa Development Commission, recognizing the need for trained manpower to assist Iowa's industrial development, organized the NEBIT program -- New and Expanding Business
and Industry Training (20). The program was designed to make programs in educational institutions, including area schools, more responsive to the local needs of business and industry as they relate to the expansion and the need for trained manpower.

Area schools contemplating the establishment of career education programs verify the occupational needs locally and statewide. Such programs require the consideration of present and future prospects of employment. Help and criticism of the non-academic world is sought to be certain the preparation for an occupation is useful.

Occupational Surveys

Industrial teacher educators join in the recommendation that occupational needs be examined prior to the establishment of training programs.

Wolansky (26, p.35) writes:

Any assessment of existing programs, or need to introduce a new course or courses must, increasingly, take into consideration the contributions that such a course could make toward enabling young people to move from school to a productive, satisfying adult life.

... These new programs, in part, stem from the pressures of the employers; but to a greater extent, they are initiated by the school administration's awareness to keep industrial education programs functionally related to job opportunities.
Speaking on this same point, Feirer (4) said:

Too often, in vocational education, we tend to perpetuate only traditional programs. Now is the time for curriculum planners and administrators actually to study employment prospects in the decade ahead and then to tailor their occupational programs accordingly.

Goldstein (5) points out we have federal directives to analyze occupational needs:

The 1968 Vocational Education Act amendments require that public vocational education planning take into account future occupational needs. The needs to be met are largely local. Thus, these national projections may serve as a guide to education and training officials nationally, but additional work is needed to collect training statistics and develop manpower projections locally.

There are various models of curriculum development in education. In vocational education the curriculum is supposed to prepare the student to take his place as a productive worker (in the occupation trained for) following graduation. Clearly the curriculum must include training that most efficiently achieves that goal. The determination of what training to include is referred to as "Task Analysis" by Mehail (11).

1. Occupational analysis ... employer needs, facts on job activities, occupational setting.

2. Task analysis ... element of the job that the student must be able to perform.

3. Course planning ... translation of task requirements into units of instruction.

4. Course development ... selection of media, texts, method of instruction, preparation of tests.
5. Evaluation ... adjustment in training to keep abreast with changes in industry.

A number of occupational surveys have been done nationally and locally by government agencies, educational institutions and individuals. An example is the study titled: Manpower and training needs in fluid power for Iowa Industries, by Hoghaug (6).

The purpose of the study was to survey the industries employing technicians and skilled workers in the manufacture of fluid power products and to ascertain if there was a need for persons with these types of skills. Included in the information were the number of job vacancies, replacement needs, number of firms employing technicians and skilled workers involved with fluid power, ages of the persons, hours per week the individuals were involved directly with fluid power, and projected employment needs through 1975. In addition, data were obtained to determine the relative importance of various topic items of curricular content to the fluid power technician and skilled worker.

Analysis of the Job

When an occupation has sufficient workers it is recognized as having certain general characteristics. These characteristics are of interest to individuals who are thinking of entering the occupation, to persons who are
responsible for vocational guidance, and to those who prepare courses of study for occupational entry.

Various agencies study occupations and identify characteristics most pertinent to their needs. The United States Employment Service's Dictionary of Occupational Titles (23) has classified almost 25,000 occupations. This agency has compiled specific data on individual occupations so that employment specialists can observe the relationships among families of occupations. They further arrange occupations by kind of work, level of ability, etc. Their job description for Motorcycle Repairman follows:

MOTORCYCLE REPAIRMAN (auto. ser.) 620.281. motorcycle mechanic. Repairs and overhauls motorcycles, motor scooters, and similar motor vehicles: Listens to engine, examines vehicle's frame, and confers with customer to determine nature and possible extent of malfunction or damage. Connects test panel to engine and measures generator output, ignition timing, and other engine performance indicators. Dismantles engine and repairs or replaces defective parts, such as magneto, carburetor, and generator. Removes cylinder heads, grinds valves, and scrapes off carbon, using handtools and power tools, and replaces defective valves, pistons, cylinders, and rings. Hammers out dents and bends in frame, welds tears and breaks, and reassembles and reinstalls engine. Repairs and adjusts clutch, brakes, and drive chain. Repairs or replaces other motorcycle and motor scooter parts, such as spring fork, headlight, horn, handlebar controls, valve release, gear lever, gasoline and oil tanks, starter, brake lever and muffler.

The job description in the previous example was obtained by what Isaacson (9) describes as job analysis. He relates that it is the act of observing a worker in his work situation by a skilled and trained observer. A composite of
such observations gives the common or average picture of that occupation.

The information obtained by this job analysis appears to have two deficiencies for educational use:

1. It may be easily outdated.

2. It neglects wages, working conditions, source of training, and other information usually desired by prospective workers, vocational counselors, and curriculum developers.

An analysis of the job then, while obtaining information about the specific skills and knowledge required, should attempt to present additional background concerning the work environment i.e., wages, age, training, etc. of those currently employed and where possible, future trends.

Legislated Needs for Qualified Mechanics

The growth of motor vehicle registrations in the United States has contributed to the proliferation of legislation and government agencies to control highway construction, safety, and consumer interest.

Recently Iowa enacted a Motor Vehicle Program that provides for the inspection of motor vehicles and the subsequent accomplishment of repairs, if needed. Since motorcycles are covered by this law the Iowa Department of Public Safety was contacted to find out how the law might affect a training program. Deputy Commissioner Neilsen made the
The Department of Public Safety feels an individual performing the inspection of a motor vehicle is not required to be an expert mechanic, but a knowledgeable technician in the use of devices that are needed and required to perform the official inspection. The current Motor Vehicle Program provides for the inspection of the motor vehicle and the needed repairs; if required, are to be performed either at the place of inspection, the home of the owner, or at another garage or repair shop. The choice is made by the motor vehicle operators.

We are currently involved with collecting data from businesses desiring to become inspection stations and to employing qualified mechanics in their businesses. Each Motor Vehicle Dealer makes and provides a number of claims as to background and experience of each mechanic in his employ. We are not able at this point to repute the claims. The Department of Public Safety would like to require a course of instruction for Motor Vehicle Inspectors to be completed by each individual requesting state certification to inspect motor vehicles. This is an impossibility at this time, but we feel through an association with the Iowa Department of Public Instruction and their Divisions that such a course may be developed by them and offered through the fifteen Area Vocational Technical Schools around the state. We have sent a proposal to the Iowa State Department of Public Instruction concerning our desire to establish such a course of instruction, but have not had a response to this date. I am sure they plan to cooperate with us in this venture.

I fully realize your letter pertains to the motorcycle question and I am not trying to evade your questions. However, we are concerned with other motor vehicles due to the greater number. I can assure you that when a course of instruction has been developed, it will involve motorcycles and their maintenance. In regard to your two specific questions, I would like to

---

answer as follows:

1. Iowa does not require a license for a mechanic in the State of Iowa at the present time, and I do not have the ability to read the actions that may be taken in the future concerning licensing for motor vehicle inspectors.

2. My personal belief is that some licensing of motor vehicle mechanics could contribute greatly to safety by requiring all motor vehicle mechanics to have some degree of uniform preparation.

I do not have any knowledge as to the number of weeks required for any motor vehicle mechanic course and must rely upon the educators to assist us in this matter.

California has recently passed a bill labeled SB-51, popularly called the "Auto-Fraud Repair Bill" (18). Since the bill was amended to include motorcycles and it might be used as a model in other states, selected portions of it have been included in this review.

... [The Bill] makes it unlawful after June 30, 1972, to be an automotive repair dealer without being registered.
... "Motor vehicle" means a passenger vehicle required to be registered with the Department of Motor Vehicles and all motorcycles ... 
... No service shall be designated as minor ... if the performance of the service requires mechanical expertise, has given rise to a high incidence of fraud or deceptive practices, or involves a portion of the vehicle essential to its safe operation.
... The director shall on his own initiative or in response to complaints, investigate on a continuous basis and gather evidence of violations ...

The director, where the automotive repair dealer cannot show there was a bona fide error, may refuse to validate, or may invalidate temporarily or permanently, the registration of an automobile repair dealer for [violations] which are done by the automotive repair dealer or any mechanic, employee, partner, officer, or member of the automotive repair dealer.
[Violations include] ...
... failing or refusing to give a customer a copy of any document requiring his signature ... willful departure from or disregard of accepted trade standards for good and workmanlike repair ... [failing to] record on an invoice and describe all service work done and parts supplied ... [failure to] return replaced parts to the customer [if requested] ... [failure] to maintain records for at least two years. The automotive repair dealer registration fee is not less than twenty-five dollars, nor more than fifty dollars ... annually ...

Existing Motorcycle Mechanic Training Facilities

Some of the public are confused by what true motorcycle mechanic training programs are. Often they point out programs that are actually personal maintenance evening courses for motorcycle owners. Full-time programs of several months duration are very scarce. The most well known is at Los Angeles Trade Technical College at Los Angeles, California.

Trade Tech is one of the city's eight public community colleges and offers sixty programs, one of which is an in depth study of motorcycle repair and shop management. Trade Tech's program involves seventy-two weeks of instruction and leads to an Associate Degree. A detailed description of course content is given in an article in Cycle Mechanics magazine (21). Main headings are included here.

1. Orientation to the Motorcycle Industry (54 Hours)
2. Theory of Tools and Measurement (54 Hours)
3. Internal Combustion Engine Theory (54 Hours)
4. Engine Disassembly and Assembly (216 Hours)
5. Fuel Systems (54 Hours)
6. Carburetor Breakdown and Assembly (108 Hours)
7. Electrical System Principles (72 Hours)
8. Electrical Systems Breakdown and Assembly (162 Hours)
9. Lubricating Systems Theory (36 Hours)
10. Power Transmission Theory (36 Hours)
11. Power Transmission Breakdown and Assembly (162 Hours)
12. Frame and Suspension Theory and Demonstration (108 Hours)
13. Wheel and Brake Laboratory (108 Hours)
14. Engine Diagnosis and Repair (216 Hours)
15. Transmission Diagnosis and Repair (108 Hours)
16. General Service and Tune-up (216 Hours)
17. Shop Management and Control (108 Hours)

Trade Tech's coordinator, W. E. Roth,\(^1\) writes:

This program was developed after several meetings with industry personnel. They advised the College as to course content, equipment and facilities needed. They also publicized the program through many motorcycle publications.

The first motorcycle mechanics repair class was started in March 1967. Since that time the program has grown, and we now have four full time day classes and one evening class that meets two nights a week. Average class size is 24 students per class.

\(^1\)W. E. Roth, Coordinator, Los Angeles Trade Technical College, 400 West Washington Blvd., Los Angeles, California. Information regarding the program. Private communication. February 4, 1972.
The drop out rate is low and most of the students remain to complete the course. The College also offers a work experience program where the student attends class four hours a day and works in a motorcycle shop four hours.

We have had a great deal of interest and response to this program and a great deal of success by our graduated students.

Motorcycle concepts are useful in programs other than those for training mechanics. Los Angeles City College Professor D. A. Landauer was asked how he came to teach Motorcycle Technology to engineering students. Landauer explains:

I started it because Mechanical Engineering here 5 years ago was such a drag. Our lab looked like a mausoleum, and our techniques were circa 1930.

My objectives, generally, are to a.) interest more young men in mechanical engineering and then b.) teach them about the principles in a way that will make them want to know more.

When I started using bikes, 2 years ago, we had 8 students. Now we have 32.

Another training program was investigated by Editor Bob Jackson (12). He interviewed Dale Martin, instructor of motorcycle mechanics and safety at the West Valley Vocational Center in Woodland Hills, California. West Valley is a part of the Los Angeles City School District Adult

1Donald A. Landauer, Assistant Professor, Department of Mechanical Engineering, Los Angeles City College, 855 North Vermont Ave., Los Angeles, California. Information regarding the program. Private communication. January 17, 1972.
Educational Program. They specialize in intensive, short-
term vocational training. Some of the students are high-
school boys who spend three hours per day at West Valley
and three on their high school campus. The balance of the
classes are adults who spend six hours per day for an
entire semester. Several of Martin's comments were selected
for inclusion in this review.

(Do you find an interest in your program?)

There is tremendous interest in the field of motor-
cycle mechanics. I've had inquiries from all over
the country as far away as Maine. People want to know
how they can get into our program. Unfortunately we
are unable to handle the local need and can't even
consider out-of-towners.

(Why this interest in programs such as yours? What about
the factory training programs. Are there not plenty of
openings in these programs?)

No, as a matter of fact it is quite difficult to get
into a factory sponsored program in most cases. These
programs are not open to the public. A dealer referral
is usually required which in most cases means that
you are already employed as a mechanic.

(How does your program of instruction compare with a
factory's program?)

By necessity, the dealer's program is almost always a
cram course. It is a "by the numbers" approach.
... Their program is almost always highly condensed.

In contrast, we are able to spend more time on
theoretical aspects of motorcycle problems. Our
students are able to make value judgements which are
often necessary in working on repair.

(... do the manufacturers help you with your program?)

... cooperation has ranged from minimal to completely
zero. ... [their] main effort is being put into sale
of new units and administering distribution. ... Many of the manufacturers are also involved with a racing program and then finally they may get around to mechanical training.

(What's the reason for this?)

Due to the tremendous popularity of motorcycling, it is a seller's market right now. The consumer is gobbling up the bikes almost as fast as they are produced. So right now the factory doesn't have to be too concerned with the problem.

(But with thousands of new customers, meaning thousands of new bikes to be repaired, is there not some point where they must become very concerned?)

Without a doubt. At some point the boom will subside and the market will become a buyer's market. At that time the consumption level will have reached a point where customer satisfaction will become paramount.

(What would be your advice to a young man wanting to be a motorcycle mechanic?)

It's unfortunate, but I can't tell him to sign up in our course; there just isn't room. What I would tell youngsters in other sections of the country is to try and get your local school boards to create such programs as ours. Contact your legislators and get them to help set up similar programs.

Safety

Many of the articles mention safety, a facet of motorcycling of major importance. Unfortunately, the exploding market makes an up-to-date analysis of the problem almost impossible. Public attention to the problem arose in the early 60's when a sudden increase in motorcycle sales reflected an increased accident rate. One study done in 1968 by Johnson (10) found motorists were the major cause
of auto-motorcycle accidents, but these motorists typically felt the responsibility of avoiding such accidents was that of the motorcyclist. Wagar (25) reports:

... a driver's license in Japan is taken very seriously. There is separate licensing for motorcyclists, and pre-license training can take up to 40 hours of classroom time plus time spent on vehicle operation. A great deal of shame is attached to losing driving privileges, which can happen quite easily if due respect is not shown to other road users.

The lengthy driver and rider training programs before licensing result in a very low fatality rate for new drivers. Unlike this country [United States], where up to 70 percent of all fatalities occur within the first six months of operation, Japanese riders rank low in fatalities during the first year.

Despite this evidence no information could be found that describes efforts of safety authorities to promote improved attitudes among motorists, (toward motorcyclists) or to encourage driver education programs to include motorcycle rider instruction. Quite a number of states have passed, or are attempting to pass, helmet laws. Such laws do nothing to prevent accidents but allegedly protect riders from head injuries when they are involved in an accident.

Wagar (25) writes that many helmets offered for sale to motorcyclists will crack if dropped on the floor. He cites one helmet distributor who had more than 200 helmets returned, that broke in shipping. Apparently there are government agencies working on realistic standards for helmet construction however there were no reports found
that made specific recommendations to solve the present problem.

Federal safety standards for motor vehicles are being applied to new motorcycles. Some of the changes include standardized placement of controls, better lighting, brake light energized by both front and rear wheel brakes, and side reflectors.

Honda - Motorcycle Industry Innovator

Most motorcyclists are familiar with changes in the progress of motorcycling brought about by the Japanese Honda Motor Company Limited and its United States arm: American Honda Motor Company, Incorporated. Those unfamiliar with motorcycling will gain insight by looking into Honda’s development.

Soichiro Honda, now in his 60’s, dropped out of school at age thirteen. He worked as an apprentice in an auto repair shop, raced cars, and finally opened his own shop at twenty-two. At one time he pawned his wife’s clothes to keep a piston-ring foundry alive. In 1948 he obtained 500 engines, attached them to bicycles and began to turn out motorbikes. Life magazine (2) reports that gas was so severely rationed, Honda had to fuel his motorbikes with an extract made from crushed pine roots. When his supply of engines dwindled he began to build his own. He incor-
porated in 1948 with working capital of 2,777 dollars and thirty-four employees. In five years sales reached 6.7 million dollars and Honda relinquished administrative duties to an associate and turned his attention to research and development, his present major interest.

The Honda entry into the United States market began in 1959 when they sold 167 units in this country (1). To get the program moving Honda placed 40,000 dollars of advertising in Life magazine. In 1964 and 1965, Honda cosponsored the Academy Awards on television. From that beginning Honda sales increased to over one-half million units in the United States in 1971. That figure represents slightly over 50% of the American market.

One program of special interest is that of Honda's involvement in the American YMCA (7). In an effort to help youth age 10-16, many of whom were in some kind of trouble, Honda donated 10,000 mini-bikes and 25,000 dollars to the YMCA to use in a program to spark youngster's interest in activities other than delinquency. As a result of the success (and Honda's gift of nearly two million in retail value) The United States government made available 400,000 dollars to set up four regional centers to administer the program. Other business groups are donating helmets, shoes, jackets, and various equipment. Some of these mini-bikes are used by the Iowa YMCA.

Another Honda endeavor has been the production of
safety films, the latest of which runs $13\frac{1}{2}$ minutes and is complemented by forty-five minutes of classroom instruction (1, p. 84). Fifty prints of this film have been ordered by the State of Iowa.

Honda's spectacular growth to their present size has produced parts and service needs of a magnitude never before experienced in the motorcycle industry. American Honda predicted new model sales for 1971 would exceed 1970's by at least 28%. This would result in unit sales of 700,000. Actually sales at mid-year were increasing at a rate much greater than 28% with the high sales months of July and August yet to be tallied.

In an attempt to keep up with this growth in sales, American Honda initiated the Automatic Ordering System in 1970 (8). The heart of A.O.S. is an IBM 360-40 computer fed by fourteen key punch input machines. Main offices are connected to branch warehouses by Honeywell tele-communicators. A.O.S. is designed to prevent over or understocking, by automatically keeping each dealer's inventory at a ninety day supply. Gardena, California warehouses total 145,000 square feet; Moorestown, New Jersey 110,000 and 40,000 square feet each at Portland and Dallas.

In the service area Honda appears to be a leader.
Their national service manager, Bob Young, writes:

I do not know if Honda was the first in warranty labor. It is my understanding though that we were reimbursing at a higher rate than other distributors and manufacturers in 1964, and I believe we were the first to have a national warranty labor reimbursement rate whereby the dealer can be reimbursed at the regular retail shop labor rate.

Honda was the first to pay freight on parts.

With the possible exception of Harley-Davidson, we have the only service school which has one week schools on single systems.

For the past six years we have had three permanent training centers in the United States. Each of these has a full-time training staff. These training centers generally offer year-round training programs and we are the only motorcycle distributor or manufacturer that has been doing this. This year we are adding a new training center in New Jersey which will have training for Honda motorcycles and automobiles. We are relocating the training center, now in Racine, Wisconsin, to Milwaukee, Wisconsin, and are increasing the capacity of the training center. We are also building a new training center in the Gardena area and probably will also expand the training center in Atlanta, Georgia. In the past, each of the training centers were staffed with one full-time instructor, and at this time we are adding another instructor in each training center so each training center will have two full-time instructors who will have no other responsibility except that of training.

Frequently, in the past, the one training center instructor had to also perform some service representative duties. Also each training center was able to handle only one class at a time. The training centers now will be able to handle two classes with 12 students in each, concurrently. By the end of this year we will have four permanent training centers with eight full-time training instructors.

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There are approximately 1,700 Honda dealers across the United States. In the Motorcycle Service Department we have approximately 85 persons on our staff. Of these, 38 are in the field and the remainder are in the Gardena office. All of these people are working with dealer and customer service.

The Immediate Future of the Motorcycle Industry

Modern motorcycles are characterized by technological improvements. They are efficient and reliable. In recent years superior electrical and ignition systems have been introduced. Hydraulic disc brakes and improved tires add to their safety. Engine research has produced power plants that are true engineering marvels. What seems to be coming next?

Cycle Guide (19) reports two factors:

1. Suzuki is apparently off and running with a Wankel engine, having acquired rotary rights two years ago. They are now claiming they will come out with a line of rotary-engine machines for the 1973 model year. ... Kawasaki has taken a renewed interest in rotary engines.

2. ... Of much more immediate interest, however, is the agreement recently concluded between Honda and Harley-Davidson to produce motorcycles on a cooperative basis. ... The concern in Japan is that with the increasing influx of larger, more powerful Japanese motorcycles, Harley-Davidson is faced with a declining percentage of the big bike market, despite their present production being sold out. No details are available yet, but the initial agreement will probably involve the manufacture of the larger displacement Honda touring machines ... [by Harley-Davidson]

What these developments may do to motorcycle sales and service is open to speculation. If sales trends are any indication, the following tables are of interest.
Table 1 provides an indication of the relative position of states regarding numbers of registered motorcycles. With 48,173, Iowa ranked thirteenth in 1969.

Table 2 documents the rapid increase in motorcycle registration in both Iowa and the United States. The growth of registrations in Iowa very closely parallels that of the United States (at a smaller scale). See also Figure 1.

Table 3 indicates the Japanese share of the United States market was 81% in 1970. This share is an increase over the 75% of the previous year. While dollar sales of other suppliers have increased, their share of the total market has decreased, a fact that attests to the vigor of motorcycle sales. During 1970 one-fourth billion American dollars were spent for Japanese motorcycles. Despite a general recession motorcycle sales have been strong, with some models back-ordered. Dealers are bracing for continued sales activity despite the devaluation of the dollar.

Summary

Knowledgeable persons in the motorcycle industry recognize a pressing need for trained motorcycle mechanics. There are indications that factors such as legislation will tend to increase the need to train these workers.

Vocational education has procedures and techniques
Table 1. Motorcycle registrations by state in 1969

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<th>State</th>
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<th>Rank</th>
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Table 2. Private motorcycle registrations 1945 to 1971\textsuperscript{a}

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<td>1957</td>
<td>9,175</td>
<td>456,534</td>
</tr>
<tr>
<td>1956</td>
<td>8,956</td>
<td>419,832</td>
</tr>
<tr>
<td>1955</td>
<td>8,899</td>
<td>401,390</td>
</tr>
<tr>
<td>1954</td>
<td>9,153</td>
<td>394,027</td>
</tr>
<tr>
<td>1953</td>
<td>9,740</td>
<td>401,547</td>
</tr>
<tr>
<td>1952</td>
<td>10,301</td>
<td>407,693</td>
</tr>
<tr>
<td>1951</td>
<td>10,601</td>
<td>420,128</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Source: \textsuperscript{(22)}.

\textsuperscript{b}Off-road motorcycles which do not require vehicle registration are not included.

\textsuperscript{c}Iowa Dept. of Public Safety, Motor Vehicle Registration Division, Des Moines, Iowa. Private communication. January, 1972.

\textsuperscript{d}N.A. - not available.
Table 2. (continued)

<table>
<thead>
<tr>
<th>Year</th>
<th>Iowa</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>11,502</td>
<td>443,954</td>
</tr>
<tr>
<td>1949</td>
<td>11,743</td>
<td>469,872</td>
</tr>
<tr>
<td>1948</td>
<td>11,172</td>
<td>483,591</td>
</tr>
<tr>
<td>1947</td>
<td>8,939</td>
<td>426,794</td>
</tr>
<tr>
<td>1946</td>
<td>5,597</td>
<td>306,580</td>
</tr>
<tr>
<td>1945</td>
<td>3,299</td>
<td>191,176</td>
</tr>
</tbody>
</table>

ALL PRIOR YEARS NOT SIGNIFICANT

for assessing manpower needs, and analyzing the occupation to develop training programs. The area vocational schools are intended to be utilized to train workers where a need can be shown to exist.

Information regarding the few existing training programs, manufacturers efforts, etc. is available to provide background, however formal research directly related to the motorcycle industry or manpower needs for motorcycle mechanics is limited. Research that could be used to assist in determining the need for motorcycle mechanics in Iowa is non-existent. No formal research has been done to determine the skill and knowledge requirements of contemporary motorcycle mechanics.

The results of this review of literature point to the need for this study.
Table 3. Motorcycle imports by quantity and volume

<table>
<thead>
<tr>
<th>Year</th>
<th>TOTAL OF ALL IMPORTS</th>
<th>Japan</th>
<th>United Kingdom</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million $ in 1000's</td>
<td>Million $</td>
<td>% of U.S. Total</td>
<td>Million $</td>
</tr>
<tr>
<td>1970</td>
<td>307</td>
<td>1092</td>
<td>250.3</td>
<td>81</td>
</tr>
<tr>
<td>1969</td>
<td>166</td>
<td>644</td>
<td>124.1</td>
<td>75</td>
</tr>
<tr>
<td>1968</td>
<td>112</td>
<td>348</td>
<td>65.3</td>
<td>N.A.</td>
</tr>
<tr>
<td>1967</td>
<td>104</td>
<td>353</td>
<td>50.3</td>
<td>11.6</td>
</tr>
<tr>
<td>1966</td>
<td>176</td>
<td>691</td>
<td>114.7</td>
<td>31.5</td>
</tr>
<tr>
<td>1965</td>
<td>134</td>
<td>608</td>
<td>95.4</td>
<td>31.5</td>
</tr>
<tr>
<td>1964</td>
<td>68</td>
<td>323</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>1963</td>
<td>38</td>
<td>183</td>
<td></td>
<td>N.A.</td>
</tr>
<tr>
<td>1962</td>
<td>24</td>
<td>122</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961</td>
<td>14</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td>13</td>
<td>61</td>
<td></td>
<td></td>
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<tr>
<td>1959</td>
<td>13</td>
<td>53</td>
<td></td>
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<tr>
<td>1958</td>
<td>13</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>13</td>
<td>53</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^Source: (22).

^N.A. - not available or not significant for all prior years.
METHOD OF PROCEDURE

One purpose of this survey was to determine the number of motorcycle mechanics currently employed by firms in Iowa and adjacent urban areas and to determine additional manpower needs of these firms.

Another goal was to secure information regarding the desired skill and knowledge these workers should possess. Additionally it was intended to obtain background information to provide insight into the industry as it affects motorcycle mechanics.

This chapter describes the procedures used in the collection and analysis of the data necessary to fulfill the objectives of the study.

Technical Assistance

No formal advisory committee was formed to assist in the development of the study since several nearby motorcycle dealers indicated a readiness to give advice and opinion as necessary. The following dealers cooperated whenever required:

Garen Lynn, Lynn Motors, 1700 E. University, Des Moines, Iowa.

George Garvis, Garvis Hondatown, 1603 Euclid, Des Moines, Iowa.

George Mathews, Mathew's Honda, 4224 E. 14th, Des Moines, Iowa.
Sources of Information

The various participants in the motorcycle industry for purposes of this study are diagramed in Figure 2.

To insure that the objectives of the study were covered as completely as possible several sources were surveyed.

1. A questionnaire was sent to motorcycle dealers.
2. A questionnaire was sent to motorcycle owners.
3. A letter inviting discussion was sent to motorcycle manufacturers and motorcycle oriented consumer groups.
4. Interviews of dealers were conducted in which:
   a. Currently employed motorcycle mechanics were asked to fill out a questionnaire.
   b. Shop service records were inspected for kinds of work done.

Motorcycle Dealers Questionnaire

The population in this portion of the study included 149 motorcycle dealers, 130 of whom were Iowa firms and nineteen who were located just outside of Iowa's borders as shown in Figure 3.

The list of dealers to be surveyed was initially obtained by searching the files of licensed motorcycle dealers at Iowa's Motor Vehicle Registration Department at the Lucas Office Building in Des Moines, Iowa. The
Figure 2. Participants in the motorcycle industry
Figure 3. Location of motorcycle dealers included in study
list of dealers was clarified by comparing with advertise-
ments in the Yellow Pages in the telephone books for Iowa
communities. This step gave rise to the out-of-state
firms serving Iowa.

A questionnaire was determined to be the best method
of gathering data from such a large geographical area.
The main questionnaire was designed to fit on one 8½ x 11
page after photo-reduction to 60% of its original size.
The first draft was submitted to twelve different persons
with backgrounds varying from industry to education. As
a result of the pilot survey, corrections and changes were
made and a revised copy was prepared that was mailed to the
dealers included in the study. A copy of the dealer
questionnaire is included in Appendix A.

Questions chosen for inclusion in the dealer question-
aire examined the following:

1. Number of motorcycle mechanics currently employed.
2. Number of motorcycle mechanics needed in the
   near future.
3. Importance of various skill and knowledge cate-
gories.
4. Background for the motorcycle mechanic occupation.
5. Related information about motorcycle dealerships.

Motorcycle Owners Questionnaire

The population for this portion of the study included
302 Iowa licensed motorcycle owners. An N = 300 was chosen
because it was considered to be a sample size that could be handled with the facilities available and still give a representative picture of the owners' point of view. The files of Iowa's Motor Vehicle Registration Department were used to obtain names and addresses as they were for the motorcycle dealer search. A stratification was obtained by determining the total number of registered motorcycles in each of Iowa's ninety-nine counties, then proportioning the 300 by county so the list is geographically representative of motorcycle population in Iowa. Motorcycle registrations were filed by county, then by license number ... in numerical order. By using a pre-constructed table of random numbers and the allotment per county, registration cards were pulled to obtain owners' names and addresses. The process resulted in a stratified random sample distributed as shown in Figure 4.

Once again a questionnaire was determined to be the best method of gathering data. After being submitted to twelve different persons with varying backgrounds, including motorcyclists, corrections and changes in the instrument were made. The final questionnaire was designed to fit on one 8½ x 11 page after reduction to 60% of its original size. A copy of the owner questionnaire is included in Appendix A.

Questions chosen for inclusion in the owner questionnaire examined the following:
Figure 4. Location of motorcycle owners included in study
1. Owner difficulties in finding motorcycle mechanics and parts for needed repairs.

2. Specific repair areas in which owners experienced difficulty.

3. A general profile of the motorcycle owner.

Survey of Motorcycle Manufacturers and Consumer Groups

Identical letters were sent to eight of the leading motorcycle manufacturers and to six motorcycle consumer oriented groups. Manufacturers' national service managers, and presidents or executive directors of the consumer groups received letters. Their names and addresses were obtained from various trade publications (See Appendix B). The identical letters explained the study and asked for comments on the following questions:

1. Is there a need for trained motorcycle mechanics?

2. Do you feel training programs at state vocational schools would be helpful to the motorcycle industry and public?

3. Would you recommend such programs? or

4. Do you currently (or do you plan to) conduct your own programs?

A copy of the letter is included in Appendix B.

Interviews of Motorcycle Dealers

It was felt the questionnaire findings could be better interpreted if several motorcycle dealers were visited
and their concepts of the industry personally obtained.

Twenty dealers were selected. Selection was based on five factors:

1. Respondent indicated a willingness to cooperate.
2. Respondent indicated service records were kept.
3. It was noted at least one, and preferably more, motorcycle mechanics were employed.
4. The respondent wrote comments on the return, indicating interest in the study.
5. The dealership could be worked into a reasonable interview travel plan.

Four dealerships near the intended route who had not returned questionnaires were selected for a spot check. In all, twenty-four dealerships were visited. Four of the dealerships were in Nebraska, two in Illinois, and eighteen in Iowa.

Motorcycle Mechanic Questionnaire

A questionnaire was prepared that asked for general background information related to the occupational environment and for a ranking of importance of skills necessary to the performance of the job. It was given to the mechanics during the interview of dealers. Completed questionnaires were received from thirty-six currently employed motorcycle mechanics. A copy of the questionnaire is included in Appendix A.
Shop Service Record Tabulation

Since the questionnaires filled out by dealers, customers, and motorcycle mechanics may reflect human bias in some undetectable way it was decided to randomly select twenty-four shop service records at each dealership interviewed to be recorded on forms previously prepared for the purpose. Since no such form had yet been developed, a format was used that permitted the addition of service operations not anticipated in the obvious major service areas. A copy of the tabulation device is found in Appendix C.

Knowledge and Skill Categories

In an attempt to simplify the collection and analysis of data it was felt a list of subject areas should be devised. Consequently, the following list was formed from appropriate periodicals, existing curriculum and advice from motorcycle dealers:

1. Fuel Systems
2. Electrical Systems
3. Ignition Systems
4. Lubricating Systems
5. Frame, Suspension
6. Wheels, Brakes
7. Engine, Theory and Repair
8. Transmission
9. Starter, Generator, or Alternator
10. Painting, Finishing
11. Parts Inventory and Display
12. Shop Management and Control
13. Customer Relations
14. Trouble Shooting and Diagnosis
15. Diagnostic Equipment
16. Welding and Brazing

Dealer, customer, and mechanic questionnaires, as well as the service record tally form, use these categories, in this order, as much as possible to permit comparison between groups.

Collection of Data

Because of the seasonally oriented nature of motorcycle sales it was decided to approach the dealers in the late winter months, a time when they would be anticipating the coming season but would not be too busy. The questionnaire letters to manufacturers and consumer groups were mailed early in the fall of 1971 and the replies provided insight that helped develop the remainder of the study.

The owner and dealer questionnaires were mailed because of the wide dispersion of the recipients around the state. The first working day of January, 1972 was chosen for the
first mailing since it was felt the holiday mail would be diminished. Also the tendency for dealerships to begin active preparation for the coming season early in March meant the questionnaires had to be sent early enough to permit follow-ups and subsequent personal interviews while dealers had time.

A cover letter explained the study and emphasized the importance to those receiving the questionnaire. It was attached to dealer questionnaires and was an integral part of the owner questionnaire. Copies of cover letters are found in Appendix A.

Ten days after the first mailing a follow-up post card was sent to non-respondents. Ten days after mailing the post card a second follow-up was sent to remaining non-respondents that included all of the material of the first mailing plus a special cover letter. Copies of follow-up materials are found in Appendix D.

When questionnaire return reached 80% further collection was terminated and coding begun. Plans were finalized to visit the dealers selected on the basis of returned questionnaires described earlier. It was found five trips of one day each would permit inclusion of all twenty-four dealers. The interviewing required travel totaling 2000 miles.
Analysis of the Data

Dealer and owner questionnaires were examined for correctness as they were received. Partially completed returns were useable due to the analysis system selected. Data were recorded on coded tally sheets, then the data were transferred to key punched Hollerith 80-column cards. An IBM 360 model 65 was used to analyze the data.

The same process was used on the mechanic questionnaires when the interviewing was complete. It was decided to tally the service record data by hand since they involved only one type of information.

Arithmetic frequencies and totals were tabulated by computer for the various responses to the dealer, owner, and mechanic questionnaires.

The Statistical Package for Social Sciences by Nie et al. (15) was used for development of analysis tables via computer. These tables permit multiple chi-square comparisons while simultaneously recording "N" and %. By identifying and labeling the variables (responses to questions) the tables are output with headings explained in common terms instead of numerals.

Every dealer and owner involved in the study was identified by residence in or near an Iowa merged school district. This will permit the geographic areas having greatest manpower need for motorcycle mechanics to be described. Iowa merged areas are shown in Figure 5.
Figure 5. Iowa merged area school districts
FINDINGS

This chapter presents the results of five separate attempts to gain information to fulfill the objectives of the study. These separate sources of information were:

1. A questionnaire to motorcycle dealers.
2. A questionnaire to motorcycle owners.
3. A letter inviting discussion sent to manufacturers and others.
4. A motorcycle mechanic questionnaire.
5. A tabulation of motorcycle dealer's shop service records.

The purpose of the study was to assess the employment opportunities, and the need for trained motorcycle mechanics, and to provide information that could be used by persons who may desire to initiate training programs or who intend to examine the motorcycle market more closely.

The findings are presented in two major parts:

1. General findings concerning the five separate sources surveyed.
2. Analysis of findings as they pertain to:
   a. the training of motorcycle mechanics.
   b. the motorcycle market as it influences the motorcycle mechanic's occupation.

General Findings

Discussion letter to manufacturers and others

Since the letter inviting discussion sent to manu-
facturers and others was used to guide the remaining portions of the study it seemed best to present those findings first. Due to the fact the information is in conversational form it is presented by grouped responses to each specific question. All of these responses are private communications and the authors and their addresses are found in Appendix B.

Question 1: Is there a need for trained motorcycle mechanics?

**American Motorcycle Association:** At this time in America there are approximately 6000 motorcycle dealers. ... There is no educational system established at this time that is supplying this demand and, consequently, every dealership in America needs well-trained mechanics.

**Road Rider:** ... we need more mechanics of quality these days! Apparently anybody that can hold a wrench good and tight is considered a qualified mechanic in many cases. Some of the owner problems with poor quality service is really and truly pathetic.

**B.S.A.** Yes there is a definite need for trained mechanics. The shortage grows greater each year due to the fact there are more and more motorcycles and motorcycle retail agencies. The average mechanic is usually a young person who rides a motorcycle and has a natural desire to work on cycles, but has no formal training of any type.

We also have a reluctance on the part of many dealers to send people to mechanics school as they say the man comes back wanting more money and better fringe benefits. I believe the area most overlooked is the person who is not working as a cycle mechanic but wants to become one.

**B.M.W.** ... there is a very definite need for skilled motorcycle mechanics, not only in your fair state of Iowa but all other states as well.

**IFOA:** There is a desperate need for training motorcycle mechanics.
Harley-Davidson: There is always an increasing need for skilled motorcycle mechanics. There are also many people who are interested ... Each week we reply to approximately 10 letters from people who would like to enroll in our service school ... With the motorcycle boom still booming, the need for motorcycle mechanics is increasing.

Hodaka: Yes, there is a definite need for trained motorcycle mechanics.

Suzuki: There is a definite need for more trained, experienced motorcycle mechanics in just about every area of the United States.

Yamaha: ... there is a need for trained motorcycle mechanics.

Question 2: Do you feel training programs at state vocational schools would be helpful to the motorcycle industry and public?

American Motorcycle Association: Without question, one of the best answers to this problem is for state ... vocational schools to offer such a training program. This will afford America's youth the opportunity to train themselves in this area and will give us a chance to provide jobs for these people when they leave our educational system. These jobs are such that they will earn them an above-average income and put them into America's financial stream as assets rather than liabilities.

Slegers-Forbes: The need is there, the opportunity is there, now all it needs is more trained men and I hope you are successful in establishing a course of study in Iowa's vocational schools.

B.S.A.: Training at a state vocational school would be the best approach of all, in my mind. Trainees would then receive knowledge on all cycles, rather than just one brand.

Harley-Davidson: Since we are not able to train people other than our dealers and their mechanics, we refer all requests for enrollment in our school to [vocational schools].
Honda: The best means of providing a good grounding in fundamentals is at the local level, and without fundamentals, mechanics cannot be considered trained.

IFOA: Yes, very helpful. Any training is as effective as the instructor and the preparation. In saying "yes" I'm assuming a meaningful and relevant training program.

Hodaka: Yes, state vocational schools should be the place where this training is obtainable.

Suzuki: One excellent method of providing these mechanics is courses offered by state vocational schools...

Yamaha: ... we not only encourage but help public schools, vocational schools, private schools, and penal institutions.

Question 3: Would you recommend such programs?

B.S.A.: We would be glad to recommend and endorse any state vocational program. We would also be willing to lend any type of experience we could to such a venture. It would be to our advantage to cooperate 100%.

Honda: We do encourage such programs.

IFOA: Answered ... in the affirmative.

Kawasaki: Vocational schools are realistic and I think the question need not even be asked, as Kawasaki Motors Corp. has aided in the support of as many of these schools as possible.

Most respondents felt their reply to question 2 satisfactorily answered question 3.

Question 4: Do you (or do you plan to) conduct your own programs?

B.M.W.: We do have Service School facilities available but in view of our large organization, only our franchised dealers and their mechanics can attend.
B.S.A.: [Yes] ... The big drawback to our schools is the fact that we can only teach a few men at a time (15-20), and we only have one week to work with them.

Harley-Davidson: ... we are not able to train people other than our dealers and their mechanics ...

Honda: [See Review of Literature - Comments on Honda]

Kawasaki: Kawasaki Motors Corp. has their own training program which deals exclusively with our products. This program is available to mechanical employees of our authorized dealerships.

Suzuki: ... just recently, we have initiated a five-day service seminar for employees of Suzuki dealers. This school covers basics in carburetion, electronics, engine and transmission and new motorcycle set-up. Additionally we have set aside time for practical work and trouble shooting.

Most of the manufacturers responding included outlines of their current training programs. Copies of these outlines are found in Appendix E.

Observations during the dealership interviews

Twenty-four dealers were visited, four who had not returned questionnaires and twenty who had returned them.

The spot check of the four non-respondents revealed that one was out of business and the remaining three were operating the dealership as a side line. None employed what appeared to be full-time motorcycle mechanics although they had little time for the interviewer's questions.

Seventeen of the twenty selected for interviews were cooperative. Two of the three who would not help apparently resisted because the owner was out of town. The third simply refused to cooperate and no reason was given.
The seventeen cooperating dealers ranged from "compact" shops to very large establishments. The smallest employed a total of four people, the largest, twenty-three.

A specific interview of the dealer was not intended because of time limitations, however considerable discussion was unavoidable. The interviewer noted that:

1. Dealers almost universally have no concept of the possibility that the Iowa merged area schools could be of help to them as businessmen.

2. Dealers have some widely opposing views regarding the acceptable development of motorcycle mechanics.

3. Dealers are quite independent. They left the interviewer with the distinct impression that educators weren't likely to win their confidence by telling them how a thing ought to be done.

4. Dealers commonly charge eight to ten dollars per hour for service shop work regardless of the kind of work being done or who does it.

5. Many of the motorcycle dealers have snowmobile brands to stimulate their winter sales, however very few felt this line of activity was likely to be a major part of their future business. This seemed to be due to minimal snow cover during Iowa winters.

Service record tally

The original intent to randomly select twenty-four service records from each interviewed dealer was expected to result in about 400 individual repairs that would then be grouped into major categories.

Actually the request for twenty-four service records was answered in a variety of ways by the seventeen dealers cooperating in this phase of the study. It should be noted
1. Dealers file their service records in many ways ranging from neat alphabetical arrangement by year, in filing cabinets, to using them as props for the filing cabinets. Quite a random selection resulted.

2. Although some dealers provided records from winter months, and others from summer months, the only difference noticed in the type of work done was that a marked increase in tune-up and minor repair occurred in the summer months.

3. Usually more than twenty-four records were observed since a few were voided, unreadable, etc.

4. Usually an individual service record had several individual repairs on it, i.e., individual service records were written by motorcycle, not by specific repair.

5. "Service record" is not a universal term, "work order", "repair order", and "damn paperwork" being used equally and with varying degrees of emphasis.

6. Mechanics usually fill out the service records and use a variety of terms to describe the repairs. Generally the parts used help to clarify the service performed.

7. Some dealers consider these records a total nuisance, others feel they are important, however the only reason given for keeping them was for legal proceedings. No dealer intended to use them in an analysis of his service operation.

8. The majority of interviewed dealers were suspicious of the interviewer's intent in tallying the service records. Once convinced the purpose was to aid in structuring a course of study for motorcycle mechanics many were outwardly skeptical. One expressed this skepticism as a reason for refusing to cooperate.

9. Visits to many different dealerships indicated Honda dealers most often have a substantial investment in modern buildings with modern, tasteful showrooms and up-to-date service facilities. Honda dealers, as a rule, were much more receptive to discussion regarding training programs.
The final tally netted 974 individual repairs which were then grouped under major categories as shown in Table 4. A complete breakdown is shown in Appendix C.

Note that safety inspections and warrantee check-ups were not recorded because they were so numerous they interfered with data collection. New vehicle set-up was not included since some dealers did not charge that function to service. Warrantee checks were usually recorded simply as warrantee checks although they often include a tune-up and were recorded that way by some dealers. Because of the lack of uniformity in recording these kinds of service a percentage cannot be attached to the time accounted for by them. It appears to be very large, as much as 50% of the time in some shops.

About half of the repairs appeared to be of a nature that would require a highly competent mechanic. They involved disassembly and reassembly of major components and/or knowledge of some complex or intricate system. There were twenty-nine occasions that specifically recorded trouble shooting or diagnostic services although it is certain many of the other repairs required this high level of expertise but did not record it as such. Engine repairs were the most prevalent service, followed by electrical system repairs.

The other half of recorded repairs were of a less difficult type. For example, a quite large number of cable,
Table 4. Distribution of repairs by major category

<table>
<thead>
<tr>
<th>Estimated level of repair</th>
<th>Major</th>
<th>Minor</th>
<th>Total</th>
<th>Major service category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31</td>
<td>21</td>
<td>52</td>
<td>Fuel system</td>
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<td></td>
<td>91</td>
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<td>182</td>
<td>Electrical system</td>
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<td>10</td>
<td>34</td>
<td>44</td>
<td>Ignition system</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>53</td>
<td>58</td>
<td>Lubricating system</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>10</td>
<td>35</td>
<td>Frame, suspension</td>
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<td>75</td>
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<td>Wheels, brakes</td>
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<td>146</td>
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<td>Engine repair</td>
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<td>67</td>
<td>40</td>
<td>107</td>
<td>Transmission, chain, sprockets</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>0</td>
<td>25</td>
<td>Starter, generator, alternator</td>
</tr>
<tr>
<td></td>
<td>59</td>
<td>43</td>
<td>102</td>
<td>Miscellaneous^c</td>
</tr>
<tr>
<td></td>
<td>462</td>
<td>492</td>
<td>974</td>
<td>TOTALS</td>
</tr>
</tbody>
</table>

^Does not include safety inspection and warrantee check-up. These services and new vehicle set-up not treated as service by all dealers.

^Estimate: Major -- Requires major knowledge of system. Minor -- Could be learned easily.

^cIncludes painting, finishing, welding, brazing, etc.
lever, and control adjustments and replacements were noted. Also recorded were a great many services like tire repair, battery charging or installation, chain adjustments, bulb replacement, and simple tune-ups.

New vehicle set-up and warrantee checks are usually a minor level of service unless an unusual problem is encountered. Many complex components are simply replaced rather than repaired, as is generally the case with speedometers and tachometers.

The service records were a useful source of information but were occasionally weak as it regards accurate description and uniform procedure.

**Motorcycle mechanic questionnaire**

The dealers that were interviewed were selected for several reasons, one being that they had one or more motorcycle mechanics in their employ. As a result the seventeen dealerships visited netted thirty-six motorcycle mechanics who filled out questionnaires.

Working conditions observed were remarkably neat and sanitary in some shops and noticeably unsafe and unhealthy in others. The environment seemed to affect the mechanic's attitude in most cases, the well kept shops having the more serious, attentive mechanics and the messy shops having noisy, unkept mechanics. The presence of a mechanic acting as service manager didn't seem to insure a neat work
environment.

Summary 1 provides a profile of the motorcycle mechanic. His average age is 24.7 with the older respondents generally being service managers, the youngest part-time and referring to themselves as assistants or set up men.

One-third are, or had been, college students, which may account for their unexpected interest in the study and the possibility of training programs.

Almost one-third indicated less than high school completion, or did not record their schooling. Some of these individuals did not understand the questionnaire terms i.e., "diagnosis", "inventory", and "management".

As might be expected, those indicating several years experience generally identified themselves as service managers. Those with little experience were usually assistants and/or part-time employees. Seventeen respondents had two or less years of experience and nineteen had three or more.

The most common source of training was found to be a company school with just over one-third of the respondents noting this category. They almost never listed months of training completed presumably because these schools are typically one to two weeks in length. Seven wrote some reference to on-the-job training in the margin.

When asked to rank the importance of specific categories of knowledge in their jobs, these men responded
Summary 1. Motorcycle mechanic profile

<table>
<thead>
<tr>
<th>Age (yrs.)</th>
<th>No. persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (yrs.)</th>
<th>No. persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
</tr>
<tr>
<td>48</td>
<td>1</td>
</tr>
</tbody>
</table>

Average age: 24.7

Highest grade completed:

<table>
<thead>
<tr>
<th>Grade</th>
<th>High school</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>9 10 11 12</td>
<td>1 2 4</td>
</tr>
<tr>
<td>No. persons</td>
<td>1</td>
<td>2 1 2 14</td>
</tr>
</tbody>
</table>

Years employed as a motorcycle mechanic?

- Less than one: 8
- 1-2 yrs: 9
- 3-4 yrs: 8
- 5-6 yrs: 4
- 7-8 yrs: 1
- over 8: 6

Married:

- Full-time: 32
- Part-time: 4

25: Yes 10: No

Major responsibilities (some checked more than one)

- 25: General Mechanic
- 3: Mechanic's Assistant
- 1: Specialist in an area
- 2: Set-up man
- 12: Service Manager
- 2: Other (General manager)
- (Parts manager)

Where training specifically related to motorcycle mechanics was obtained. (by persons reporting)

- 2: High school
- 1: Trade school
- 1: College or Univ.
- 13: Company school
- 1: Apprenticeship
- 1: Other (Correspondence)
as shown in Table 5.

**Owner questionnaire**

Useful questionnaires were received from 240 motorcycle owners (79.5%). Of the sixteen unuseable returns (5.3%), half were not deliverable due to an incomplete address or having moved. Four individuals reported they no longer owned their motorcycles. At the time of terminating coding, forty-six subjects had not returned questionnaires (15.2%). Twenty-one of the respondents included letters of a paragraph or more in length and several more wrote comments. Relevant portions of these are included in Appendix F. The majority of the twenty-one letters were critical of some phase of service and generally described the owners need to do his own service work. Some of these respondents then marked the questions as it pertained to the service work they had done, and they always found their own work quite acceptable.

Table 6 gives a geographic distribution of motorcycle owner respondents. The largest group is found in Merged Area 11 which includes Des Moines, Iowa. Area 10 is the next largest and includes Cedar Rapids and Iowa City. Areas 13 and 9 are among those having a fairly large number of respondents but do not reflect the large urban areas across the border, i.e., Omaha near Area 13, and Moline and Rock Island near Area 9.
Table 5. Motorcycle mechanics opinions regarding skills and knowledge important to their jobs

<table>
<thead>
<tr>
<th>Skill-knowledge category</th>
<th>Very important</th>
<th>Occasionally necessary</th>
<th>Not important</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel systems</td>
<td>31</td>
<td>4</td>
<td>0</td>
<td>88.6</td>
<td>11.4</td>
<td>0</td>
<td>0</td>
<td>11.4</td>
<td>0</td>
</tr>
<tr>
<td>Electrical systems</td>
<td>32</td>
<td>4</td>
<td>0</td>
<td>88.9</td>
<td>11.1</td>
<td>0</td>
<td>0</td>
<td>11.1</td>
<td>0</td>
</tr>
<tr>
<td>Ignition systems</td>
<td>34</td>
<td>2</td>
<td>0</td>
<td>94.4</td>
<td>5.6</td>
<td>0</td>
<td>0</td>
<td>5.6</td>
<td>0</td>
</tr>
<tr>
<td>Lubricating systems</td>
<td>22</td>
<td>11</td>
<td>2</td>
<td>62.9</td>
<td>31.4</td>
<td>2</td>
<td>5.7</td>
<td>31.4</td>
<td>0</td>
</tr>
<tr>
<td>Frame, suspension</td>
<td>16</td>
<td>13</td>
<td>1</td>
<td>45.7</td>
<td>51.4</td>
<td>1</td>
<td>2.9</td>
<td>51.4</td>
<td>0</td>
</tr>
<tr>
<td>Wheels, brakes</td>
<td>21</td>
<td>14</td>
<td>0</td>
<td>60.0</td>
<td>40.0</td>
<td>0</td>
<td>0</td>
<td>40.0</td>
<td>0</td>
</tr>
<tr>
<td>Engine, theory and repair</td>
<td>33</td>
<td>3</td>
<td>0</td>
<td>91.7</td>
<td>8.3</td>
<td>0</td>
<td>0</td>
<td>8.3</td>
<td>0</td>
</tr>
<tr>
<td>Transmission</td>
<td>31</td>
<td>5</td>
<td>0</td>
<td>86.1</td>
<td>13.9</td>
<td>0</td>
<td>0</td>
<td>13.9</td>
<td>0</td>
</tr>
<tr>
<td>Starter, generator, alternator</td>
<td>22</td>
<td>13</td>
<td>0</td>
<td>62.9</td>
<td>37.1</td>
<td>0</td>
<td>0</td>
<td>37.1</td>
<td>0</td>
</tr>
<tr>
<td>Painting, finishing</td>
<td>2</td>
<td>14</td>
<td>19</td>
<td>5.7</td>
<td>40.0</td>
<td>54.3</td>
<td>0</td>
<td>40.0</td>
<td>54.3</td>
</tr>
<tr>
<td>Parts inventory and display</td>
<td>7</td>
<td>11</td>
<td>17</td>
<td>20.0</td>
<td>31.4</td>
<td>48.6</td>
<td>0</td>
<td>31.4</td>
<td>48.6</td>
</tr>
<tr>
<td>Shop management and control</td>
<td>12</td>
<td>14</td>
<td>9</td>
<td>34.3</td>
<td>40.0</td>
<td>25.7</td>
<td>0</td>
<td>40.0</td>
<td>25.7</td>
</tr>
<tr>
<td>Customer relations</td>
<td>24</td>
<td>6</td>
<td>5</td>
<td>68.6</td>
<td>17.1</td>
<td>14.3</td>
<td>0</td>
<td>17.1</td>
<td>14.3</td>
</tr>
<tr>
<td>Trouble shooting and diagnosis</td>
<td>34</td>
<td>2</td>
<td>0</td>
<td>94.4</td>
<td>5.6</td>
<td>0</td>
<td>0</td>
<td>5.6</td>
<td>0</td>
</tr>
<tr>
<td>Diagnostic equipment</td>
<td>21</td>
<td>10</td>
<td>3</td>
<td>61.8</td>
<td>29.4</td>
<td>8.8</td>
<td>0</td>
<td>29.4</td>
<td>8.8</td>
</tr>
<tr>
<td>Welding and brazing</td>
<td>5</td>
<td>19</td>
<td>11</td>
<td>14.3</td>
<td>54.3</td>
<td>31.4</td>
<td>0</td>
<td>54.3</td>
<td>31.4</td>
</tr>
</tbody>
</table>
Table 6. Owner response by area school district

<table>
<thead>
<tr>
<th>School district area</th>
<th>N</th>
<th>Yes (n/%) (^b)</th>
<th>Return No (n/%) (^b)</th>
<th>Unuseable (n/%) (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td>19/82.6</td>
<td>4/17.4</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>9/ 64.3</td>
<td>4/ 28.6</td>
<td>1/ 7.1</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>8/ 88.9</td>
<td>1/11.1</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>7/ 77.8</td>
<td>2/22.2</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>14/ 73.7</td>
<td>5/26.3</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>9/ 90.0</td>
<td>1/10.0</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>7</td>
<td>21</td>
<td>19/90.0</td>
<td>2/ 9.5</td>
<td>0/ 0.0</td>
</tr>
<tr>
<td>9</td>
<td>22</td>
<td>16/72.7</td>
<td>5/22.7</td>
<td>1/ 4.5</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
<td>23/76.7</td>
<td>4/13.3</td>
<td>3/10.0</td>
</tr>
<tr>
<td>11</td>
<td>68</td>
<td>57/83.8</td>
<td>5/ 7.4</td>
<td>6/ 8.8</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>13/81.3</td>
<td>2/12.5</td>
<td>1/ 6.3</td>
</tr>
<tr>
<td>13</td>
<td>21</td>
<td>19/90.5</td>
<td>1/ 4.8</td>
<td>1/ 4.8</td>
</tr>
<tr>
<td>14</td>
<td>10</td>
<td>5/50.0</td>
<td>4/40.0</td>
<td>1/10.0</td>
</tr>
<tr>
<td>15</td>
<td>17</td>
<td>13/76.5</td>
<td>3/17.6</td>
<td>1/ 5.9</td>
</tr>
<tr>
<td>16</td>
<td>13</td>
<td>9/59.2</td>
<td>3/21.1</td>
<td>1/ 7.7</td>
</tr>
<tr>
<td>Totals</td>
<td>302</td>
<td>240/79.5</td>
<td>46/15.2</td>
<td>16/ 5.3</td>
</tr>
</tbody>
</table>

\(^a\) Chi-square of 25.51 not significant at the .05 level.

\(^b\) Percentage sums to 100 across rows.
Summaries 2 and 3 give a profile of the motorcycle owner as a consumer of motorcycle service in the state of Iowa. Summary 2 describes the person and Summary 3 his experiences with motorcycle service.

From Summary 2 it is found the largest group of motorcycle owners is aged eighteen to twenty-one with the over forty-two group in second place. Of the respondents, 222 (95.7%) were male. Ten (4.3%) were female. Another eight were unsure as to how to answer this question. Almost three-fourths are not attending school. Slightly over half are married.

It was found 86.2% have at least one year's experience with motorcycling and 37.5% have five or more years experience. Over two-thirds have not attended a motorcycle race in the last twelve months, and only twelve reported they use their motorcycles for competition. The largest group indicated they used their motorcycles for weekly recreation.

Honda owners outnumbered the nearest competitor by almost three to one, with small machines (0-100cc) being the most common. One-fourth of the machines are larger than 400cc, which is generally the lower limit for high performance street motorcycles.

Of particular interest is the fact that 49.6% of the respondents own motorcycles that are model year 1970 or newer.
Summary 2. Motorcycle owner profile

1. What is your age?

<table>
<thead>
<tr>
<th>Age</th>
<th>Under 18</th>
<th>18-21</th>
<th>22-25</th>
<th>26-29</th>
<th>30-33</th>
<th>34-37</th>
<th>38-41</th>
<th>Over 42</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>26</td>
<td>55</td>
<td>38</td>
<td>18</td>
<td>17</td>
<td>15</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>10.9</td>
<td>23</td>
<td>15.9</td>
<td>7.5</td>
<td>7.1</td>
<td>6.3</td>
<td>11.7</td>
<td>17.6</td>
</tr>
</tbody>
</table>

2. What is your sex?

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>222</td>
<td>10</td>
</tr>
<tr>
<td>%</td>
<td>95.7</td>
<td>4.3</td>
</tr>
</tbody>
</table>

3. Are you currently attending school?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>62</td>
<td>174</td>
</tr>
<tr>
<td>%</td>
<td>26.3</td>
<td>73.4</td>
</tr>
</tbody>
</table>

4. Are you married?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>133</td>
<td>102</td>
</tr>
<tr>
<td>%</td>
<td>56.6</td>
<td>43.4</td>
</tr>
</tbody>
</table>

5. How long have you participated in motorcycling?

<table>
<thead>
<tr>
<th>Duration</th>
<th>0-11mos.</th>
<th>1-2yrs.</th>
<th>3-4yrs.</th>
<th>5-6yrs.</th>
<th>7-8yrs.</th>
<th>9-11yrs.</th>
<th>over 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>33</td>
<td>60</td>
<td>57</td>
<td>40</td>
<td>14</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>13.8</td>
<td>25.0</td>
<td>23.8</td>
<td>16.7</td>
<td>5.8</td>
<td>2.5</td>
<td>12.5</td>
</tr>
</tbody>
</table>

6. Have you attended a motorcycle race in the last twelve months?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>72</td>
<td>166</td>
</tr>
<tr>
<td>%</td>
<td>30.3</td>
<td>69.7</td>
</tr>
</tbody>
</table>
Summary 2 (Continued)

7. For which of the following do you use your motorcycle most? (Some checked more than one)

<table>
<thead>
<tr>
<th>Weekly recreation</th>
<th>Economical transport.</th>
<th>Touring</th>
<th>Competition</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>173</td>
<td>58</td>
<td>20</td>
<td>12</td>
</tr>
</tbody>
</table>

8. What brand of motorcycle do you own?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Honda</th>
<th>Yamaha</th>
<th>Harley</th>
<th>Triumph</th>
<th>Suzuki</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>111</td>
<td>40</td>
<td>27</td>
<td>16</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>%</td>
<td>46.4</td>
<td>16.7</td>
<td>11.3</td>
<td>6.7</td>
<td>6.3</td>
<td>5.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brand</th>
<th>Kawasaki</th>
<th>BMW</th>
<th>BSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>12</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>5.0</td>
<td>1.3</td>
<td>0.8</td>
</tr>
</tbody>
</table>

9. What is the displacement of your motorcycle? (cc)

<table>
<thead>
<tr>
<th>(cc)</th>
<th>0-100</th>
<th>101-200</th>
<th>201-300</th>
<th>301-400</th>
<th>401-500</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>69</td>
<td>39</td>
<td>31</td>
<td>39</td>
<td>13</td>
</tr>
<tr>
<td>%</td>
<td>29.4</td>
<td>16.6</td>
<td>13.2</td>
<td>16.6</td>
<td>5.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(cc)</th>
<th>501-600</th>
<th>601-700</th>
<th>701-800</th>
<th>801-900</th>
<th>901-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>1.7</td>
<td>5.1</td>
<td>3.8</td>
<td>2.6</td>
<td>0.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(cc)</th>
<th>over 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>12</td>
</tr>
<tr>
<td>%</td>
<td>5.1</td>
</tr>
</tbody>
</table>

10. What is the year of your motorcycle?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>4</td>
<td>59</td>
<td>55</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>%</td>
<td>1.7</td>
<td>24.8</td>
<td>23.1</td>
<td>10.1</td>
<td>9.7</td>
<td>9.2</td>
<td>7.1</td>
<td>10.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>56-60</th>
<th>51-55</th>
<th>45-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>%</td>
<td>2.6</td>
<td>0.4</td>
<td>1.3</td>
</tr>
</tbody>
</table>
11. Do you perform your own routine maintenance on your motorcycle? (Check battery, oil, lube chain, etc.)

<table>
<thead>
<tr>
<th>Response</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>203</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>%</td>
<td>84.9</td>
<td>12.1</td>
<td>2.9</td>
</tr>
</tbody>
</table>

12. Do you (will you) perform your own minor repair or service on your motorcycle? (Change points, adjust brakes, carburetor, etc.)

<table>
<thead>
<tr>
<th>Response</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>122</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>%</td>
<td>51.0</td>
<td>24.3</td>
<td>24.7</td>
</tr>
</tbody>
</table>

Most of the owners performed their own routine maintenance, but only half plan on doing minor repair work.

Summary 3 doesn't give as good a picture as was expected because "service work" was taken to mean repairs by some and any service, including oil changes and tune-ups, by others. Ignition and engine services were most often indicated with electrical system work ranking high. Most customers felt their service work was "minor" except under engine service where "major" was the larger response.

Almost half (44.2%) of the respondents didn't find needed parts available on some occasions. Mechanics were not available in 43.2% of the cases. Half of those who responded weren't ready to describe the quality of work as "well done". They account for 61.1% of those who had
Summary 3. Owner responses pertaining to service

13. Check those categories in which you have had service work done.

<table>
<thead>
<tr>
<th>Major</th>
<th>Minor</th>
<th>Total</th>
<th>Areas where work was done</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>49</td>
<td>58</td>
<td>Fuel system</td>
</tr>
<tr>
<td>14</td>
<td>48</td>
<td>62</td>
<td>Electrical system</td>
</tr>
<tr>
<td>16</td>
<td>67</td>
<td>83</td>
<td>Ignition system</td>
</tr>
<tr>
<td>10</td>
<td>32</td>
<td>41</td>
<td>Lubricating system</td>
</tr>
<tr>
<td>12</td>
<td>21</td>
<td>33</td>
<td>Chassis</td>
</tr>
<tr>
<td>14</td>
<td>34</td>
<td>48</td>
<td>Wheels, brakes, tires</td>
</tr>
<tr>
<td>44</td>
<td>27</td>
<td>71</td>
<td>Engine, mechanical</td>
</tr>
<tr>
<td>23</td>
<td>31</td>
<td>54</td>
<td>Transmission</td>
</tr>
<tr>
<td>13</td>
<td>25</td>
<td>38</td>
<td>Starter, generator, alternator</td>
</tr>
<tr>
<td>12</td>
<td>17</td>
<td>29</td>
<td>Finish</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td>No service work done</td>
</tr>
</tbody>
</table>

14. Were parts available to satisfactorily fix your motorcycle?

<table>
<thead>
<tr>
<th>Response:</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>124</td>
<td>71</td>
<td>27</td>
</tr>
<tr>
<td>%</td>
<td>55.9</td>
<td>32.0</td>
<td>12.2</td>
</tr>
</tbody>
</table>

15. Were mechanics available to get the work done?

<table>
<thead>
<tr>
<th>Response:</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>117</td>
<td>59</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>56.8</td>
<td>28.6</td>
<td>14.6</td>
</tr>
</tbody>
</table>

16. If you have had any service performed on your motorcycle, how would you describe it?

<table>
<thead>
<tr>
<th>Response:</th>
<th>Well done</th>
<th>Acceptable</th>
<th>Poorly done</th>
<th>Didn't have any done</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>69</td>
<td>74</td>
<td>35</td>
<td>42</td>
</tr>
<tr>
<td>%</td>
<td>31.4</td>
<td>33.6</td>
<td>15.9</td>
<td>19.1</td>
</tr>
</tbody>
</table>
work done. Approximately twelve of those who marked "well done" to describe service work quality, either clarified their response to explain they did their own work, or attached letters of complaint, implying they had experienced both extremes.

**Dealer questionnaire**

Useful returns were received from 121 of the dealers or 81.2%. Of the seven considered unuseable, two had sold out profitably, two had gone out of business, one was unidentifiable, and one had inadvertently been listed twice in the original list. Twenty-two questionnaires were not returned (14.8%). Of these, four were spot checked and three were found to be operating the business as a sideline, and one had gone out of business.

Table 7 gives the geographic distribution of dealer respondents. The largest group is found in Merged Area 11. Out-of-state respondents are included in the merged area they are closest to, so Areas 9 and 13 are enlarged.

Summary 4 presents some supplemental information about the motorcycle dealers who received questionnaires in this portion of the study. The 28.9% group who belong to the Iowa Motorcycle Dealers Association are somewhat diminished since nineteen dealers in the study are located out of Iowa. If only Iowa dealers are included the percentage becomes 35.8. Slightly over half have begun their business in the
Table 7. Dealer response by area school district

<table>
<thead>
<tr>
<th>School district area</th>
<th>N</th>
<th>Yes (n/%)^b</th>
<th>Return</th>
<th>No (n/%)^b</th>
<th>Unuseable (n/%)^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>6/ 85.7</td>
<td>1/14.3</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>9/100.0</td>
<td>0/ 0.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>8/ 88.9</td>
<td>1/11.1</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2/100.0</td>
<td>0/ 0.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>7/ 70.0</td>
<td>3/30.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>4/ 80.0</td>
<td>1/20.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>6/100.0</td>
<td>0/ 0.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>12/ 66.7</td>
<td>5/27.8</td>
<td>1/ 5.6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>12/ 80.0</td>
<td>2/13.3</td>
<td>1/ 6.7</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>20</td>
<td>16/ 80.0</td>
<td>3/15.0</td>
<td>1/ 5.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>9/ 81.8</td>
<td>1/ 9.1</td>
<td>1/ 9.1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>12</td>
<td>9/ 75.0</td>
<td>2/16.7</td>
<td>1/ 8.3</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>5/ 83.3</td>
<td>0/ 0.0</td>
<td>1/16.7</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>8/ 80.0</td>
<td>2/20.0</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>9</td>
<td>8/ 88.9</td>
<td>1/11.1</td>
<td>0/ 0.0</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>149</td>
<td><strong>121/ 81.2</strong></td>
<td><strong>22/14.8</strong></td>
<td><strong>6/4.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

^Chi-square of 16.08 not significant at the .05 level.  
^bPercentages sum to 100 across rows.
Summary 4. Dealer supplemental information

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dealers who belong to Iowa m/c Dealers Assoc.</td>
<td>43</td>
<td>28.9</td>
</tr>
<tr>
<td>Dealers who were in business in 1968</td>
<td>72</td>
<td>48.3</td>
</tr>
<tr>
<td>Dealers who advertise in the yellow pages</td>
<td>113</td>
<td>75.8</td>
</tr>
</tbody>
</table>

Brand of motorcycles sold (one to three brands advertised, brand shown is major interest):

<table>
<thead>
<tr>
<th>Brand:</th>
<th>Honda</th>
<th>Yamaha</th>
<th>Kawasaki</th>
<th>Suzuki</th>
<th>H-D</th>
<th>BSA-Tri.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Dealers:</td>
<td>34</td>
<td>23</td>
<td>14</td>
<td>14</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>%</td>
<td>23.0</td>
<td>15.5</td>
<td>9.5</td>
<td>9.5</td>
<td>8.8</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Four or more brands sold: 6 dealers (4.1%)
Brand not listed is specialty: 41 dealers (27.7%)
Also deal in auto, farm impl., or marine: 12 dealers (8.1%)
Dealers out-of-state: 19 (12.8%)

aDescribes those receiving questionnaires.

last five years. Three-fourths advertise in the yellow pages. Slightly over half (57.5%) of the dealers included in the survey were selling Japanese made motorcycles, although the number might be higher if some of the forty-one dealers who sell less popular brands were found to sell Japanese brands. Since only 8.1% sell other major items it appears 137 dealers are exclusively motorcycle
oriented.

One-third (33.9%) of those returning questionnaires (forty-one dealers) wrote comments. A list of relevant comments can be found in Appendix F. Most of the comments were favorable to the idea of training programs for motorcycle mechanics. Quite a number made suggestions regarding the qualities a motorcycle mechanic should have.

Summary 5, Table 8, and Table 9 present the general responses of motorcycle dealers to the survey questions. Summary 5 describes the dealership, and Tables 8 and 9 describe how dealers see the motorcycle mechanic.

From Summary 5 it can be seen the most common shop is one in which the owner works as a mechanic. Shops that hire only one paid person are most frequently encountered among shops that hire outside help. Forty-three (35.5%) shops that employ two or more full-time mechanics have 111 motorcycle mechanics working for them, or 75% of those reported as currently employed full-time.

If it were possible, these dealers would hire 141 more full-time motorcycle mechanics in the next two years, almost doubling the number currently employed. Of those responding, 80.2% think this need can be helped with training programs in the public schools.

It was found that 38.0% of the dealers employed a full-time service manager, and 49.2% employed a full-time parts employee.
Summary 5. Motorcycle dealer profile

1. How many motorcycle mechanics do you employ?

<table>
<thead>
<tr>
<th>No. full-time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>37</td>
<td>23</td>
<td>16</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>37</td>
<td>46</td>
<td>48</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Total full-time</td>
<td>148</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. part-time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>46</td>
<td>19</td>
<td>8</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>46</td>
<td>38</td>
<td>24</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Total part-time</td>
<td>133</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. owner-mechanic</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>60</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>60</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Total owner-mechanic</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. If you could find mechanics who were, in your opinion, well qualified, how many would you hire ... (considering expansion, replacement, etc.)

**Full-time in coming year:** (104 grand total)

<table>
<thead>
<tr>
<th>No. needed</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>40</td>
<td>18</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>40</td>
<td>36</td>
<td>2</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

**Full-time in next two years:** (141 grand total)

<table>
<thead>
<tr>
<th>No. needed</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>37</td>
<td>28</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>totals</td>
<td>37</td>
<td>56</td>
<td>27</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

**Part-time in coming year:** (74 grand total)

<table>
<thead>
<tr>
<th>No. needed</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>38</td>
<td>10</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>totals</td>
<td>38</td>
<td>20</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

**Part-time in next two years:** (99 grand total)

<table>
<thead>
<tr>
<th>No. needed</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>38</td>
<td>18</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>totals</td>
<td>38</td>
<td>36</td>
<td>3</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>
Summary 5 (Continued)

3. Do you think there is a need for training programs for motorcycle mechanics in the public schools?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>93</td>
<td>23</td>
</tr>
<tr>
<td>%</td>
<td>80.2</td>
<td>19.8</td>
</tr>
</tbody>
</table>

4. Do you have a full-time service manager?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>46</td>
<td>75</td>
</tr>
<tr>
<td>%</td>
<td>38</td>
<td>62</td>
</tr>
</tbody>
</table>

5. Do you have a full-time parts employee?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>59</td>
<td>61</td>
</tr>
<tr>
<td>%</td>
<td>49.2</td>
<td>50.8</td>
</tr>
</tbody>
</table>

6. How much do your mechanics earn in an average year? (full-time equivalent)

<table>
<thead>
<tr>
<th></th>
<th>5000-</th>
<th>6001-</th>
<th>7001-</th>
<th>8001-</th>
<th>9001-</th>
<th>over 10,000</th>
<th>10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. reporting</td>
<td>32</td>
<td>20</td>
<td>21</td>
<td>15</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>32.3</td>
<td>20.2</td>
<td>21.2</td>
<td>15.2</td>
<td>10.1</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

7. Do you keep written records of your service work?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>just &quot;sales&quot; receipts</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>67</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>%</td>
<td>55.8</td>
<td>2.5</td>
<td>41.7</td>
</tr>
</tbody>
</table>

8. If you do, would you permit us to look at 24 records to help determine typical activities of motorcycle mechanics?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>64</td>
<td>18</td>
</tr>
<tr>
<td>%</td>
<td>78</td>
<td>22</td>
</tr>
</tbody>
</table>
Summary 5 (Continued)

9. For what purpose do most of your customers actually appear to be buying motorcycles?

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Weekly Recreation</th>
<th>Economical Transport</th>
<th>Touring</th>
<th>Competition</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>102</td>
<td>40</td>
<td>27</td>
<td>21</td>
<td>2</td>
</tr>
</tbody>
</table>

10. How many new machines over 175cc did you sell this past season?

<table>
<thead>
<tr>
<th>Machines</th>
<th>0-</th>
<th>101-</th>
<th>201-</th>
<th>301-</th>
<th>401-</th>
<th>501-</th>
<th>701-</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>No. reporting</td>
<td>76</td>
<td>21</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>63.9</td>
<td>17.6</td>
<td>4.2</td>
<td>8.4</td>
<td>4.2</td>
<td>0.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>

11. How many new machines under 175cc did you sell this past season?

<table>
<thead>
<tr>
<th>Machines</th>
<th>0-</th>
<th>101-</th>
<th>201-</th>
<th>301-</th>
<th>401-</th>
<th>501-</th>
<th>701-</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>No. reporting</td>
<td>81</td>
<td>19</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>69.2</td>
<td>16.2</td>
<td>5.1</td>
<td>3.4</td>
<td>2.6</td>
<td>2.6</td>
<td>0.9</td>
</tr>
</tbody>
</table>

12. Are you making a profit on your service shop?

<table>
<thead>
<tr>
<th>Profit</th>
<th>Yes</th>
<th>No</th>
<th>Don't know</th>
<th>Breaking even</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>51</td>
<td>21</td>
<td>9</td>
<td>35</td>
</tr>
<tr>
<td>%</td>
<td>44.0</td>
<td>18.1</td>
<td>7.8</td>
<td>30.2</td>
</tr>
</tbody>
</table>

It would appear the majority of motorcycle mechanics are paid 5000-6000 dollars. Actually the tabulation records dealers responding ... not the mechanics involved. See Table 20 for actual number of mechanics per salary range. This question was not answered by 18.1% of the respondents.
Only 2.5% said they did not keep any kind of record, over half kept "service records", a designation generally considered by dealers to imply a fairly complete record of the service performed. Among those who kept records 78% said they would cooperate with additional service record research.

Over half of the dealers felt their customers were buying motorcycles mainly for weekly recreation.

Just over one-third (36.1%) of the dealers sold 101 or more new motorcycles over 175cc, while 30.8% sold 101 or more machines under 175cc.

Only 44% of the respondents felt sure they were making a profit on their service shop. One-fourth (25.9%) either didn't know or felt they were losing money.

Table 8 indicates dealers place high emphasis on skills and knowledge that are traditionally the specialty of mechanics: engine, ignitions, transmission, fuel and electrical systems, and trouble shooting. Low emphasis is placed on areas that are frequently cared for by some other specialist: painting and finishing, parts, and welding.

Table 9 reveals that dealers want an individual who can be depended on and who can do the job. They aren't much concerned about his age or physical capability (although several commented he has to be able to test ride the motorcycle). Less than one-fourth felt high school graduation was absolutely required. Dealers are not generally convinced
Table 8. Dealer opinions regarding motorcycle mechanics skill needs

<table>
<thead>
<tr>
<th>Skill-knowledge category</th>
<th>Very important</th>
<th>Occasionally necessary</th>
<th>Not important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Fuel system</td>
<td>108</td>
<td>90.0</td>
<td>12</td>
</tr>
<tr>
<td>Electrical systems</td>
<td>108</td>
<td>90.0</td>
<td>11</td>
</tr>
<tr>
<td>Ignition systems</td>
<td>115</td>
<td>96.6</td>
<td>4</td>
</tr>
<tr>
<td>Lubricating systems</td>
<td>62</td>
<td>52.1</td>
<td>47</td>
</tr>
<tr>
<td>Frame, suspension</td>
<td>45</td>
<td>37.8</td>
<td>63</td>
</tr>
<tr>
<td>Wheels brakes</td>
<td>59</td>
<td>50.0</td>
<td>52</td>
</tr>
<tr>
<td>Engine, theory and repair</td>
<td>110</td>
<td>92.4</td>
<td>8</td>
</tr>
<tr>
<td>Transmission</td>
<td>105</td>
<td>89.0</td>
<td>13</td>
</tr>
<tr>
<td>Starter, generator, alternator</td>
<td>91</td>
<td>76.5</td>
<td>26</td>
</tr>
<tr>
<td>Painting, finishing</td>
<td>5</td>
<td>4.2</td>
<td>45</td>
</tr>
<tr>
<td>Parts inventory and display</td>
<td>17</td>
<td>14.4</td>
<td>39</td>
</tr>
<tr>
<td>Shop management and control</td>
<td>39</td>
<td>33.1</td>
<td>44</td>
</tr>
<tr>
<td>Customer relations</td>
<td>84</td>
<td>70.6</td>
<td>29</td>
</tr>
<tr>
<td>Trouble shooting and diagnosis</td>
<td>108</td>
<td>91.5</td>
<td>9</td>
</tr>
<tr>
<td>Diagnostic equipment</td>
<td>64</td>
<td>54.2</td>
<td>43</td>
</tr>
<tr>
<td>Welding and brazing</td>
<td>18</td>
<td>15.1</td>
<td>66</td>
</tr>
</tbody>
</table>
### Table 9. Dealer opinions regarding motorcycle mechanic characteristics

**Question 14:** From your experience, how important are the following items to the potential motorcycle mechanic? (Which do you look for when hiring.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Very important</th>
<th>Occasionally necessary</th>
<th>Not important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neat, clean appearance</td>
<td>71 60.2</td>
<td>43 36.4</td>
<td>4 3.4</td>
</tr>
<tr>
<td>Experience as a motorcycle mechanic</td>
<td>63 54.8</td>
<td>48 41.7</td>
<td>4 3.5</td>
</tr>
<tr>
<td>A motorcycle riding enthusiast</td>
<td>35 29.9</td>
<td>49 41.9</td>
<td>33 28.5</td>
</tr>
<tr>
<td>An older person</td>
<td>5 4.4</td>
<td>31 27.2</td>
<td>78 68.4</td>
</tr>
<tr>
<td>Ability to perform as a m/c mechanic</td>
<td>110 94.0</td>
<td>6 5.1</td>
<td>1 0.9</td>
</tr>
<tr>
<td>High school graduate</td>
<td>25 21.7</td>
<td>36 31.3</td>
<td>54 47.0</td>
</tr>
<tr>
<td>Punctuality</td>
<td>92 78.0</td>
<td>23 19.5</td>
<td>3 2.5</td>
</tr>
<tr>
<td>Formal training as a m/c mechanic</td>
<td>25 21.7</td>
<td>67 57.3</td>
<td>25 21.4</td>
</tr>
<tr>
<td>Loyalty</td>
<td>103 87.3</td>
<td>13 11.0</td>
<td>2 1.7</td>
</tr>
<tr>
<td>Not physically handicapped</td>
<td>21 18.8</td>
<td>47 42.0</td>
<td>44 39.3</td>
</tr>
</tbody>
</table>
the potential motorcycle mechanic must be a motorcycle riding enthusiast. 96.6% at least prefer a neat, clean appearance.

Analysis of Findings

Owner questionnaire

Examination of Table 10 appears to show an equal likelihood for owner respondents to include a letter with the return regardless of attitude on quality of service. However, a check of the returns revealed two respondents who chose "well done", but noted they did their own work, two who said it was well done but required a long wait, and one who said "well done" didn't apply to the dealer he used to patronize. In general then, respondents included letters if they were dissatisfied.

No chi-square analysis was done since it could not take into account the respondents comments.

Table 11 indicates that motorcycle owners tend to own larger displacement motorcycles as their years of experience increase. The table reflects the great popularity of the 301-500cc category among larger size machines. The larger number of persons with few years of experience is consistent with motorcycling's rapid increase in popularity in the last few years.

No chi-square significance at the .05 level was found
Table 10. Attitudes of owners who included letters regarding quality of service work done vs years of motorcycling experience

<table>
<thead>
<tr>
<th>Quality of service work done</th>
<th>Persons who included letters only</th>
<th>How long participated in motorcycling?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0-11 mos.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Well done</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Acceptable</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Poorly</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

*Percentages sum to 100 down columns.*
Table 11. Owner years of m/c experience vs size of motorcycle owned

<table>
<thead>
<tr>
<th>Size of m/c?</th>
<th>0-11 mos.</th>
<th>1-2 yrs.</th>
<th>3-4 yrs.</th>
<th>5-6 yrs.</th>
<th>7-8 yrs.</th>
<th>9-10 yrs.</th>
<th>over 11 yrs.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>28</td>
<td>52</td>
<td>55</td>
<td>36</td>
<td>13</td>
<td>4</td>
<td>28</td>
<td>216</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How long have you participated in motorcycling?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 mos.</td>
</tr>
<tr>
<td>101-200 yrs.</td>
</tr>
<tr>
<td>201-300 yrs.</td>
</tr>
<tr>
<td>301-500 yrs.</td>
</tr>
<tr>
<td>501-1000 yrs.</td>
</tr>
<tr>
<td>over 1000 yrs.</td>
</tr>
</tbody>
</table>

a Some size categories combined due to small N.

b Percentage sums to 100 across rows.
in any category.

What the owner uses his motorcycle for tends to affect his attitudes toward service as shown in Table 12. Half of those who use their motorcycles for competition claim they have had no service work done. Those who use their machines for touring were more than twice as likely to rate service "poorly" as other groups. The largest group, those who use their motorcycles for weekly recreation, were more often well satisfied than not.

No chi-square was calculated since many owners selected more than one response. Also, several cells had "n" less than five and collapsing the table would have eliminated valuable data on those who use their machines for touring or competition.

Table 13 compares brand with owners intent to do minor repairs. No large differences are evident although Honda owners tend to do less of their own minor repairs than owners of most other brands.

A calculated chi-square of 15.51 was not significant at the .05 level.

According to Table 14 the owners of Yamaha motorcycles seem to be more generally satisfied with dealer service than owners of other brands. No Suzuki owners rated dealer service as being done "poorly" although the "N" for this group was rather small. Only one Triumph owner indicated he had no work done and that brand's owners were most often
Table 12. Owner attitude toward service work done vs stated usage of vehicle

<table>
<thead>
<tr>
<th>Motorcycle used for</th>
<th>N</th>
<th>Well done</th>
<th>Acceptable</th>
<th>Poorly</th>
<th>None done</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Weekly recreation</td>
<td>158</td>
<td>45</td>
<td>28.5</td>
<td>55</td>
<td>34.8</td>
</tr>
<tr>
<td>Economical transport.</td>
<td>54</td>
<td>20</td>
<td>37.0</td>
<td>20</td>
<td>37.0</td>
</tr>
<tr>
<td>Touring</td>
<td>19</td>
<td>6</td>
<td>31.6</td>
<td>4</td>
<td>21.1</td>
</tr>
<tr>
<td>Competition</td>
<td>12</td>
<td>3</td>
<td>25.0</td>
<td>1</td>
<td>8.3</td>
</tr>
</tbody>
</table>

^Percentages sum to 100 across rows.
Table 13. Owner performance of minor repairs vs brand

<table>
<thead>
<tr>
<th>Brand</th>
<th>N&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Honda</td>
<td>110</td>
<td>51</td>
<td>46.4</td>
<td>28</td>
</tr>
<tr>
<td>Yamaha</td>
<td>40</td>
<td>23</td>
<td>57.5</td>
<td>9</td>
</tr>
<tr>
<td>Harley</td>
<td>27</td>
<td>17</td>
<td>63.0</td>
<td>4</td>
</tr>
<tr>
<td>Triumph</td>
<td>16</td>
<td>8</td>
<td>50.0</td>
<td>5</td>
</tr>
<tr>
<td>Suzuki</td>
<td>15</td>
<td>7</td>
<td>46.7</td>
<td>3</td>
</tr>
<tr>
<td>Kawasaki</td>
<td>12</td>
<td>6</td>
<td>50.0</td>
<td>4</td>
</tr>
</tbody>
</table>

<sup>a</sup>Brands with N less than 12 not included.

<sup>b</sup>Percentage sums to 100 across rows.
Table 14. Owner attitudes toward service done vs brand

<table>
<thead>
<tr>
<th>Brand</th>
<th>N</th>
<th>How would you describe service work done?</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well done</td>
<td></td>
<td></td>
<td>Acceptable</td>
<td></td>
</tr>
<tr>
<td>Honda</td>
<td>99b</td>
<td>31 31.3</td>
<td>31 31.3</td>
<td>20 20.2</td>
<td>17 17.2</td>
<td></td>
</tr>
<tr>
<td>Yamaha</td>
<td>36</td>
<td>14 38.9</td>
<td>11 30.6</td>
<td>3  8.3</td>
<td>8  22.2</td>
<td></td>
</tr>
<tr>
<td>Harley</td>
<td>26</td>
<td>6  23.1</td>
<td>10 38.5</td>
<td>4  15.4</td>
<td>6  23.1</td>
<td></td>
</tr>
<tr>
<td>Triumph</td>
<td>16</td>
<td>5  31.3</td>
<td>6  37.5</td>
<td>4  25.0</td>
<td>1  6.3</td>
<td></td>
</tr>
<tr>
<td>Suzuki</td>
<td>13</td>
<td>3  23.1</td>
<td>7  53.8</td>
<td>0  0.0</td>
<td>3  23.1</td>
<td></td>
</tr>
<tr>
<td>Kawasaki</td>
<td>12</td>
<td>3  25.0</td>
<td>5  41.7</td>
<td>2  16.7</td>
<td>2  16.7</td>
<td></td>
</tr>
</tbody>
</table>

^Brands with N less than 12 not included.

^Percentages sum to 100 across rows.
dissatisfied with dealer service.

The percentage of Honda owners who rated dealer service as done "poorly" was one of the highest in the table, a fact that takes on greater practical significance in light of the large number of Honda owners.

A calculated chi-square of 22.4 was not significant at the .05 level.

Table 15 compares owners' attitudes toward service with their intent to do their own minor repairs. Those who are able (or think they are able) to do their own minor repairs and service rate dealer service as having been done "poorly" almost three times as often as those who do not do their own minor repair.

A large number (81%) of those who have not had any service done indicate they will (or do) perform their own minor repairs and service.

Those who do not perform their own minor repairs, more often rate dealer service "well done".

These variations account for significant chi-squares among those responding "acceptable" (at the .01 level) and those responding "poorly" (at the .05 level).

Table 16 was prepared to determine if motorcycle owners were noticeably pleased or dissatisfied with repairs or service in any specific skill or knowledge categories. Only "major" responses were considered since it was felt those were more likely to require the skills of a motorcycle
Table 15. Owner attitude toward service work done vs performance of minor repairs

<table>
<thead>
<tr>
<th>How would you describe service work done?</th>
<th>Do you (will you) perform your own minor repairs (adjust carburetor, brakes, etc.)?</th>
<th>Yes</th>
<th>Sometimes</th>
<th>No</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Well done</td>
<td></td>
<td>24</td>
<td>34.8</td>
<td>17</td>
<td>24.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>28</td>
<td>40.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptable</td>
<td></td>
<td>30</td>
<td>40.5</td>
<td>27</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>23.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorly</td>
<td></td>
<td>21</td>
<td>60.0</td>
<td>6</td>
<td>17.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>22.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None done</td>
<td></td>
<td>34</td>
<td>81.0</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^aPercentage sums to 100 across rows.
Table 16. Owner attitude toward service work done vs specific major service or repair category

<table>
<thead>
<tr>
<th>How would you describe service work done?</th>
<th>N</th>
<th>Well done</th>
<th>Acceptable</th>
<th>Poorly</th>
<th>None done</th>
<th>Major work category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Fuel system</td>
<td>9</td>
<td>3 33.3</td>
<td>6 66.7</td>
<td>0 0.0</td>
<td>0 0.0</td>
<td>Fuel system</td>
</tr>
<tr>
<td>Electrical system</td>
<td>14</td>
<td>4 28.6</td>
<td>7 50.0</td>
<td>1 7.1</td>
<td>2 14.3</td>
<td>Electrical system</td>
</tr>
<tr>
<td>Ignition system</td>
<td>16</td>
<td>6 37.5</td>
<td>6 37.5</td>
<td>2 12.5</td>
<td>2 12.5</td>
<td>Ignition system</td>
</tr>
<tr>
<td>Lubricating system</td>
<td>10</td>
<td>2 20.0</td>
<td>5 50.0</td>
<td>1 10.0</td>
<td>2 20.0</td>
<td>Lubricating system</td>
</tr>
<tr>
<td>Chassis</td>
<td>12</td>
<td>3 25.0</td>
<td>7 58.3</td>
<td>2 16.7</td>
<td>0 0.0</td>
<td>Chassis</td>
</tr>
<tr>
<td>Wheels, brakes</td>
<td>14</td>
<td>4 28.6</td>
<td>7 50.0</td>
<td>1 7.1</td>
<td>2 14.3</td>
<td>Wheels, brakes</td>
</tr>
<tr>
<td>Engine, mechanical</td>
<td>44</td>
<td>11 25.0</td>
<td>23 52.3</td>
<td>7 15.9</td>
<td>3 6.8</td>
<td>Engine, mechanical</td>
</tr>
<tr>
<td>Transmission</td>
<td>22</td>
<td>4 18.2</td>
<td>13 59.1</td>
<td>4 18.2</td>
<td>1 4.5</td>
<td>Transmission</td>
</tr>
</tbody>
</table>
| Start., gen., alter.                    | 13| 6 46.2    | 5 38.5     | 2 15.4 | 0 0.0     | Start., gen., alter.
| Finish                                  | 12| 3 25.0    | 6 50.0     | 3 25.0 | 0 0.0     | Finish              |

*aPercentages sum to 100 across rows.*
mechanic.

Owners were generally quite satisfied with fuel system repairs. None rated this category under the heading "poorly". In all of the other categories they were more often satisfied than dissatisfied, except for transmission and finish. Here they were as likely to rate "poorly" as "well done".

Twelve answered the question by checking "none done" while indicating areas in which service was done. Generally these individuals did their own work.

The table should be evaluated with care since owners may have had repairs done in several categories and their overall rating may not represent each category they checked. Because of this restriction it was felt chi-square analysis would be misleading.

Table 17 points out the value of having mechanics and parts available. It can be seen 108 respondents rated service "well done" when they found mechanics and/or parts were available. Only four made a "well done" choice when they felt mechanics and/or parts were not available, and a check of the returns indicated those four made marginal notes that they did their own work. On the other hand twenty-six rated service done "poorly" when they felt mechanics and/or parts were unavailable. The table clearly shows increasing dissatisfaction when mechanics and/or parts are unavailable.
Table 17. Owner attitude toward service work done vs availability of parts and mechanics

<table>
<thead>
<tr>
<th>How would you describe quality of service?</th>
<th>Were mechanics available?</th>
<th>Were parts available?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----</td>
<td>-----------</td>
</tr>
<tr>
<td>Well done</td>
<td>58</td>
<td>87.9</td>
</tr>
<tr>
<td>Acceptable</td>
<td>31</td>
<td>43.1</td>
</tr>
<tr>
<td>Poorly</td>
<td>5</td>
<td>14.3</td>
</tr>
<tr>
<td>None done</td>
<td>19</td>
<td>67.9</td>
</tr>
</tbody>
</table>

*Percentage sums to 100 across rows within groups.*
This data produced significant chi-squares in all categories except "none done". Careful examination of the contingency table showed the significance to be due to those individuals who did their own work and then responded "well done" when mechanics and parts were unavailable. Removal of those four responses from the table removed almost all statistical significance.

Table 18 gives an indication of the owner's opinion of service work by merged areas. Of special interest is Area 9 where owners are especially satisfied, and Area 15 where owners are noticeably dissatisfied.

Almost one-fourth of the owners in Area 11 rated service "poorly". That area has the most motorcycle owners in the state, so the 23.5% represents a large group.

No chi-square analysis was attempted since there were too many degrees of freedom and many of the cells had "n" less than five.

Dealer questionnaire

Table 19 summarizes employment data. There are 148 motorcycle mechanics employed full-time by the responding dealers. They would hire 103 more (properly qualified) full-time mechanics in the coming year, 141 in the next two years. Opportunities for part-time motorcycle mechanic workers are increasing, seventy-four needed this year, ninety-nine for the next two years.
Table 18. Owner attitude toward service work done vs merged area of residence

<table>
<thead>
<tr>
<th>Merged area</th>
<th>N</th>
<th>Well done</th>
<th>Final</th>
<th>Acceptable</th>
<th>Final</th>
<th>Poorly</th>
<th>Final</th>
<th>None done</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>17</td>
<td>3</td>
<td>17.6</td>
<td>8</td>
<td>47.1</td>
<td>3</td>
<td>17.6</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>1</td>
<td>14.3</td>
<td>3</td>
<td>42.9</td>
<td>2</td>
<td>28.6</td>
<td>1</td>
<td>14.3</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2</td>
<td>28.6</td>
<td>3</td>
<td>42.9</td>
<td>1</td>
<td>14.3</td>
<td>1</td>
<td>14.3</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0.0</td>
<td>3</td>
<td>50.0</td>
<td>1</td>
<td>16.7</td>
<td>2</td>
<td>33.3</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>2</td>
<td>14.3</td>
<td>7</td>
<td>50.0</td>
<td>1</td>
<td>7.1</td>
<td>4</td>
<td>28.6</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>3</td>
<td>33.3</td>
<td>4</td>
<td>44.4</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
<td>22.2</td>
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<td>7</td>
<td>19</td>
<td>7</td>
<td>36.8</td>
<td>7</td>
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<td>5.3</td>
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<td>21.1</td>
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<td>8</td>
<td>15</td>
<td>6</td>
<td>40.0</td>
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<td>0.0</td>
<td>4</td>
<td>26.7</td>
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<td>9</td>
<td>22</td>
<td>8</td>
<td>36.5</td>
<td>5</td>
<td>22.7</td>
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<td>13.6</td>
<td>6</td>
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<td>41.7</td>
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<td>6</td>
<td>35.3</td>
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<td>29.4</td>
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<td>5.9</td>
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<td>29.4</td>
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<td>0.0</td>
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<td>25.0</td>
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<td>0</td>
<td>0.0</td>
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<td>8</td>
<td>4</td>
<td>50.0</td>
<td>2</td>
<td>25.0</td>
<td>2</td>
<td>25.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

*aPercentages sum to 100 across rows.
### Table 19. Dealer employment needs and current employment figures vs merged area

<table>
<thead>
<tr>
<th>Merged area</th>
<th>Current employment</th>
<th>Future needs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>owner-mechs.</td>
<td>Part-time mechanics</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td>75</td>
<td>133</td>
</tr>
</tbody>
</table>
Area 11 (Des Moines) will have the largest need (eighteen) for trained motorcycle mechanics in the next two years closely followed by Area 10 (Cedar Rapids, Iowa City) needing seventeen. Areas 9 and 13 will both need a large number of workers (thirteen each). Area 9 includes Davenport and Area 13, Council Bluffs.

No chi-square analysis was done since there were too many degrees of freedom.

Information in Table 20 reveals that the most frequent kind of dealership is one in which only one full-time mechanic is employed. These dealerships are also the ones who tend to pay the least, twenty paying their workers 5000 to 6000 dollars per year. As dealerships increase in number of employees, they tend to pay their mechanics more.

Note that the "N" refers to dealers reporting, so that there are forty-four mechanics employed by two mechanic dealerships, forty-two in three mechanic shops and so forth.

The largest group (39) of the mechanics are earning in the range of 7001-8000 dollars per year.

A significant chi-square at the .01 level is accounted for by the unusual distribution of dealerships by number of employees, particularly the one dealer who employs five mechanics in the 8001-9000 range.

Table 21 compares the responses of dealers having different numbers of employees. It also separates general
Table 20. Number of employed full-time mechanics per dealership vs salary paid

<table>
<thead>
<tr>
<th>No. of full time m/c mechanics employed</th>
<th>Number of dealerships reporting salary of employed full-time motorcycle mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$5000-6000</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Dealers reporting</td>
<td>76</td>
</tr>
<tr>
<td>Total mech. in group</td>
<td>139</td>
</tr>
</tbody>
</table>

\(^{a}\)Percentages sum to 100 across rows.
Table 21. Dealer attitude regarding very important skills, knowledge, and characteristics vs a given number and type of employee

<table>
<thead>
<tr>
<th>Owner-mechanic</th>
<th>Full-time mechanics</th>
<th>Skill and knowledge category or characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>N=60</td>
<td>N=6</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%C</td>
</tr>
<tr>
<td>51</td>
<td>85.0</td>
<td>5 83.3</td>
</tr>
<tr>
<td>51</td>
<td>86.4</td>
<td>4 66.7</td>
</tr>
<tr>
<td>57</td>
<td>95.0</td>
<td>5 83.3</td>
</tr>
<tr>
<td>29</td>
<td>49.2</td>
<td>1 16.7</td>
</tr>
<tr>
<td>22</td>
<td>37.3</td>
<td>1 16.7</td>
</tr>
<tr>
<td>28</td>
<td>47.5</td>
<td>2 33.3</td>
</tr>
<tr>
<td>55</td>
<td>93.2</td>
<td>4 66.7</td>
</tr>
<tr>
<td>54</td>
<td>91.5</td>
<td>3 50.0</td>
</tr>
</tbody>
</table>

a "Occasionally necessary" and "not important" deleted for clarity.

b Owner-mechanic was not defined in the original instrument.

c Percentages shown are the number of those in the named group who considered the category "very important".
Table 21 (Continued)

Number employed

<table>
<thead>
<tr>
<th>Owner-mechanic&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Full-time mechanics</th>
<th>Skill and knowledge category or characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=60</td>
<td>N=6</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
<tr>
<td>44 74.6</td>
<td>2 33.3</td>
<td>28 75.7</td>
</tr>
<tr>
<td>1 1.7</td>
<td>0 0.0</td>
<td>3 8.1</td>
</tr>
<tr>
<td>7 11.9</td>
<td>1 16.7</td>
<td>7 18.9</td>
</tr>
<tr>
<td>20 33.9</td>
<td>1 16.7</td>
<td>16 43.2</td>
</tr>
<tr>
<td>42 71.2</td>
<td>3 50.0</td>
<td>26 70.3</td>
</tr>
<tr>
<td>52 88.1</td>
<td>5 83.3</td>
<td>33 89.2</td>
</tr>
<tr>
<td>31 53.4</td>
<td>4 66.7</td>
<td>23 62.2</td>
</tr>
<tr>
<td>9 15.3</td>
<td>0 0.0</td>
<td>5 13.5</td>
</tr>
<tr>
<td>33 55.9</td>
<td>3 60.0</td>
<td>22 59.5</td>
</tr>
<tr>
<td>28 50.9</td>
<td>4 66.7</td>
<td>23 63.9</td>
</tr>
<tr>
<td>19 32.8</td>
<td>2 33.3</td>
<td>13 37.1</td>
</tr>
<tr>
<td>4 7.4</td>
<td>0 0.0</td>
<td>2 5.7</td>
</tr>
</tbody>
</table>

<sup>b</sup> owner-mechanic refers to the number of mechanics employed by the owner of the shop.
<table>
<thead>
<tr>
<th>Owner-mechanic</th>
<th>Full-time mechanics</th>
<th>Skill and knowledge category or characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ability to perform</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>High school graduate</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Punctuality</td>
</tr>
<tr>
<td>N=60</td>
<td></td>
<td>Formal training</td>
</tr>
<tr>
<td>n</td>
<td>%&lt;sup&gt;C&lt;/sup&gt;</td>
<td>n</td>
</tr>
<tr>
<td>54</td>
<td>93.1</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>25.0</td>
<td>1</td>
</tr>
<tr>
<td>44</td>
<td>75.9</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>24.6</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>86.2</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>22.2</td>
<td>0</td>
</tr>
</tbody>
</table>
mechanics from dealers who consider themselves "owner-mechanics". All of the respondents included in this table are consistent in their belief that the ignition system is the most important skill and knowledge category and that ability to perform as a motorcycle mechanic is the most important characteristic of a mechanic they would hire.

Those dealerships that indicated two "owner-mechanics" (a partnership) selected "very important" consistently less often when describing the categories and characteristics. However, they were more insistent that the individual be an experienced motorcycle mechanic than any other kind of dealership.

Few dealers considered welding and brazing, painting and finishing, or parts inventory-display to be very important skills or knowledge. Very few felt they had to have an older person when hiring.

Among those who employed one or more mechanics there was general agreement on importance of the categories listed although the need for shop management declined noticeably as shop size increased.

No chi-squares were computed due to the large number of degrees of freedom and frequent cells having "n" less than five.

The relationship between profit status and dealer attitude is summarized in Table 22. This group of respondents also generally ranked skill and knowledge in ignition
Table 22. Dealer attitudes regarding very important skills, knowledge, and characteristics by profit status of service operation

<table>
<thead>
<tr>
<th>Skill and knowledge category or characteristic</th>
<th>Yes N=50</th>
<th>No N=21</th>
<th>Unknown N=9</th>
<th>Breaking even N=35</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Fuel system</td>
<td>47</td>
<td>92.2</td>
<td>20</td>
<td>95.2</td>
</tr>
<tr>
<td>Electrical system</td>
<td>47</td>
<td>94.0</td>
<td>19</td>
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<td>Ignition system</td>
<td>48</td>
<td>94.1</td>
<td>20</td>
<td>100.0</td>
</tr>
<tr>
<td>Lubricating system</td>
<td>29</td>
<td>58.0</td>
<td>10</td>
<td>47.6</td>
</tr>
<tr>
<td>Frame, suspension</td>
<td>20</td>
<td>40.0</td>
<td>7</td>
<td>33.3</td>
</tr>
<tr>
<td>Wheels, brakes</td>
<td>28</td>
<td>57.1</td>
<td>11</td>
<td>52.4</td>
</tr>
<tr>
<td>Engine theory and repair</td>
<td>45</td>
<td>90.0</td>
<td>19</td>
<td>90.5</td>
</tr>
<tr>
<td>Transmission</td>
<td>45</td>
<td>91.8</td>
<td>18</td>
<td>85.7</td>
</tr>
<tr>
<td>Starter, generator, alternator</td>
<td>38</td>
<td>76.0</td>
<td>17</td>
<td>81.0</td>
</tr>
<tr>
<td>Painting and finishing</td>
<td>2</td>
<td>4.1</td>
<td>1</td>
<td>4.8</td>
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<tr>
<td>Parts inventory - display</td>
<td>5</td>
<td>10.0</td>
<td>3</td>
<td>15.0</td>
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<tr>
<td>Shop management</td>
<td>20</td>
<td>40.8</td>
<td>7</td>
<td>33.3</td>
</tr>
</tbody>
</table>

^a"Occasionally necessary" and "not important" deleted for clarity.

^bPercentages shown are the number of those in the named group who considered that category "very important".
Table 22. (Continued)

<table>
<thead>
<tr>
<th>Skill and knowledge category or characteristic</th>
<th>N=50</th>
<th>N=21</th>
<th>N=9</th>
<th>N=35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Unknown</td>
<td>Breaking even</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>39</td>
<td>78.0</td>
<td>14</td>
<td>66.7</td>
<td>4</td>
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<td>46</td>
<td>93.9</td>
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<td>30</td>
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</tr>
<tr>
<td>9</td>
<td>18.0</td>
<td>2</td>
<td>9.5</td>
<td>0</td>
</tr>
<tr>
<td>36</td>
<td>73.5</td>
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<td>66.7</td>
<td>5</td>
</tr>
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</tr>
<tr>
<td>3</td>
<td>6.3</td>
<td>1</td>
<td>5.0</td>
<td>0</td>
</tr>
<tr>
<td>45</td>
<td>93.8</td>
<td>19</td>
<td>90.5</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>16.7</td>
<td>3</td>
<td>14.3</td>
<td>2</td>
</tr>
<tr>
<td>37</td>
<td>74.0</td>
<td>16</td>
<td>76.2</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>22.0</td>
<td>8</td>
<td>38.1</td>
<td>1</td>
</tr>
<tr>
<td>43</td>
<td>86.0</td>
<td>17</td>
<td>81.0</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>15.2</td>
<td>4</td>
<td>20.0</td>
<td>0</td>
</tr>
</tbody>
</table>
systems "very important" more often than any other category. Engine theory and repair ranked second. They felt "ability to perform as a m/c mechanic" was the most important characteristic.

Those who do not know if they are making a profit, selected "very important" to describe skill and knowledge categories less often than the others in every case but one. Here (frame, suspension) they agreed with those who do not make a profit. However, this group was more particular about the person's characteristics. They frequently selected "high school graduate", "punctuality", and "loyalty" when describing what they deemed "very important".

Here again skill and knowledge in painting and finishing was ranked lowest, as was the requirement that the individual be an "older person".

A large number of cells and some with "n" less than five made chi-square analysis of this table impractical.

Table 23 reveals some apparent value in record keeping. Those who keep service records more often report they are making a profit than those who only keep sales receipts. In addition, those who keep service records more often report breaking even, and less often report not making a profit, or not knowing their profit status.

Those who keep no records at all were so few in number that no relationship can be relied upon, however, it should
Table 23. Dealer shop profit status vs record keeping

<table>
<thead>
<tr>
<th>Do you keep service records?</th>
<th>Are you making a profit on your service shop?</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>%a</td>
<td>No</td>
<td>%a</td>
<td>Unknown</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Yes</td>
<td>30 25.9</td>
<td>10 8.6</td>
<td>3 2.6</td>
<td>20 17.2</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0 0.0</td>
<td>0 0.0</td>
<td>2 1.7</td>
<td>1 0.9</td>
<td></td>
</tr>
<tr>
<td>Just sales receipts</td>
<td>21 18.1</td>
<td>11 9.5</td>
<td>4 3.4</td>
<td>14 12.1</td>
<td></td>
</tr>
</tbody>
</table>

*Percentages sum to 100 overall.*

be noted that two of the three reporting do not know whether they are making a profit or not.

This data produced a chi-square of 16.98, significant at the .01 level. This appears to be due to the small number of persons who responded that they do keep service records or sales receipts yet don't know if they are making a profit or not.

Table 24 identifies those dealers who state they are making a profit as employers who are more likely to pay lower salaries. A similarly large group is found under the lowest salary range (5000-6000/year) in the "breaking even" category. Those who state they are not making a profit on their service operation tend toward higher salaries,
### Table 24. Dealer shop profit status vs salary paid to motorcycle mechanics

<table>
<thead>
<tr>
<th>Are you making a profit on your service shop?</th>
<th>Number of dealerships reporting salary paid to full-time m/c mechanics</th>
<th>over 10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$5000-6000</td>
<td>$6001-7000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>n</td>
</tr>
<tr>
<td>Yes</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Breaking even</td>
<td>31</td>
<td>12</td>
</tr>
</tbody>
</table>

<sup>a</sup>Percentages sum to 100 across rows.
based on percentages of those responding to that profit category.

A chi-square analysis resulted in non-significance at the .05 level. Cells with "n" less than five reduce reliability but appear necessary for reference.

Table 25 indicates that those dealers who do not employ parts managers and/or service managers, make a profit more often than those who do. Reinforcing this trend are the percentages that show that dealers who do not make a profit, more often employ those managers.

On the other hand, there is a greater percentage of those dealers who think they are breaking even, who do employ parts and/or service managers.

That none of these percentage differences are large, evidently accounts for a lack of chi-square significance at the .05 level.

Table 26 reveals that those dealers who feel there is a need for motorcycle mechanic training in the public schools consistently look for more personable potential employees. Those who do not feel there is a need for this training selected "very important" less often in every case except when asked if the person should be a motorcycle riding enthusiast, and when asked if he should be an older person. In this category there was a slight percentage increase.

Chi-square analysis indicated the difference in opinion
Table 25. Dealer shop profit status vs those who employ service managers and parts managers

<table>
<thead>
<tr>
<th>Do you have a full-time ...</th>
<th>Are you making a profit on your service shop?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Service manager</td>
<td></td>
</tr>
<tr>
<td>Yes (N=44)</td>
<td>16</td>
</tr>
<tr>
<td>No (N=72)</td>
<td>35</td>
</tr>
<tr>
<td>Parts manager</td>
<td></td>
</tr>
<tr>
<td>Yes (N=55)</td>
<td>21</td>
</tr>
<tr>
<td>No (N=60)</td>
<td>30</td>
</tr>
</tbody>
</table>

^Percentages sum to 100 across rows within major group.

was significant at the .05 level for "Experience as a motorcycle mechanic" and "Formal training as motorcycle mechanic".

Table 27 points out that, while there are some dealers who need mechanics who do not favor motorcycle mechanic training in the public schools, a far greater number of those reporting do favor such training.

Six and one-half times as many mechanics (eighty-eight)
Table 26. Dealer attitudes regarding very important m/c mechanic characteristics vs position on need for m/c mechanic training in public schools

<table>
<thead>
<tr>
<th>Characteristics of m/c mechanic</th>
<th>Yes (N=92)</th>
<th>No (N=22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neat, clean appearance</td>
<td>56 61.5</td>
<td>13 56.5</td>
</tr>
<tr>
<td>Experience as m/c mechanic</td>
<td>51 56.7</td>
<td>10 45.5</td>
</tr>
<tr>
<td>M/c riding enthusiast</td>
<td>27 29.7</td>
<td>7 31.8</td>
</tr>
<tr>
<td>An older person</td>
<td>4 4.5</td>
<td>1 4.8</td>
</tr>
<tr>
<td>Ability to perform as mechanic</td>
<td>86 95.6</td>
<td>20 87.0</td>
</tr>
<tr>
<td>High school graduate</td>
<td>21 23.3</td>
<td>4 19.0</td>
</tr>
<tr>
<td>Punctuality</td>
<td>74 80.4</td>
<td>15 68.2</td>
</tr>
<tr>
<td>Formal training as m/c mechanic</td>
<td>20 21.7</td>
<td>3 14.3</td>
</tr>
<tr>
<td>Loyalty</td>
<td>82 89.1</td>
<td>17 77.3</td>
</tr>
<tr>
<td>Not physically handicapped</td>
<td>18 20.2</td>
<td>3 15.0</td>
</tr>
</tbody>
</table>

^"Occasionally necessary" and "not important" deleted for clarity.

^Percentages are number of those in the named group who considered that skill and knowledge category "very important".
Table 27. Dealer need for m/c mechanics vs position on need for m/c mechanic training programs

<table>
<thead>
<tr>
<th>Do you think there is a need for m/c mechanic training in the public schools?</th>
<th>Number of m/c mechanics needed in coming year</th>
<th>Number of m/c mechanics needed in next two years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full-time</td>
<td>Part-time</td>
</tr>
<tr>
<td>Yes</td>
<td>88</td>
<td>59</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

are needed in the coming year by dealers who favor the training as opposed to the number needed by those not in favor (thirteen).

As this table is arranged, it does not result in a significant chi-square at the .05 level.

Table 28 discloses a general lack of relationship between a dealer's profit status and his attitude toward m/c mechanic training programs. A somewhat smaller percentage of those in favor (40.2%) are making a profit than those who are not in favor (57.1%). However, 34.8% of those in favor are breaking even while only 14.3% of those not in favor are doing so.

The lack of relationship seems to agree with the lack of chi-square significance at the .05 level.

Table 29 data compares two more factors with the dealers'
Table 28. Dealer shop profit status vs position on need for m/c mechanic training programs

<table>
<thead>
<tr>
<th>Do you think there is a need for m/c mechanic training in the public schools?</th>
<th>Are you making a profit on your service shop?</th>
<th>N</th>
<th>n</th>
<th>%a</th>
<th>n</th>
<th>%a</th>
<th>n</th>
<th>%a</th>
<th>n</th>
<th>%a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>92</td>
<td>37</td>
<td>40.2</td>
<td>16</td>
<td>17.4</td>
<td>7</td>
<td>7.6</td>
<td>32</td>
<td>34.8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21</td>
<td>12</td>
<td>57.1</td>
<td>5</td>
<td>23.8</td>
<td>1</td>
<td>4.8</td>
<td>3</td>
<td>14.3</td>
</tr>
</tbody>
</table>

*aPercentages sum to 100 across rows.

Table 29. Dealer position on need for m/c mechanic training vs in-state or out and inclusion of comments

<table>
<thead>
<tr>
<th>Do you think there is a need for m/c mechanic training in the public schools?</th>
<th>Residency of dealer</th>
<th>Dealer added comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>out-of-state</td>
<td>Iowa</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%a</td>
</tr>
<tr>
<td>Yes (N=93)</td>
<td>10</td>
<td>76.9</td>
</tr>
<tr>
<td>No (N=23)</td>
<td>3</td>
<td>23.1</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>103</td>
</tr>
</tbody>
</table>

*aPercentages sum to 100 down, within major group.
attitude regarding training.

It can be seen Iowa dealers are somewhat more inclined toward this training (80.6%) than out-of-state dealers (76.9%).

Dealer respondents were more likely to write comments (75.7%) if they favored the training than if they did not feel it was necessary (24.3%).

Chi-square analysis of this data showed a lack of significance at the .05 level.

Table 30 lists the dealer responses regarding need for motorcycle mechanic training in public schools controlled on brand of motorcycle sold.

Those retailing the most popular brands are generally in agreement that there is a need. Honda and Harley-Davidson dealers agree most frequently and in the same percentage (90%). None of the exclusively BSA-Triumph dealers felt there was a need for this training although the sample was quite small.

The variation among these responses is great enough that chi-square significance results at the .05 level. The variation causing the statistical significance appears to be due to the very small sample associated with BSA-Triumph. Here again that data was left in because of its practical significance.

In summarizing the data from Table 31, Iowa dealers appear to be making a profit or breaking even 76.7% of the
Table 30. Dealer position on need for m/c mechanic training vs brand sold

<table>
<thead>
<tr>
<th>Brand sold</th>
<th>No. of dealers</th>
<th>Yes n</th>
<th>Yes %</th>
<th>No. n</th>
<th>No. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc. brands</td>
<td>31</td>
<td>22</td>
<td>71.0</td>
<td>9</td>
<td>29.0</td>
</tr>
<tr>
<td>Honda</td>
<td>30</td>
<td>27</td>
<td>90.0</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Yamaha</td>
<td>18</td>
<td>15</td>
<td>83.3</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>Suzuki</td>
<td>11</td>
<td>9</td>
<td>81.8</td>
<td>2</td>
<td>18.2</td>
</tr>
<tr>
<td>Harley</td>
<td>10</td>
<td>9</td>
<td>90.0</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Kawasaki</td>
<td>9</td>
<td>8</td>
<td>88.9</td>
<td>1</td>
<td>11.1</td>
</tr>
<tr>
<td>Many brands sold</td>
<td>5</td>
<td>3</td>
<td>60.0</td>
<td>2</td>
<td>40.0</td>
</tr>
<tr>
<td>BSA-Triumph</td>
<td>2</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*aPercentages sum to 100 across rows.

time, while out-of-state dealers only make a profit or break even 53.9% of the time. Out-of-state dealers were not making a profit over twice as often as Iowa dealers.

These differences were not significant at the .05 level.
Table 31. Dealer shop profit status vs in-state or out

<table>
<thead>
<tr>
<th>Are you making a profit on your service shop?</th>
<th>N</th>
<th>Yes n</th>
<th>%</th>
<th>No n</th>
<th>%</th>
<th>Unknown n</th>
<th>%</th>
<th>Breaking even n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa dealer</td>
<td>103^a</td>
<td>46</td>
<td>44.7</td>
<td>16</td>
<td>15.5</td>
<td>8</td>
<td>7.8</td>
<td>33</td>
<td>32.0</td>
</tr>
<tr>
<td>Out of state dealer</td>
<td>13</td>
<td>5</td>
<td>38.5</td>
<td>5</td>
<td>38.5</td>
<td>1</td>
<td>7.7</td>
<td>2</td>
<td>15.4</td>
</tr>
</tbody>
</table>

^Percentages sum to 100 across rows.

Motorcycle mechanic questionnaire

The significance of Table 32 is a lack of noticeable relationship between schooling completed and attitudes toward important skills and knowledge. Those who indicated college attendance were no more consistently liberal or conservative in their attitudes than those who had not finished high school.

A chi-square significant at the .05 level was found in the "trouble shooting" category in the original uncombined table. However, small samples both before and after combining limit such evaluation.

In Table 33 we find a tendency for mechanic respondents
Table 32. Motorcycle mechanics' attitudes toward very important skills and knowledge vs highest grade completed by respondents

<table>
<thead>
<tr>
<th>Haven't completed high school</th>
<th>High school graduates</th>
<th>College attendance</th>
<th>Skill and knowledge category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=6</td>
<td>n</td>
<td>%b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 100</td>
<td>10 76.9</td>
<td>Fuel system</td>
</tr>
<tr>
<td></td>
<td>6 100</td>
<td>11 78.6</td>
<td>Electrical system</td>
</tr>
<tr>
<td></td>
<td>6 100</td>
<td>12 85.7</td>
<td>Ignition system</td>
</tr>
<tr>
<td></td>
<td>4 66.6</td>
<td>9 69.2</td>
<td>Lubricating system</td>
</tr>
<tr>
<td></td>
<td>4 66.6</td>
<td>5 38.5</td>
<td>Frame, suspension</td>
</tr>
<tr>
<td></td>
<td>5 83.3</td>
<td>8 61.5</td>
<td>Wheels, brakes</td>
</tr>
<tr>
<td></td>
<td>6 100</td>
<td>11 78.6</td>
<td>Engine - mechanical</td>
</tr>
<tr>
<td></td>
<td>6 100</td>
<td>12 85.7</td>
<td>Transmission</td>
</tr>
<tr>
<td></td>
<td>5 83.3</td>
<td>9 69.2</td>
<td>Starter, generator, alternator</td>
</tr>
<tr>
<td></td>
<td>0 0.0</td>
<td>1 7.7</td>
<td>Painting, finishing</td>
</tr>
<tr>
<td></td>
<td>1 16.6</td>
<td>3 23.1</td>
<td>Parts inventory</td>
</tr>
<tr>
<td></td>
<td>2 33.3</td>
<td>3 23.1</td>
<td>Shop management</td>
</tr>
<tr>
<td></td>
<td>5 83.3</td>
<td>8 61.5</td>
<td>Customer relations</td>
</tr>
<tr>
<td></td>
<td>5 83.3</td>
<td>14 100</td>
<td>Trouble shooting</td>
</tr>
<tr>
<td></td>
<td>4 66.6</td>
<td>6 50.0</td>
<td>Diagnostic equipment</td>
</tr>
<tr>
<td></td>
<td>3 50.0</td>
<td>1 7.7</td>
<td>Welding, brazing</td>
</tr>
</tbody>
</table>

^"Occasionally necessary" and "not important" deleted for clarity. Includes general mechanics, assistants, service managers, etc. Some school grades combined due to small N.

^bPercentages are the number of those in the named group who considered that skill and knowledge category very important.
Table 33. Attitudes regarding *very important* skills and knowledge by mechanic, service manager, and company school graduate

<table>
<thead>
<tr>
<th>Service school graduates</th>
<th>General mechanic</th>
<th>Service manager</th>
<th>Skill and knowledge category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=13^b</td>
<td>N=26^c</td>
<td>N=12^c</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%^d</td>
<td>n</td>
<td>%^d</td>
</tr>
<tr>
<td>13</td>
<td>100.0</td>
<td>24</td>
<td>96.0</td>
</tr>
<tr>
<td>13</td>
<td>100.0</td>
<td>25</td>
<td>96.2</td>
</tr>
<tr>
<td>13</td>
<td>100.0</td>
<td>26</td>
<td>100.0</td>
</tr>
<tr>
<td>8</td>
<td>61.5</td>
<td>15</td>
<td>60.0</td>
</tr>
<tr>
<td>6</td>
<td>46.2</td>
<td>12</td>
<td>48.0</td>
</tr>
<tr>
<td>7</td>
<td>53.8</td>
<td>16</td>
<td>64.0</td>
</tr>
<tr>
<td>11</td>
<td>84.6</td>
<td>26</td>
<td>100.0</td>
</tr>
<tr>
<td>12</td>
<td>92.3</td>
<td>22</td>
<td>84.6</td>
</tr>
</tbody>
</table>

^a "Occasionally necessary" and "not important" ratings not shown to improve clarity.

^b Six service managers and nine general managers have attended service school.

^c Four claim to be both general mechanics and service managers.

^d Percentages are the number of those in the named group who considered that skill and knowledge category *very important.*
Table 33 (Continued)

<table>
<thead>
<tr>
<th>Service school graduates</th>
<th>General mechanic</th>
<th>Service manager</th>
<th>Skill and knowledge category</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=13(^b)</td>
<td>N=26(^c)</td>
<td>N=12(^c)</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>%(^d)</td>
<td>n</td>
<td>%(^d)</td>
</tr>
<tr>
<td>9</td>
<td>69.2</td>
<td>16</td>
<td>64.0</td>
</tr>
<tr>
<td>1</td>
<td>7.7</td>
<td>1</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>23.1</td>
<td>4</td>
<td>16.0</td>
</tr>
<tr>
<td>6</td>
<td>46.2</td>
<td>7</td>
<td>28.0</td>
</tr>
<tr>
<td>11</td>
<td>84.6</td>
<td>16</td>
<td>64.0</td>
</tr>
<tr>
<td>13</td>
<td>100.0</td>
<td>24</td>
<td>92.3</td>
</tr>
<tr>
<td>9</td>
<td>69.2</td>
<td>17</td>
<td>68.0</td>
</tr>
<tr>
<td>4</td>
<td>30.8</td>
<td>3</td>
<td>12.0</td>
</tr>
</tbody>
</table>
to be influenced by their background. Those who identified themselves as service managers felt parts inventory and shop management were more important than general mechanics did. Attendance at a service school seems to change attitudes as shown by increased emphasis on customer relations. Service school graduates and service managers also tended to agree on the importance of engine and transmission skill and knowledge, reversing the order of the general mechanic responses.

Chi-squares were not calculated because respondents could select more than one job title. Questionnaires were not designed to permit more precise identification.

**Composite on certain categories**

The data in Table 34 cannot be compared directly because it was not obtained in the same way in each case. Dealers and mechanics were asked to respond to every category, whereas the "service record" entries were used only once, and owners usually checked one or two categories.

The data does show some contrasts however. Ignition systems, ranked "very important" most often by dealers and mechanics, was seldom considered a "major" operation on the service records, and was ranked third in frequency by motorcycle owners. Transmission difficulties were one of the more common problems among owners (second) and service records (third), yet dealers and mechanics identified
Table 34. Comparison of weights on important skill and knowledge categories by dealers, mechanics, owners, and service records

Recorded as "major" repair or service in service by m/c repair by m/c record owner by dealers repair or skill- knowledge category

<table>
<thead>
<tr>
<th>Repair or skill-knowledge category</th>
<th>n % Rank</th>
<th>n % Rank</th>
<th>n % Rank</th>
<th>n % Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel system</td>
<td>31 88.6 4</td>
<td>31 90.0 4</td>
<td>103 96.6 1</td>
<td>115 96.6 1</td>
</tr>
<tr>
<td>Electrical system</td>
<td>91 88.9 3</td>
<td>91 90.8 3</td>
<td>32 94.4 1</td>
<td>34 94.4 1</td>
</tr>
<tr>
<td>Ignition system</td>
<td>10 94.4 1</td>
<td>10 98.9 4</td>
<td>26 97.0 8</td>
<td>27 97.0 8</td>
</tr>
<tr>
<td>Lubricating system</td>
<td>25 73.2 1</td>
<td>25 75.2 1</td>
<td>16 72.7 1</td>
<td>16 72.7 1</td>
</tr>
<tr>
<td>Frame-suspension</td>
<td>23 50.0 1</td>
<td>23 52.1 1</td>
<td>21 50.0 1</td>
<td>21 50.0 1</td>
</tr>
<tr>
<td>Wheels, brakes</td>
<td>146 30.2 1</td>
<td>146 30.2 1</td>
<td>33 91.7 2</td>
<td>33 91.7 2</td>
</tr>
<tr>
<td>Engine - mechanical</td>
<td>67 13.9 3</td>
<td>67 13.9 3</td>
<td>31 86.1 5</td>
<td>31 86.1 5</td>
</tr>
<tr>
<td>Transmission, chain</td>
<td>25 73.2 1</td>
<td>25 75.2 1</td>
<td>22 62.9 6</td>
<td>22 62.9 6</td>
</tr>
<tr>
<td>Start., gen., or alt.</td>
<td>59 12.2 1</td>
<td>59 12.2 1</td>
<td>2 5.7 10</td>
<td>2 5.7 10</td>
</tr>
<tr>
<td>Painting, finish</td>
<td>100% 100%</td>
<td>100% 100%</td>
<td>100% 100%</td>
<td>100% 100%</td>
</tr>
</tbody>
</table>

For clarity only "major" or "very important" ratings are listed and only those categories are included that were used on the customer questionnaire.

Dealers and mechanics were asked to rank every category. Service record entries were used only once and owners usually checked only one.

This was a miscellaneous category and included other services like welding and brazing.
category as "very important" less often than four other categories.

Owners felt they had the least "major" problem with their fuel systems, although all other sources ranked that category fourth. Painting and finishing were seldom ranked "very important" by dealers (4.2% of the time) and mechanics (5.7% of the time) while owners ranked this as a "major" problem as often as frame and suspension, and more often than fuel and lubrication systems.

Since the data were not directly comparable no chi-square analysis was done.
SUMMARY

Introduction

This study had as its purpose the assessment of employment opportunities and the need for trained motorcycle mechanics in Iowa. An additional purpose was to provide information that could be used by those who would like to initiate training programs, or who would like to examine the motorcycle market more closely. Specifically, the objectives of the study were:

1. To determine the extent of need for motorcycle mechanic training in Iowa.
2. To identify the things a motorcycle mechanic should be able to do.
3. To suggest possible instructional areas which may affect the outline of a course of study.
4. To develop instruments and obtain background information to assist those who will develop training programs, or examine the market more closely.

To insure the objectives of the study were covered as completely as possible several sources of information were surveyed.

1. Questionnaires to motorcycle owners, dealers, and mechanics.
2. Letter inviting discussion to manufacturers and consumer oriented groups.
3. Dealerships visits and observation of service records.

Questionnaires

The motorcycle dealers questionnaire was sent to 149 dealerships; 130 in Iowa, and nineteen outside of the state. Dealers were selected on the basis of their being primarily involved in sales and service of major brands of motorcycles. The instrument was photo-reduced to 60% of its original size to fit on an 8½ x 11 page. After the original mailing and two follow-ups, 81.2% of the return was found to be useable (N=121).

The motorcycle owners questionnaire was sent to 302 Iowa licensed motorcycle owners. This random sample was stratified in accordance with the motorcycle population distribution in Iowa. This questionnaire was also reduced to 60% of its original size to fit on an 8½ x 11 page. After the original mailing and two follow-ups 79.5% of the return was found to be useable (N=240).

The motorcycle mechanics questionnaire was given to employees having this job title during the visits to dealers. Thirty-six men filled out this questionnaire at seventeen dealerships in Iowa, Illinois, and Nebraska.
Discussion Letter

Eight motorcycle manufacturers and four others (consumer groups, well known persons) responded to a letter that invited discussion on the subject of motorcycle mechanic training. The letter asked specifically about 1) the need for trained mechanics, 2) if such training should be at vocational schools, 3) if the recipient would recommend these programs, and 4) if they conducted programs of their own.

Dealer Visits - Service Record Survey

Twenty-four dealerships were visited, four in Nebraska, two in Illinois, and eighteen in Iowa. These dealers were dispersed so as to require 2000 miles of travel to visit them all. Four of these were questionnaire non-respondents selected to be spot-checked. Twenty were selected because they indicated they kept service records, were willing to cooperate, and employed one or more full-time motorcycle mechanics. Seventeen were cooperative in the actual interview enabling the researcher to obtain completed questionnaires from the thirty-six mechanics mentioned. Also, approximately twenty-four service records were observed at each dealership resulting in 974 individual repairs being recorded from these records.
Summary of Findings

The data and findings are grouped herein as they apply to the objectives of the study.

The need for trained motorcycle mechanics in Iowa

The dealers responding to the questionnaire were strongly in favor (80.2%) of training programs for motorcycle mechanics. They specified a need for full-time mechanics totaling 104 for the coming year, and 141 in the next two years. This almost doubles the 148 currently employed full-time. They also said they will need seventy-four part-time motorcycle mechanics in the coming year, ninety-nine in the next two years.

Dealer needs confirm the responses to the discussion letter, which were emphatic and unanimous in their position that these mechanics are "definitely" in demand. Manufacturers feel that the kind of training needed can be given at area schools and they recommend such programs. All of those who conduct their own motorcycle mechanic schools indicated they were for those who were already employed in the capacity and that the schools were seldom over two weeks in length.

Something about the effect of this shortage can be inferred from the motorcycle owner's response. Analysis showed no customer rated his service "well done" if mechanics were unavailable and he relied on the dealer for
repairs. 61.1% of those who had work done did not describe service as "well done". 43.2% of the respondents have already had experiences where mechanics were not available to service their motorcycles.

A finding that may compound this problem is that 49.6% own machines that are 1970 or newer, implying an increasing need for repairs (and mechanics) as the vehicles age.

Most of the twenty-one letters accompanying the owner returns and most of the assorted marginal comments were critical of some aspect of service.

One-third of the dealers wrote comments on their returns and these were generally emphasizing the need for some kind of training help.

During the visits to dealerships it was generally observed that dealers, while definitely in favor of motorcycle mechanic training, are skeptical of the area schools ability to produce acceptable workers. About one-fourth of the employed mechanics were interested in such programs, occasionally implying a desire to attend such training themselves.

The largest need for motorcycle mechanics occurred in merged Area 11 which contains Des Moines, Iowa. This area, for example, will need eighteen full-time workers in the next two years. Area 10 will need seventeen, and Areas 9 and 13 will each need thirteen.
It was found that 49.2% of the dealerships employ a full-time parts manager and 38.0% employ a full-time service manager. As dealers expand, these managers are promoted from the ranks of the most capable and experienced mechanics, increasing the shortage of mechanics.

A dealer's attitudes regarding motorcycle mechanic training are affected by several factors. Those who need mechanics are much more likely to favor training for motorcycle mechanics in the public schools. Six and one-half times as many mechanics (eighty-eight vs thirteen) are needed by those who favor this training. Iowa dealers are more often in favor than out-of-state dealers. A dealer's service shop profit status does not affect his attitude on this matter, however, dealers who have franchises on the most popular brands tend to be noticeably more encouraging of this training. Need for trained mechanics generally follows the popularity of a brand, i.e., dealers of the most popular brands have the biggest need.

Things a motorcycle mechanic should be able to do

A standard list of skill and knowledge categories was prepared and used in all three questionnaires and the service record tally. Its form was altered somewhat to make it appropriate for the customer questionnaire and service record tally. Space was provided in every case for respondents to include items they felt should be added to the list. Very few additions were made and none were
Motorcycle dealers were asked to rank the importance of the skill and knowledge categories in the standard list. No other variables were controlled. Under "very important" they ranked "Ignition systems" first. "Engine-theory and repair" was second. "Fuel", and "Electrical systems" and "Trouble shooting and diagnosis" were tied in third place. "Painting, finishing" and "Parts inventory and display" were least important.

Given the same set of conditions, the motorcycle mechanics ranked both "Ignition systems" and "Trouble shooting and diagnosis" first. "Engine theory and repair" was second, and "Electrical systems" third. These workers ranked "Painting, finishing" and "Welding and brazing" least important.

Although there was little difference in the numbers of those ranking high importance items, and among those ranking low importance items, there was a large difference between high and low extremes.

The same material was examined while controlling on the dealer's service shop profit status. No significant difference occurred among those who were making a profit, breaking even, or losing on their shops. However, those who felt they didn't know their shop profit status selected "very important" to describe categories consistently less often than others.
Re-examination of this material while controlling on number and type of employees produced a similar result. Those who employ one or more full-time mechanics, and those where the one owner works as a mechanic, tend to agree in much the same percentage as when there was no control. One trend was evident. As shop size grows, need for knowledge of shop management drops rapidly. Those shops having two "owner-mechanics" (partnership) marked "very important" to describe the categories consistently less often than the others.

The motorcycle mechanics' responses were subdivided to see if graduates of company schools, service managers, and general mechanics differ in their opinions of what is "very important". The results must be used cautiously since the samples were small and the differences generally small. As might be expected service managers placed more emphasis on "parts inventory" and "shop management" than the other respondents. General mechanics rated "customer relations" very important less often and "Engine-theory and repair" very important more often than the other respondents. A mechanic's background appears to affect his attitude in so far as service schools or job title is concerned.

The motorcycle mechanic's attitude regarding "very important" categories did not seem to be consistently affected by the amount of public schooling or college he had completed.
Those who had not completed high school placed noticeably higher emphasis on welding and brazing but other responses were generally similar.

Owners were not asked to rate the motorcycle mechanic's "need to know" directly. Instead they were asked to respond if they had any "major" or "minor" service work done. The analysis considered only "major" service and repairs. The analysis was controlled as to the owner's opinion of the quality of the work done. While this gave additional information about the skill and knowledge category, it must be used with caution since owners occasionally checked more than one category and it is not known if they all deserved the same quality rating.

By far the largest category of major repair was that of mechanical engine repairs. These repairs (forty-four) were done twice as often as those in second place: transmission (twenty-two). One-fourth of the respondents described their engine repairs "well done" but transmission repairs were described as "poorly" as often as "well done" (18.2% each). Ignition systems ranked third in frequency, while fuel systems were the least frequent major service or repair, and the only one that no owner felt was done "poorly".

A comparison of selected skill and knowledge capabilities of motorcycle mechanics was made. It displayed the relative rank applied to the skill and knowledge categories using findings from the dealer, mechanic, and owner
questionnaires, and the service record tally. For all practical purposes dealers and mechanics ranked the skill and knowledge categories in the same way. Data from the service records and customer questionnaires differed from one another and from the dealer-mechanic responses noticeably in some categories.

While the service records and owners agreed the biggest source of work was "Engine - mechanical", they both ranked "Ignition systems" lower (eighth and third respectively). This is opposite of the rating by dealer-mechanics, both groups of which felt "Ignition" was first and "Engine", second. Dealer-mechanics gave "Lubricating systems" a rating of seventh and 6.5 respectively, while the service record and owner data placed it ninth.

"Fuel systems" was last in the owners opinion of what his major service and repair had been. Yet the service record data and dealer-mechanic responses placed it fourth. Actually the dealers and mechanics ranked it very close to the top importance categories in percentages.

Suggestions for possible instructional areas

These suggestions have been included in the discussion chapter under "Conclusions".
Background information regarding training programs and the market

Eighty-five retailers of major brand Japanese motorcycles responded to the questionnaire. There were thirty-four Honda dealers, twenty-three Yamaha, and fourteen each of Kawasaki and Suzuki dealers. The American Harley-Davidson motorcycle was represented by thirteen dealers. Most of these dealers also sold other brands of motorcycles but the brand used for identification in the study was the most popular of those handled. Of the dealers in the study, 8.1% also dealt in farm implements, automobiles, etc., but these firms generally separated one operation from the other in sales, parts, service, building and management. Honda dealerships most often reflect a substantial investment in their facility. They are also most receptive to discussion of training programs.

It was found that 38.0% of the motorcycle dealers have a full-time service manager and 49.2% have a full-time parts employee. 55.8% kept service records and 41.7% kept sales receipts, 78.0% of those who kept records said their records could be looked at to help this research. When asked their shop profit status, 7.8% didn’t know it, 44.0% felt they were making a profit, 18.1% reported they were not, and 30.2% claimed they were breaking even.

Cross tabulation revealed that those dealers who employ service and parts managers are somewhat less likely to make
a profit. In addition those who keep records appear more likely to make a profit. Analysis of dealer profit status, controlled on motorcycle mechanics' salaries, showed those paying the smallest range of salaries most often reported making a profit. However, the largest group of full-time motorcycle mechanics (thirty-nine) are earning in the 7000-8000 dollar per year range. Generally, multiple-mechanic shops pay more, report making a profit less often, are less frequent than one mechanic shops, yet employ 75% of the full-time motorcycle mechanics reported by dealers.

Dealers were asked to rate personal characteristics of motorcycle mechanics they might hire. Their responses were then divided between those who reported making a profit and those who did not. Both groups rated "ability to perform as a motorcycle mechanics" most important and "loyalty" second in importance. Both groups felt the need to be "an older person" was least important. In all cases but two those making a profit were more likely to rate categories higher. Those two, that the potential mechanic be a "motorcycle riding enthusiast", and "an older person", were selected as very important more often by dealers who reported they did not make a profit.

The currently employed mechanics ranged in age from seventeen to forty-eight, the average being 24.7. About a third had not completed high school, and about that number had attended college. Twenty-five were married. Thirteen
noted they had attended a company service school and that was the only source of formal preparation any had attended.

The largest group of motorcycle owners is aged eighteen to twenty-one and the second largest group over age forty-two. A total of 222 (95.7%) are male and slightly over half are married. Three-fourths are not attending school and over two-thirds have not attended a motorcycle race in the last twelve months. Only 37.5% have five or more years experience with motorcycles. The largest group of owners reported they use their machines for "weekly recreation". There are three times as many Honda owners as any other brand. Only half of the owners plan on doing their own minor repair work all of the time.

Analysis showed owners tend to own larger machines as their years of experience increase. The large number of persons reporting who had few years of experience is consistant with the increase in motorcycle popularity in recent years.

The twenty-one owners who included letters with their questionnaires generally did so to express dissatisfaction. Those who indicated they use their motorcycles for competition were much less likely to have their dealer service the machine. Touring enthusiasts were noticeably more likely to express dissatisfaction with service and repairs.

Motorcycle owners who stated their intention to look after their own minor repairs rated dealer service as
done "poorly" three times as often as those who do not do their own minor repair. Those who rely on the dealer for minor repairs rate his work "well done" more often.

Of Honda owners, 28.2% felt they would not do their own minor repairs. This was one of the largest percentages and takes on much greater significance in view of the large number of owners of Honda motorcycles. 20.2% of Honda owners reported their service as done "poorly", a percentage exceeded only by Triumph with 25.0%. Yamaha owners consistently reported greater satisfaction with service than owners of other brands.

The service records reviewed by the researcher generally lacked uniformity. Dealers almost unanimously had no intention of using them to analyze their service operation. One of the main points of confusion is the assignment and record of new motorcycle "set-up" costs, much warrantee work, and safety inspections. Many dealers seem to assign cost to their service operation that belong to the sales department.
DISCUSSION

This study was conducted in an attempt to determine the need for motorcycle mechanic training in Iowa and the desired knowledge these individuals should possess. In addition it was felt the background information obtained would help those who might wish to initiate such training or study this industry further.

It is the researcher's opinion that there exists a need for persons qualified as motorcycle mechanics in the state of Iowa. The data suggest the shortage is serious enough that it will limit growth of the industry in coming years. 1969-1970 saw an increase of over 20% in Iowa's motorcycle registrations. 1970-1971 had a 30% increase to bring the current number of registrations to over 80,000. Iowa's motorcycle growth closely parallels national growth so there is evidence local industry cannot expect help from outside.

Some of this need can be met by offering appropriate programs to train motorcycle mechanics at certain of Iowa's area schools. Another possibility suggested by the findings, is that of evening programs at area schools and high schools, to show motorcycle owners how to perform their own minor service and repairs. A surprising 50% of the repairs and services observed on the service records were relatively simple operations that could have been done by owners using tools that came with their motorcycles. This statistic was
confirmed by the fact that only 51% of owners responded that they did their own minor service and repair.

Such training for owners would have at least one side effect. The data show that owners who perform their own minor services are three times more often critical of their dealer's shop service work.

The data generally indicates the instructional areas currently included in motorcycle mechanic training course outlines are relevant. Strong emphasis on the engine and its associated systems seems warranted. A de-emphasis of welding and brazing, painting and finishing, and the like seems appropriate where time is a limiting factor. Although a very large number of electrical system repairs can be considered as a problem manufacturers should look into, it doesn't reduce the amount of time or skill mechanics will need in that area.

Although most mechanics and dealers give little emphasis to customer relations, shop management, and similar items, the researcher was left with the distinct impression that a fair understanding of these factors was evident in the more successful dealerships. Most dealers prefer a motorcycle mechanic who is best described as "clean-cut". Based on this information, one important instructional area should be some treatment of such factors. Along these same lines it seems the course outline should include an instructional unit in taxes, insurance, credit, mortgages,
budgeting, and other areas of personal finance and family management for the students.

Most dealers want a potential employee to have experience as a motorcycle mechanic. Since so many dealerships need part-time help it may be possible for area schools to include part-time co-operative training in the program. This would give some immediate help to dealers while providing work experience for the student. Often part-time workers remain as full-time workers after graduation (in other similar programs) so placement efforts would be helped too.

The findings suggest some training for dealers and/or their managers is necessary. Dealers frequently describe their service shop as "a necessary evil". Since less than half make a profit on these operations their attitude is understandable. The findings show that the larger shop operations are more likely to lose money, especially those employing parts managers and/or service managers. Despite the fact most dealers keep some kind of shop service record, no instance was found where they were used to analyze the shop operation. It seemed many dealers charged new motorcycle set-up and warrantee work, and parts and/or service manager's salaries to the service shop. This practice made sales look very profitable and service look quite bad. Based on this data it appears a series of management and/or business analysis workshops are in order. Here again the
the appropriate area school staff could be of help. It must be emphasized that few dealers are aware of the area schools potential to help them.

It is the researcher's opinion that the large return of questionnaires (80%), the multitude of comments, and general enthusiasm of those involved in the study is significant. If they can be considered a representative cross-section of the over 80,000 motorcyclists in Iowa and the over 150 dealerships, it seems they are quite an active group. Many owners expressed surprise that anyone in Iowa's schools was interested in them. Many dealer's first reaction to the interviewer was one of suspicion. They had to be convinced that this study wasn't some kind of trick, that someone really had their best interest at heart.

The problem of setting up a training programs for motorcycle mechanics will be compounded by the dealer's independent attitude. Whether this attitude is due to a defensiveness over being in this line of work, the current sellers market, or whatever, dealers aren't especially worried about their future. They do admit a serious lack of qualified mechanics but that problem is overshadowed by the difficulty of getting enough of certain models of motorcycles to fill public demand. Since 49.6% of the owner respondents possess machines that are model year 1970 or newer, and motorcycle registrations increased by
over 20,000 last year, it is this researcher's opinion that dealers will soon find themselves in serious service trouble. The pressure will probably make them receptive to area school training as a source of motorcycle mechanics, however, if the reaction comes too late it may seriously affect sales of new machines in coming years. The study clearly shows customers (owners) more often express dissatisfaction with service when parts and/or mechanics are not available, than when they are.

The responsibility for promoting the implementation of training should lie with a statewide motorcycle dealers association. Such an organization does exist but receives little support from Iowa dealers. The association was asked to respond regarding the subject of this study but failed to do so. The Iowa area schools could initiate the implementation of the training but seem to respond more readily to the pressure of outside groups or staff members who indicate needs or high interest in the subject. That being the case, this researcher sees the responsibility as being left to the manufacturers, since they have ultimately the most to lose. Their representatives should work with the state dealer's association and the area school's coordinating staff to implement this needed training.

Implementation would be best accomplished by establishing an advisory committee consisting of industry personnel
(national service managers), educators (area school staff), and representatives of the motorcycle dealers of Iowa. The Iowa Development Commission (20) desires to help those who do business in Iowa and should be contacted for additional information on their services.

Some supplemental information and ideas came to the attention of the author while conducting this study. They are offered here because they may give further insight into the future of the motorcycle market.

1. The motorcycle mechanic occupation doesn't seem to be a long term one despite the fact motorcycle sales have seen continual growth for several decades. The occupation appears capable of attracting high quality people who could be asked to show evidence of formal training in all phases of two and four stroke engine theory, related systems, etc. The pay is quite competitive, the machinery physically easy enough to work on, and motorcycles are particularly interesting to some.

To bolster this occupation, federal and state standards for safe and healthy work environments should be enforced. Manufacturers could initiate health insurance and retirement programs, offered through dealers, to attract and retain qualified workers. Dealers frequently complain that sending a worker to a company school means he will want
more money when he returns, or he will move to another employer. Fringe benefits, based on training and work experience will up-grade the occupation and increase permanence of workers.

2. A system of licensing for mechanics, based on training and work experience, would provide a common base for salary, promotion, and liability. A manufacturer might expect a given size dealership to employ a certain number and grade of mechanics. State and federal safety regulations could request that the only valid inspection be that done by a licensed mechanic. Manufacturers would be able to state that warrantees would be valid if the work was performed by licensed mechanics.

3. Federal laws could be passed requiring manufacturers to pay the same amount to dealers for warrantee work, as customers must pay the dealer for that repair or service. Similar laws could require sales type tax on new motorcycles earmarked for the training of these mechanics.

Conclusions

On the basis of the study, the following conclusions were reached:

1. There is a serious need for motorcycle mechanics
in Iowa. The shortage will rapidly increase, probably limiting future growth of the industry. Immediate steps should be taken to implement programs to train motorcycle mechanics in the most seriously affected areas. Priority should be given to Merged Area 11 (Des Moines, Iowa).

2. Half of the repairs and services currently being done by motorcycle mechanics could be done by motorcycle owners. Evening courses to teach owner-maintenance would ease the shortage.

3. Workshops should be conducted for motorcycle dealers and their foremen regarding management practices and business principles. These workshops would also serve to promote a sense of cooperation throughout the state.

4. The subject matter emphasis of existing full-scale motorcycle mechanic training programs appears to be accurate. Manufacturers' service schools are more effective when used to impart specific information to persons employed in the occupation and having a strong basic subject matter background.

Recommendations for Further Study

1. A study of business economics for motorcycle dealerships would be of great benefit to the industry. An analysis of present practices,
guidelines regarding staff, profit, etc., and recommendations for change should be included. A plain-language handbook might be one objective.

2. A follow-up study of graduates of existing full-term motorcycle mechanic programs. Comparison might be made with a control group of employed motorcycle mechanics without the formal training, on such variables as salary, satisfaction, success, performance, etc. Data might suggest changes in training, criteria for guidance personnel, and up-grade programs for those currently employed.

3. This study should be replicated in Iowa and other states to validate the findings and/or up-date the information.

4. Examine full-scale training programs to see if they should include related instruction designed to improve the students efficiency as a citizen and in personal-family management.
BIBLIOGRAPHY


APPENDIX A: QUESTIONNAIRES AND COVER LETTERS
Dear Sir;

Your response is needed regarding important occupational research being conducted throughout Iowa. The primary purpose of this study is to determine the need for a training program for motorcycle mechanics at the newly established area vocational schools. Related information about the market, attitudes of buyers and sellers, and service problems will be of interest to the businessman.

Included in the study are all Iowa motorcycle dealers and several hundred Iowa motorcycle owners. Individual replies will be kept strictly confidential: identification numbers are only for computer tabulation of replies.

Your time, effort, and cooperation will be a valuable contribution to the study and will be greatly appreciated.

PLEASE RETURN THIS QUESTIONNAIRE AS SOON AS POSSIBLE.

Sincerely yours,

Dr. William W. Wolansky
Professor-in-charge
Industrial Education
Iowa State University

Floyd E. Croy Jr.
Instructor of Industrial
Iowa State University
THE QUESTIONS ON THIS PAGE REFER TO THE MOTORCYCLE INDUSTRY AND HOW IT RELATES TO MOTORCYCLE MECHANICS.

THERE WILL BE NO ATTEMPT TO IDENTIFY INDIVIDUALS.

1. How many motorcycle mechanics do you employ?  
   full time  part time  owner-mechanic

2. If you could find mechanics who were, in your opinion, well qualified, how many would you hire ... (considering expansion, replacement, etc.)  
   full time  part time
   ... for the coming year?  
   ... in the next two years?

3. Do you think there is a need for training programs for motorcycle mechanics in the public schools?  
   yes  no

4. Do you have a full time service manager?  
   yes  no

5. Do you have a full time parts employee?  
   yes  no

6. Approximately how much do your mechanics earn in an average year? (full time equivalent)  
   5000-6000  6001-7000  7001-8000  8001-9000  9001-10,000  over 10,000

7. Do you keep written records of your service work?  
   yes  no  just "sales" receipts

8. If you do, would you permit us to look at 24 records to help determine typical activities of motorcycle mechanics?  
   yes  no

9. For what purpose do most of your customers actually appear to be buying motorcycles?  
   weekly recreation  touring  economical transportation  competition
   OTHER

10. How many new machines over 175cc. did you sell this past season?  
    0-100  101-200  201-300  301-400  401-500  501-600  601-700  701-800  over 800

11. How many new machines under 175cc. did you sell this past season?  
    0-100  101-200  201-300  301-400  401-500  501-600  601-700  701-800  over 800

12. Are you making a profit on your service shop?  
    yes  no  don't know  breaking even

13. From your experience, how would you rank a mechanic's need for skill on the following categories?  
    Very important (absolutely required)  Occasionally necessary (preferable)  Not important (get by without)
    Fuel system (carburetors, etc.)  Electrical systems (lights, horn, etc.)  Ignition system (points, plugs)
    Lubricating systems  Frame, suspension (forks, shocks)  Wheels, brakes
    Engine, theory and repair  Transmission (shifter, gears, etc.)  Starter, generator, or alternator
    Painting, finishing  Parts inventory and display  Shop management and control
    Customer relations  Trouble shooting and diagnosis  Diagnostic equipment
    Welding and brazing  OTHER

14. From your experience, how important are the following items to the potential motorcycle mechanic? (which do you look for when hiring)
    Very important (absolutely required)  Occasionally necessary (preferable)  Not important (get by without)
    Most, clean appearance  Experience as a motorcycle mechanic  A motorcycle riding enthusiast
    An older person  Ability to perform as a motorcycle mechanic  High school graduate
    Punctuality  Formal training as a motorcycle mechanic  Loyalty
    Not physically handicapped  OTHER

THANK YOU FOR YOUR ASSISTANCE.

GENERAL COMMENTS ________________________________

Computer Tabulation # __________
(Not for individual identification)

PLEASE RETURN QUESTIONNAIRE AS SOON AS POSSIBLE.
Fellow Motorcyclist,

Your response is needed regarding important occupational research being conducted throughout Iowa. The primary purpose of this study is to determine the need for a training program for motorcycle mechanics at the newly established area vocational schools. Related information will be helpful to dealers and manufacturers in improving their service program.

Included in this study are all Iowa motorcycle dealers and several hundred Iowa motorcycle owners. Individual replies will be kept strictly confidential; identification numbers are only for computer tabulation of replies.

Your time, effort, and cooperation will be a valuable contribution to the study and will be greatly appreciated.

Sincerely yours,

E. Croy Jr.
Instructor of Industrial Education
Iowa State University

1. What is your age?
   - under 18
   - 18-21
   - 22-25
   - 26-29
   - 30-33
   - 34-37
   - 38-41
   - 42 or over

2. What is your sex?
   - male
   - female

3. Are you currently attending school? (high school, college, etc.)
   - yes
   - no

4. Are you married?
   - yes
   - no

5. How long have you participated in motorcycling?
   - less than one year
   - 1-2 years
   - 3-4 years
   - 5-6 years
   - 7-8 years
   - 9-11 years
   - 11 or more years

6. Have you attended a m/c race in the last twelve months?
   - yes
   - no

7. For which of the following do you use your m/c most?
   - weekly recreation
   - economical transportation
   - competition
   - touring
   - others

8. What brand of motorcycle do you own?
   - Honda
   - Kawasaki
   - Triumph
   - Yamaha
   - Harley
   - BMW
   - Suzuki
   - KIA
   - others

9. What is the displacement of your motorcycle? (cc.)
   - 0-100
   - 101-200
   - 201-300
   - 301-400
   - 401-500
   - 501-600
   - 601-700
   - 701-800
   - 801-900
   - 901-1000
   - 1001-1100
   - 1101-1200
   - 1201-1300
   - 1301-1400
   - 1401-1500
   - 1501-1600
   - 1601-1700
   - 1701-1800
   - 1801-1900
   - 1901-2000
   - 2001-2100
   - 2101-2200
   - 2201-2300
   - 2301-2400
   - 2401-2500
   - 2501-2600
   - 2601-2700
   - 2701-2800
   - 2801-2900
   - 2901-3000
   - over 3000

10. What is the year of your motorcycle?
    - 1972
    - 1971
    - 1970
    - 1969
    - 1968
    - 1967
    - 1966
    - 1965-1961
    - 1956-1960
    - 1951-1955
    - 1945-1950
    - 1940-1949

11. Do you perform your own routine maintenance on your motorcycle? (check battery, oil, lube chain, etc.)
    - yes
    - sometimes
    - no

12. Do you (will you) perform your own minor repair or service on your m/c? (change points, adjust brakes, carburetor, etc.)
    - yes
    - sometimes
    - no

13. Check those categories in which you have had service work done.
    MAJOR
    MINOR
    PROBLEM
    Fuel system (carburetor, etc.)
    Electrical (lights, horn, etc.)
    Ignition (points, plugs, etc.)
    Lubricating systems
    Chassis (forks, shocks, etc.)
    Wheels, brakes, tires
    Engine, mechanical
    Transmission (shifter, gears, etc.)
    Starter, generator, or alternator
    Finish (paint, chrome)
    NO SERVICE WORK DONE
    OTHER

14. Were parts available to satisfactorily fix your m/c?
    - yes
    - sometimes
    - no

15. Were mechanics available to get the work done?
    - yes
    - sometimes
    - no

16. If you have had any service performed on your m/c, how would you describe it?
    - well done
    - poorly done
    - acceptable
    - didn't have any done

THANK YOU FOR YOUR ASSISTANCE
(General Comments on Backside.)

PLEASE RETURN QUESTIONNAIRE AS SOON AS POSSIBLE
MOTORCYCLE MECHANIC PERSONAL DATA FORM

Age _____

Circle highest grade in school completed

1  2  3  4  5  6  7  8  9  10  11  12  College 1  2  3  4  Over 4

Full time □

Years employed: □ Less than one □ 1-2 □ 3-4

Part time □

(as m/c mech.) □ 5-6 □ 7-8 □ over 8

Married?

□ Yes □ No

Major responsibilities:

□ General Mechanic □ Mechanic's assistant

□ Specialist in an area □ Set-up man

□ Service manager □ Other __________

What training specifically related to motorcycle mechanics have you had? List months completed in each area.

____ High school  ________ Area voc-tech  ________ Trade school

____ College or Univ.  ________ Military  ________ Company school

____ Correspond. school  ________ Apprenticeship  ________ Other __________

How important is the following knowledge in the job you do?

<table>
<thead>
<tr>
<th>Very important (absolutely required)</th>
<th>Occasionally necessary (desirable)</th>
<th>Not important (get by without)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel system (carburetors, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical systems (lights, horn, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition systems (points, plugs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricating systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame, suspension (forks, shocks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheels, brakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine, theory and repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission (shifter, gears, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starter, generator, or alternator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting, finishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parts inventory and display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shop management and control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer relations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble shooting and diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welding and brazing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Comments on back side.
APPENDIX B: LETTER TO MANUFACTURERS AND RESPONDENTS CREDIT NOTE
Dear Sir,

Recent editorials regarding the motorcycle service problem have prompted me to do a study of the matter. I am working on a Doctorate in Vocational Education and this study will provide the dissertation I need.

Our State Department of Public Instruction has blessed this project since they permitted a program for training m/c mechanics to be initiated at Scott Community College in Bettendorf, Iowa this summer. This study has as its academic objectives:

1. To determine the need for m/c mechanics in Iowa.
2. Assess the things they should be able to do.
3. Organize these into a recommended curriculum outline for a one year training program.

In addition this study will obtain basic data on the motorcycle owner, the motorcycle dealer, and their comparative opinions on service.

A questionnaire will go to 150 dealers in Iowa and a random sample of motorcycle owners (300). Questionnaire results will be used to design an interview checklist to be used in interviewing about 24 selected dealers and their mechanics. Their service records will also be examined. From this data we will determine what should be included in a year-long training program for motorcycle mechanics.

This study has been approved by Iowa State University and I have consulted approximately 40 people regarding the mechanics of gathering and interpreting information. An IBM 360 computer will be used to analyze the data.
The study will be completed in the spring of 1972 (April - May). We hope to publish a short description of the findings at that time in one of the widely circulated motorcyclist periodicals.

We would like a brief description of the "service scene" from major manufacturers to include as background information in the study. For example:

1. Is there a need for trained motorcycle mechanics?
2. Do you feel training programs at state vocational schools would be helpful to the motorcycle industry and public?
3. Would you recommend such programs? or
4. Do you (or do you plan to) conduct your own programs?

We would be grateful for any information, ideas, or suggestions you have regarding this study.

If your company would like a copy of the complete study I will be happy to send you one next spring.

Sincerely,

Floyd E. Croy, Jr.
Instructor of Industrial Education
Private Communications in Response to the Letter Inviting Discussion to Manufacturers and Others.


APPENDIX C: DETAILED TABULATION AND SERVICE RECORD DATA RECORDING FORM
### MISCELLANEOUS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Adjust cables, controls (new cables)</td>
</tr>
<tr>
<td>14</td>
<td>Install speedo, tach (repair)</td>
</tr>
<tr>
<td>10</td>
<td>Repair by welding</td>
</tr>
<tr>
<td>9</td>
<td>Install accessory (carrier, crash bar, windshield, fender, etc.)</td>
</tr>
<tr>
<td>8</td>
<td>Rebuild wrecked m/c (major frame and engine repair)</td>
</tr>
<tr>
<td>8</td>
<td>Install lever (clutch, brake)</td>
</tr>
<tr>
<td>7</td>
<td>Install (repair) seat</td>
</tr>
<tr>
<td>4</td>
<td>Repair, install center stand</td>
</tr>
<tr>
<td>2</td>
<td>Estimate repairs: wrecked m/c</td>
</tr>
<tr>
<td>2</td>
<td>Touch-up paint (refinish parts: fenders, etc.)</td>
</tr>
<tr>
<td>1</td>
<td>Repair by brazing</td>
</tr>
<tr>
<td>1</td>
<td>New fender (repair)</td>
</tr>
</tbody>
</table>

---

a. Vehicle safety inspection  
b. New vehicle set-up  
c. 500 mile check

---

a. Too large to record.  
b. Not recorded by all dealers. Not treated similarly by all dealers ... some tune-up, others do not. May be largest single category.  
c. Recorded as tune-up by some dealers. Would expand that category.
ENGINE

77  aTune-up (minor) points, plugs, carb. adjust.
45  bTune-up (major) adjust valves etc. (plus minor)
22  Top end overhaul
21  Repair or replace exhaust pipes, mufflers, baffles, seals
20  Major overhaul
13  Repair of piston assembly (pins, rings)
12  Oil lead, repair
11  Bore block (cylinders)(mill head)
10  Check noise in engine, trouble shoot
  9  Grind valves
  4  Repair valve mechanism (valve, pushrods)
  4  Adjust valves
  3  Install head gasket
  2  Replace seals
  2  Install accessory
  2  Broken head stud, bolt
  2  Repair of crankcase (split cases)
  2  Replace engine (install)
  2  Install rings

 aTypical for 2-stroke.
 bTypical for 4-stroke.
Engine (cont.)

2 Mike cylinders
1 Repair of crankshaft assembly (bearings)
1 Repair of 2-stroke reed valves, etc.
1 Decarbon mufflers, heads
1 Install cam chain
1 Adjust cam tensioner
1 Reassemble engine
1 Retap plug hole
1 Broken motor mount repair

STARTER, GENERATOR, OR ALTERNATOR

13 Kickstarter repair
5 Repair or replace starter
4 Repair or replace generator
2 Repair or replace alternator
1 Adjust generator

FRAME, SUSPENSION

17 Repair front fork
6 Alignment
5 Service front fork (lube, adjust)
Frame, Suspension (cont.)

4  Straighten rear fork (swing arm)
1  Straighten frame
1  Steering stem install
1  ^Major repair ... front accident

TRANSMISSION, CHAIN, SHAFT, REAR END, CLUTCH

30  Replace chain or sprocket
15  Adjust chain
14  Clutch adjustment
12  Repair transmission (minor)
12  Repair transmission (major)
  7  Adjust gear shifter
  6  Clutch replacement
  4  Clutch repair
  3  Repair drive hub
  1  Replace seals
  1  Chaincase, replace
  1  Check transmission
  1  Masterlink repair

^Also found under misc. - major accident repair.
### WHEELS, BRAKES

<table>
<thead>
<tr>
<th>Code</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>Repair tires (replace)</td>
</tr>
<tr>
<td>13</td>
<td>Repair spokes (loose spokes, respoke)</td>
</tr>
<tr>
<td>8</td>
<td>True rim</td>
</tr>
<tr>
<td>8</td>
<td>Adjust brakes (both)</td>
</tr>
<tr>
<td>5</td>
<td>Repair brakes (mechanical)</td>
</tr>
<tr>
<td>4</td>
<td>Repair wheel (repair, straighten)</td>
</tr>
<tr>
<td>3</td>
<td>Install new rim</td>
</tr>
<tr>
<td>2</td>
<td>Repair brakes (hydraulic)</td>
</tr>
<tr>
<td>2</td>
<td>Replace brakes (mechanical)</td>
</tr>
<tr>
<td>1</td>
<td>Front hub replace</td>
</tr>
</tbody>
</table>

### FUEL SYSTEM

<table>
<thead>
<tr>
<th>Code</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Adjust carburetor (float, jets)</td>
</tr>
<tr>
<td>11</td>
<td>Service fuel line and filters (air cleaners)</td>
</tr>
<tr>
<td>7</td>
<td>Carburetor repair</td>
</tr>
<tr>
<td>7</td>
<td>Rebuild carburetor</td>
</tr>
<tr>
<td>4</td>
<td>Carburetor exchange</td>
</tr>
<tr>
<td>4</td>
<td>Repair fuel tank</td>
</tr>
<tr>
<td>1</td>
<td>Fuel switch repair</td>
</tr>
</tbody>
</table>

---

*aThis category used if separate from normal tune-up carb. adjustment.*
LUBRICATING SYSTEM

53  Change oil - four stroke (clean filter)
3   Transmission oil change
2   Adjust two-stroke oil injector

ELECTRICAL SYSTEM

52  Fix lights
40  Replace fuzes, bulbs, switches, battery
24  Change battery
19  Check charging, wiring, elec. syst. (trouble shoot)
15  Install accessory (electrical, i.e., turn signals)
13  New battery installation
10  Repair horn
  4  Indicator lights
  3  Repair charge. system (rectifier, etc., not alt. or gen.)
  2  Repair turn signals

IGNITION SYSTEM

15  Set dwell and timing
10  Replace points and condenser, plugs
  8  Replace spark plug
Ignition System (cont.)

4 Service ammeter
3 Repair solid state ignition
1 New plug wire and cap
1 Repair automatic advance
1 Install point cam bushing
1 Test coil, condenser
### Fuel System
- Service fuel line and filters (air cleaners)
- Carburetor exchange
- Rebuild carburetor
- Adjust carburetor (Float, jets)
- Other

### Electrical System
- Replace fuzes, bulbs, switches, battery
- Fix lights
- Repair horn
- Install accessory
- Other

### Ignition System
- Test coil, condenser
- Replace points and condenser, plugs
- Set dwell and timing
- Repair solid state ignition
- Service ammeter or indicator lights
- Other

### Lubricating System
- Repair two-stroke oil injection system
- Adjust two-stroke oil injector
- Change oil - four stroke
- Clean filter, (change)
- Repair four stroke oil system
- Other
<table>
<thead>
<tr>
<th>Frame, suspension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service front fork (lube, adjust)</td>
</tr>
<tr>
<td>Repair rear shock absorbers (replace)</td>
</tr>
<tr>
<td>Straighten frame</td>
</tr>
<tr>
<td>Alignment</td>
</tr>
<tr>
<td>Repair front fork</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheels, brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair tires (replace)</td>
</tr>
<tr>
<td>Balance wheels</td>
</tr>
<tr>
<td>Adjust brakes (both)</td>
</tr>
<tr>
<td>Replace brakes (mechanical)</td>
</tr>
<tr>
<td>Repair brakes (hydraulic)</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tune up (minor) points, plugs, carb. adjust.</td>
</tr>
<tr>
<td>Tune up (major) adjust valves etc.</td>
</tr>
<tr>
<td>Top end overhaul</td>
</tr>
<tr>
<td>Major overhaul</td>
</tr>
<tr>
<td>Change oil</td>
</tr>
<tr>
<td>Repair valve mechanism (valve, pushrods)</td>
</tr>
<tr>
<td>Repair of crankshaft assembly (bearings)</td>
</tr>
<tr>
<td>Repair of piston assembly (pins, rings)</td>
</tr>
<tr>
<td>Repair of camshaft assembly (bushings)</td>
</tr>
<tr>
<td>Repair of 2-stroke reed valves, etc.</td>
</tr>
<tr>
<td>Repair or replace exhaust pipes, mufflers</td>
</tr>
<tr>
<td>Decarbon mufflers</td>
</tr>
<tr>
<td>Check compression</td>
</tr>
<tr>
<td>Replace seals</td>
</tr>
<tr>
<td>Replace bearings</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>


Transmission, chain, shaft, rear end, clutch
- Adjust gear shifter
- Adjust chain
- Replace chain or sprocket
- Repair transmission (minor)
- Repair transmission (major)
- Repair rear end or sprocket assy.
- Replace seals
- Replace bearings
- Clutch adjustment
- Clutch replacement
- Other

Starter, generator, or alternator
- Test starter
- Test generator
- Test alternator
- Adjust starter
- Adjust generator
- Adjust alternator
- Repair or replace starter
- Repair or replace alternator
- Repair or replace generator
- Other

Miscellaneous
- Touch-up paint
- Completely refinish
- Repair or replace fenders, tank
- Repair by welding
- Repair by brazing
- Adjust cables, controls
- Other
APPENDIX D: FOLLOW-UP POST CARD AND LETTERS
Dear Sir;

January, 1972

Recently you received a questionnaire concerning the needs for motorcycle mechanic training in the state of Iowa. To this date I have not received your completed questionnaire. I wish to remind you that this study is extremely important in determining the programs to be set up in the community colleges of the state.

If the questionnaire has been laid aside or gotten under a pile of papers, please dig it out, complete it, and mail it to me in the self addressed envelope. Your response is extremely important because only you can supply the needed information.

If you have already returned the questionnaire, please ignore this card. Thank you for your kind cooperation.

Industrial Education
Iowa State University

Yours truly,

Floyd E. Croy
Dear Motorcyclist;

A few weeks ago you should have received a copy of the enclosed questionnaire. I am sending you another on the chance that it has been misplaced, or lost in the mail, as I have no record of having received yours.

I wish to emphasize the importance of this study to motorcyclists. With the information obtained from you and 300 others like you, we will be able to determine if courses designed to prepare motorcycle mechanics should be set up in our Area Community Colleges. Your response is vital to the success of this study for without it we cannot get a complete picture for the state. If courses are set up in the Area schools, it will mean a larger supply of trained men available for motorcycle service and repair in Iowa.

Please sit down, complete the questionnaire, and return it to me before February 5, 1972.

Your cooperation is very important and will be greatly appreciated.

Thank you for your time and effort.

Sincerely,

Floyd E. Croy Jr.
Industrial Education
Iowa State University
Dear Sir:

A few weeks ago you should have received a copy of the enclosed questionnaire. I am sending you another on the chance that it has been misplaced, or lost in the mail, as I have no record of having received yours.

I wish to emphasize the importance of this study to your industry. With the information obtained from you and 149 firms like yours, we will be able to determine if the courses designed to prepare motorcycle mechanics should be set up in our Area Community Colleges. Your response is vital to the success of this study for without it we cannot get a complete picture for the state. If courses are set up in the Area schools, it will mean a larger supply of trained men available for your firm and the state in general.

Please sit down, complete the questionnaire, and return it to me before February 5, 1972.

Your cooperation is very important and will be greatly appreciated.

Thank you for your time and effort.

Sincerely,

Floyd E. Croy
Industrial Education
Iowa State University
APPENDIX E: COURSE OF STUDY OUTLINES
Motorcycle Repair

Length of Course: 25 hours a week for 72 weeks.

Objectives of Course: To develop the skills, ability, knowledge and appreciation for successful entrance and advancement in the field of Motorcycle Repair.

Content of Course:

1. Orientation to the Motorcycle Industry: 3 units, 54 hours
   a. Shop procedures, rules, safety
   b. Size and scope of industry
   c. Image of motorcyclist
   d. Public relations --- their affect on motorcycling
   e. Noise problems
   f. Understanding sales
   g. The need for profit. (Motorcycle sales, parts sales, service work, rentals)
   h. Forces motivating purchase, i.e. recreation vs. transportation
   i. Importance of service to sales in the motorcycle industry
   j. Basic Employment Information

---

2. Theory of Tools and Measurement: 3 units, 54 hours

a. Different measurement system
   (1) Foot-Pound System (American & British)
   (2) Metric Kilogram (Metric) System (European & Asiatic)
   (3) Conversion Table

b. Thread Standards
   (1) Society of Automotive Engineers (U.S.A.) S.A.E.
   (2) Whitworth (British --- limited usage)
   (3) Metric (British, European, Asiatic)
   (4) Thread Gauges, Dies, Taps, etc.

c. Basic Measuring Tools (Precision Measurement)
   (1) Micrometer (O.D. & I.D.)
   (2) Vernier Scale
   (3) Machinists Contractor
   (4) Feeler Gauges
   (5) Dial Indicators

d. Utility Tools (General Usage) both metric and S.A.E.
   (1) Hex Sockets
   (2) Open and closed end wrenches
   (3) Phillips and straight blade screwdrivers (Impact Driver)
   (4) Torque wrench

e. Power Tools
   (1) Cylinder Boring Machine
(2) Honing Machine
(3) Hydraulic Press
(4) Miscellaneous Power Tools --- Drill, Grinder

f. Specialty Tools (Shop Tools, Factory Kits)
   (1) Gear and Flywheel Pullers, Sprocket Holders
   (2) Chassis Tools --- Front Fork Assy.
   (3) Routine Maintenance Equipment

g. Proper Care of Shop Equipment

h. Proper use and care of hand and power tools

3. Internal Combustion Engine Theory: 3 units, 54 hours
   a. Types, Characteristics, and applications of the Two Stroke and Four Stroke cycle engines
   b. Principles of operation
   c. Factors affecting power
   d. Engine configuration
      (1) Single or multi cylinder
      (2) Vertical, inclined, horizontal or inverted
   e. Valve operation and timing

4. Engine Disassembly and Assembly (Two Stroke cycle & Four Stroke cycle): 4 units, 216 hours
   a. Proper and safe use of tools and equipment used in engine repair
   b. Interpretation of tolerances and specifications from manuals and charts
   c. Use of measuring devices
      (1) Micrometers
      (2) Dial indicators
(3) Cylinder gauges

d. Engine reboring
e. Piston, pin and connecting rod repair and tolerances
f. Valve and valve seat grinding
g. Valve timing
h. Engine accessory repair

5. Fuel Systems: 3 units, 54 hours

a. Type of fuels used
b. Classification of fuels (octane rating, additives, preignition, etc.)
c. Types of fuel systems
   (1) Gravity
   (2) Pressure (fuel pump)
d. Carburetion theory and principles of operation

6. Carburetor Breakdown and Assembly: 2 units, 108 hours

a. Disassemble, clean, inspect and reassemble
b. Minor adjustments
c. Proper use of testing equipment
d. Fuel injection systems repair

7. Electrical System Principles: 4 units, 72 hours

a. Units of electrical measurements
   (1) Amperage
   (2) Volts
   (3) Ohms (Ohms law)
   (4) Voltmeter
(5) Ammeter
b. Ignition (Theory and operation)
c. Lighting and accessories
d. Principles of the charging circuit
   (1) Generators
   (2) Alternators
   (3) Voltage regulators
   (4) Relays
e. Starters and Switches
f. Electrical Schematics and color coating

8. Electrical Systems Breakdown and Assembly: 3 units, 162 hours
   a. Operation and use of electrical test equipment
   b. Safe electrical repair procedures
   c. Motorcycle tuning
   d. Charging circuit repair
   e. Battery testing

9. Lubrication Systems Theory (including breakdown); 2 units, 36 hours
   a. Lubrication of Four Stroke Cycle
   b. Lubrication of Two Stroke Cycle
   c. Oil and its relation to heat and service
   d. Properties of oil
   e. Types of lubricants --- classifications (viscosity, flash point, additives, etc.)

10. Power Transmission Theory: 2 units, 36 hours
    a. Gear design
b. Transmission Theory and Operation

c. Power train

d. Clutch systems

11. Power Transmission Breakdown and Assembly: 3 units, 162 hours
a. Gear spacing (methods and tools)
b. Tolerances
c. Replacing and adjusting bushings and bearings

12. Frame and Suspension Theory and Demonstration: 2 units, 108 hours
a. Types and uses of frames and suspension
b. Proper and safe use of straightening tools and equipment
c. Frame welding

13. Wheel and Brake Laboratory: 2 units, 108 hours
a. Wheel bearings and seals
b. Wheel tuning, lacing, adjusting, balancing, etc.
c. Brakes service and adjustments
d. Brake drum and lining service

14. Engine Diagnosis and Repair: 4 units, 216 hours
a. Engine diagnosis equipment
b. Diagnosis techniques
c. Engine repair techniques

15. Transmission Diagnosis and Repair: 2 units, 108 hours
a. Clutch operation
b. Shifting mechanism
c. Gear and final drive repair
d. Repair techniques

16. General Service and Tune-up: 4 units, 216 hours
   a. Initial service and set-up of new unit
   b. Warranty service check ups
   c. Preventive maintenance service
   d. Tune-up techniques
   e. Estimating repair costs

17. Shop Management and Control: 2 units, 108 hours
   a. Shop supervision
      (1) Work in progress
      (2) Supervisors responsibilities
      (3) Problem solution
      (4) Leadership
      (5) Improving work methods
   b. Shop objectives
      (1) Quality
      (2) Production
      (3) Reasonable cost
      (4) Profit
Course Description

TITLE & NUMBER:
Mechanical Engineering 1. Four units.

DESCRIPTION:
The fundamental principles of mechanics are studied with special emphasis upon force, torque, power and motion as a basis for later courses. Laboratory verification of these principles is made on motorcycles and other small engines.

CURRICULA:
General Engineering, Mechanical Engineering, Industrial Technology

OBJECTIVES:
1. To familiarize beginning engineering students with the principles which determine the action of machines.
2. To help potential motorcycle owners to select the best machine for their needs.
3. To teach motorcycle owners the proper use and care of their machines.
4. To aid students in selecting various design criteria for mechanisms.
5. To teach students the proper selection and use of measuring equipment.
6. To relate elementary mechanical principles with academic and vocational needs in today's technology.
7. To supply a foundation in practical experience and theory for jobs.

---

1 This material courtesy of: Leo Lake, U.S. Service Manager, Yamaha International Corporation, Box 6600, Buena Park, California 90620. October 14, 1971.
No textbook need be purchased, but the following bibliography in the LOS ANGELES CITY COLLEGE library is recommended.

1. TWO STROKE MOTORCYCLES. Motorcycle staff. Floyd Clymer. 1967.

Course Outline

EACH ITEM REPRESENTS ONE WEEK, CONSISTING OF TWO LECTURES, A LAB & A TEST.

1. INTRODUCTION, DRAFTING, TECHNICAL REPORTS

A very brief peek into drafting, such as which end of the pencil to use, etc. Each man makes a drawing of a con rod and a ball bearing. Also we discuss the format of a technical report.

2. SYSTEMS, TERMS, MEASURING INSTRUMENTS

Metric and English and Time systems of measurement are studied. Vernier calipers and micrometers are used to measure conrod holes, bearing diameters. Literature from 4 leading manufacturers is studied and conclusions are calculated concerning power/cc, power/lb, etc. The assumption is made that all manufacturers exaggerate an equal amount. At this point, wallet cards with conversion unit data are distributed. These cards are given to us by the Yamaha Corp.

3. TWO STROKE, FOUR STROKE, SETUP

The differences of these two systems are discussed and the students are familiarized with the motorcycles donated to the school by the Honda and Yamaha companies. Particularly helpful is a "cutaway" engine loaned to us by Yamaha.
4. PORTING

A Jawa engine had the head removed and the clutch housing calibrated in degrees. As the crankshaft is rotated, the points are noted where the ports open and close. The students plot the points on a graph of the crank rotation that clearly shows the relative opening and closing pts.

5. CRANK ACTION, PISTON SPEED

The Jawa piston movement is measured from the cylinder top for each 10° of crank rotation. Piston speed is then calculated for various RPM's.

6. ELECTRICAL SYSTEM

Circuit symbols, component functions, and motor/accessory circuits are studied and followed through one of the motorcycles. Some simple trouble-shooting is done, eg, sparkplugs, generator, battery, timing.

7. GEARS, LEVERS

Three mating gears are selected from several hundred available (Honda, Suzuki, Yamaha) and mated in various combinations. For each 360° of the driven gear, the angle of rotation of the driver is noted. Teeth are counted and diameters are measured. Relationships observed are reported.

8. FRICTION, BRAKES

Blocks are slid along a surface, pulled by a weight hung over a pulley at the end of the table. The load on the blocks is varied as are the surfaces of the block. A coefficient of friction for each condition is determined. Vehicle brakes are studied and related to the experiment.

9. VELOCITY, LINEAR

A vehicle (usually the instructor's old tin can) is driven along a street near the school that is blocked off by the LAPD for our use on this day. Several students are equipped with stop watches, and two with flags for starting and stopping, and the rest act as traffic monitors so no curious history majors are demolished in our "speed trap." I try to maintain constant speed through the trap of about 10, 20, 30, 40 50 mph. At the second flag the brakes go on full force.
Distances, times, etc. lead to calculations of average velocities and braking distances are plotted against speeds. Naturally, the kids (and onlookers) get pretty excited by the screeching noises and the blue smoke at the higher speeds.

10. VELOCITY, ROTARY

The rotary velocity of clock hands, phonograph tables, tape recorder reels, and engine gears and vehicle wheels are measured, thought about and compared. Each one presents an example of the different use of design thought.

11. DENSITY

Several items (a block of wood, a crank pin, a steel ring, an aluminum rod) are measured and weighed. Their volumes are calculated and their densities (in the metric system) are determined. We discuss how steel ships and aluminum carburetor floats are able to float.

12. CARBURETION

We have about 35 carburetors (Honda and Suzuki) which we completely disassemble, noting each part and identifying it and its function. Here the Yamaha Shop Guide is most helpful. The separate control circuits are pointed out and discussed. This is one of the most popular weeks in the course.

13. SPRINGS

Several helical springs (Carburetor, clutch, valve) are deflected under carefully controlled conditions and the force required to deflect a unit distance is noted. The report confirms (or, in some cases, refutes) Hooke's Law.

14-15. PERFORMANCE TESTS

These two weeks we test the Honda and the Yamaha on our newly constructed dynamometer. We check fuel consumption at various speeds in various gears, and torque and power. The gas tanks are disconnected and the carbs are fed with separate, calibrated burettes so we get an individual reading on each cylinder at any speed. A very revealing experiment.
16-18. ASSEMBLY PROCEDURES.

The balance of the semester consists of disassembling and reassembling the motors we have acquired, and performing minor repair to students' bikes. To help us we have several hundred exquisite color slides covering every phase of 2-stroke and 4-stroke setup and assembly given to us by the Yamaha people and a complete set of service manuals from Honda and an equivalent set from Suzuki.
MONDAY

I. Orientation
   A. Registration
   B. Introductions
   C. Film: "Honda Today"
   D. Familiarization with CB-750 Service Bulletins and Service letters
   E. Explanation of the Metric System and its application to Torque specifications

II. Instruction in the Use of Measuring Instruments
   A. Vernier Calipers
   B. Micrometers
   C. Dial Bore Indicators
   D. Telescopic and hole Gauges

III. Discussion of Good Shop Practice
   A. Work Area
   B. Efficiency
   C. Safety

IV. Introduction to the Engine Stand

V. Disassemble the Top End of the CB-750
   A. Visual inspection of engine wear

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1 This material courtesy of: Bob Young, National Service Manager, Motorcycle Service Department, American Honda Motor Co., Inc., P.O. Box 50, 100 W. Alondra Blvd., Gardena, Calif. 90247. February 10, 1972.
B. Trace top end oiling system

C. Measure and inspect the valve train and cam lobes using the appropriate measuring instruments and using engineering specifications

VI. Question and Answer Period

TUESDAY

I. Discussion of Volumetric efficiency
   A. Valves
   B. Turbulence
   C. Spring Surge

II. Disassemble the Lower End
   A. Trace Oiling system and power flow through the lower end
   B. Measure Cylinder Taper and Piston Skirt Clearance

III. Discuss Piston failure and ring failure

IV. Describe Bearing Failure and Probable Causes

V. Demonstrate Bearing Fitting Procedures and the Use of Plastigauge to determine Correct Clearance

VI. Measure Bearing Surface of the Crank Pins using micrometers

WEDNESDAY

I. Discuss the Cutting Tools Used for Reseating Valves
   A. Practical Instruction and Participation by Students in cutting and lapping new valve seats

II. Measure Gear Backlash in Transmission and Axial Clearance in Main Shaft

III. Reassemble engine complete Setting Valves and Timing
IV. Disassemble carburetors
   A. Trace the air and gas system
   B. Reassemble and make basic carburetor settings
V. Demonstrate the Use of the Vacuum Gauges to Establish Proper Idling and Throttle Synchronization
VI. Demonstrate the Compression Gauge
VII. Question and Answer Period

THURSDAY
I. Disassemble the Top End of CB-500
   A. Measure Cam base circle and Cam lift
   B. Inspect and measure wear on Rocker Arm and Shaft
   C. Measure Valve Stem clearance and Valve Seat width
II. Instruction in the Type of Seat Cutters Used in Repairing Valve Seats (Full participation by students in re-seating and lapping valves)
III. Measure Wrist Pin and Connecting Rod Clearance
IV. Discuss Oiling Through the Top End
V. Disassemble Lower End
   A. Inspect clutch frictions and steels
   B. Axial clearance in clutch housing
   C. Trace the power flow in the transmission
   D. Disassemble and Inspect the troycoid oil pump, measure using correct specifications
   E. Measure the oil clearance in main bearings using Plastiguage method
FRIDAY

I. Reassemble CB-500 Engine

II. Disassemble the CB-500 Carburetors
   A. Discuss the air and fuel circuits
   B. Reassemble and tune using vacuum gauges
   C. Reset ignition timing and valve timing

III. Explanation of Testing Procedures of the Various Components in the Electrical System

IV. Instruction in Testing
   A. Voltage Regulator
   B. Rectifier
   C. Alternator
   D. Battery Voltage
   E. Field Current

V. Demonstrate Correct Procedure in Bleeding the Hydraulic Brake System

VI. Final Question and Answer Period

VII. Certificate Presentation
All Model Service Tester and Carburetion Course

MONDAY

I. Introduction

II. "This is Honda" (Film)

III. Explanation of Honda Electrical Systems
    A. Type 1
    B. Type 2
    C. Three phase and Flywheel A.C. Generator
    D. Ignition Coil

IV. Discussion, Question and Answer Period

V. Tracing Wiring Diagram in Shop Manual Explanation of each component part and its function

TUESDAY


II. Bench Testing of Electrical Component Parts
    A. Battery, Ignition Switch, Condenser and Ignition Coil
    B. Selenium Rectifier, Half Wave, Full Wave
    C. Three Phase, Current and Limiter Regulator and dual contact type regulator
    D. Flywheel A.C. Stator Coil, lighting and ignition
    E. Type 1 Stator Coil, Three Phase coil and Field coil
WEDNESDAY

I. Students Testing Component Parts on Honda Motorcycle with the Honda Service Tester. (QA50, CL70A, CT90, CB100, CB350 and CB750)

II. Isolation Testing Of
   A. Charging System; Day and Night
   B. Dual Contact Regulator
   C. Current Limiter Regulator
   D. Ignition Coil
   E. Condenser
   F. Ignition Timing with Timelight
   G. Rectifier Test Half Wave, Full Wave, Three Phase
   H. Starter Magnetic Switch
   I. D.C. Current (A) (-) (+)
   J. CB500 and 750 Charging System

THURSDAY

I. Carburetion
   A. Diagnosis and repair of carburetors for all Honda Model Motorcycles
   B. Explanation and tracing of each carburetor system
   C. Teardown of Seven Carburetors and Reassembly and Setting of Carburetor
   D. Carburetion Students will Work On: SS125, CT90, CB100, CB350, CB450, CB500 and CB750
I. Tuning Procedures and Techniques (CT90, CB100, CB350, CB450, CB500 and CB750)
Special Shop Course

MONDAY

I. Use of Cylinder Boring Bar
   A. Fitting Rings to Piston
   B. Fitting Rings to Cylinder
   C. Fitting Piston to Cylinder
   D. Fitting Piston Pins to Rod

TUESDAY

II. Wheel Lacing and Truing
   A. 36 Spoke Wheel
   B. 40 Spoke Wheel
   C. 16" Spoke Wheel
   D. 17" Spoke Wheel
   E. 18" Spoke Wheel
   F. 19" Spoke Wheel
   G. 21" Spoke Wheel

WEDNESDAY

III. Upper End Overhaul and Valve Seat Cutting
   A. Cutting Valve Seat
   B. Valve Guide Seal
   C. Valve Guide
   D. Valve Springs
   E. Valve Retainer
Course Outline - Motorcycle Mechanic

I. Orientation to the Motorcycle Industry 10 hours
   a. Shop procedure, rules, safety
   b. Size and scope of industry
   c. Image of the motorcyclist
   d. Public relations - their effect on motorcycling
   e. Noise problems
   f. Understanding of sales
   g. The need for profit. (Motorcycle sales, parts sales, service work, rentals)
   h. Forces motivating purchase, i.e., recreation vs. transportation
   i. Importance of service to sales in the motorcycle industry
   j. Basic Employment information

II. Theory of Tools and Measurement 10 hours
   a. Different measurement system
      1. Foot-pound system (American & British)
      2. Metric Kilogram (Metric System (European & Asiatic)
      3. Conversion Table
   b. Thread Standards
      1. Society of Automotive Engineers (U.S.A.) S.A.E.
      2. Whitworth (British - limited usage)
      3. Metric (British, European, Asiatic)
      4. Thread gauges, dies, taps, etc.
   c. Basic Measuring Tools (Precision Measurement)
      1. Micrometer (O.D. & I.D.)

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1 This material courtesy of: Leo Lake, U.S. Service Manager, Yamaha International Corporation, Box 6600, Buena Park, California 90620. October 14, 1971.
2. Vinear Scale
3. Machinist's Contractor
4. Feeler gauges
5. Dial indicators
d. Utility Tools (General Usage) Both Metric and S.A.E.
   1. Hex sockets
   2. Open and closed end wrenches
   3. Phillips and straight blade screwdrivers (Impact Driver)
   4. Torque wrench
e. Power Tools
   1. Cylinder Boring Machine
   2. Honing machine
   3. Hydraulic press
   4. Miscellaneous power tools - drill, grinder
f. Specialty Tools (Shop Tools, Factory Kits)
   1. Gear and flywheel pullers, sprocket holders
   2. Chassis tools - front fork assembly
   3. Routine maintenance equipment
g. Proper Care of Shop Equipment
h. Proper Use and Care of hand and power tools

III. **Internal Combustion Engine Theory** 50 hours

   a. Types, characteristics, and applications of the two stroke and four stroke cycle engines
   b. Principles of operation
   c. Factors effecting power
   d. Engine configuration
      1. Single or multi-cylinder
      2. Vertical, inclined, horizontal or inverted
e. Valve operation and timing

IV. **Engine Disassembly and Assembly** 100 hours (Two Stroke cycle and Four Stroke cycle)

   a. Proper and safe use of tools and equipment used in engine repair
   b. Interpretation of tolerances and specifications from manuals and charts
   c. Use of measuring devices
      1. Micrometers
      2. Dial Indicators
      3. Cylinder gauges
d. Engine reboring  
e. Piston, pin and connecting rod repair and tolerances  
f. Valve and valve seat grinding  
g. Valve timing  
h. Engine accessory repair

V. Fuel System  
10 hours

a. Types of fuels used  
b. Classification of fuels (octane rating, additives, pre-ignition, etc.)  
c. Types of fuel systems  
   1. Gravity  
   2. Pressure (fuel pump)  
d. Carburetion theory and principles of operation

VI. Carburetors Breakdown and Assembly  
50 hours

a. Disassembly, clean, inspect and reassemble  
b. Minor adjustments  
c. Proper use of testing equipment  
d. Fuel injection systems repair

VII. Electrical System Principles  
50 hours

a. Units of electrical measurements  
   1. Amperage  
   2. Volts  
   3. Ohms (Ohms law)  
   4. Atom theory  
   5. Voltmeter  
   6. Ammeter  
b. Ignition (theory and operation)  
c. Lighting and accessories  
d. Principles of the charging circuit  
   1. Generators  
   2. Alternators  
   3. Voltage regulators  
   4. Relays  
  e. Starters and switches  
  f. Electrical schematics and color coating

VIII. Electrical System Breakdown and Assembly  
50 hours

a. Operation and use of electrical test equipment  
b. Safe electrical repair procedures  
c. Motorcycle tuning  
d. Charging circuit repair  
e. Battery testing
IX. Lubrication Systems Theory  10 hours  
(including breakdown  

a. Lubrication of four stroke cycle  
b. Lubrication of two stroke cycle  
c. Oil and its relation to heat and service  
d. Types of lubricants - classifications  
   (viscosity, flash point, additives, etc.)

X. Power Transmission Theory  50 hours  

a. Gear design  
b. Transmission theory and operation  
c. Power train  
d. Clutch systems  

XI. Power Transmission Breakdown and  50 hours  
Assembly  

a. Gear spacing (methods and tools)  
b. Tolerances  
c. Replacing and adjusting bushings and bearings  

XII. Frame and Suspension Theory and  40 hours  
Demonstration  

a. Types and uses of frames and suspension  
b. Proper and safe use of straightening tools and  
equipment  
c. Frame welding  

XIII. Wheel and Brake Laboratory  50 hours  

a. Wheel bearings and seals  
b. Wheel tuning, lacing, adjusting, balancing, etc.  
c. Brakes service and adjustments  
d. Brake drum and lining service  

XIV. Engine Diagnosis and Repair  100 hours  

a. Engine diagnosis equipment  
b. Diagnosis techniques  
c. Engine repair techniques
Course Outline

YAMAHA MOTORCYCLES MECHANICS' TRAINING PROGRAM

I. FIRST WEEK

Monday, 8:30 a.m.

A. Orientation to Yamaha and the motorcycle industry
   1. Sign in
   2. Tour of the facilities in Buena Park, Calif.

B. Image of the motorcycle rider
   1. Discussion by instructor

C. The student's responsibility to the industry
   1. Discussion
   2. Slides

D. The motorcycle: transportation or recreation
   1. Discussion
   2. Slides
      a. Mechanic
      b. Parts Manager
      c. Salesman
      d. Dealership
      c. A corporation employee

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1This material courtesy of: Leo Lake, U.S. Service Manager, Yamaha International Corporation, Box 6600, Buena Park, California 90620. October 14, 1971.
E. Set up procedure for new machines

1. Crate opening
2. General assembly of motorcycle
3. Filling and importance of charging new battery
4. Clutch adjustment
5. Carb adjustment and synchronization
6. Oil pump adjustment, pin alignment and measurement of pump stroke
7. Drive chain adjustment and alignment and tension. Care of chain in general.
8. Test riding new machine, checking brakes, lights, horn, and performance.

AIDS: Proper Set-Up movie (20 min.)

Proper Set-Up slides (96 slides)

Tuesday, 8:30 a.m.

A. Theory

1. How the 2-cycle engine runs
2. 3-port, 5-port, and rotary valve
3. Main jet size, main jet correction for elevation. Air to fuel ratio
4. Spark plug heat range, how to read spark plugs (in terms of color), rich from carburation or too cold a plug. Plug too hot or carb too lean, and how to apply carbs to plugs to make plug reading come out right.
5. Gearing for different applications and riding habits.
6. Summary of spark plug heat range, main jetting, elevation, gearing, and riding habits. How the mechanic applies all five in order to have a successful running machine and satisfied customer

AIDS: 2-Cycle Slides, 3 & 5 Port. (6 slides)

Jetting, elevation carburetion in general and plug heat range (6 slides on plugs, 18 slides carburetion)

Wednesday, 8:30 a.m.

A. Piston fitting and cylinder boring
   1. Carbon effect
   2. Pre-ignition
   3. Blow-by due to stuck rings
      a. Lean condition caused by blow-by from stuck rings

AIDS: 9 slides on carbon showing a direct effect on all of the three. 1, 2, and 3 and including very differently (a) lean condition.

B. Friction
   1. Piston to cylinder wall improper fit
   2. Lack of oil

C. Reading metric devices
   1. Vernier calipers
   2. Micrometer, inside/outside
   3. Cylinder gauge
      a. Checking of cylinder taper
   4. Class discussion using all metric devices in use at YIC
5. Converting millimeters to inches

D. Cylinder boring

1. Use of Kwik-Way boring bar
2. Honing using Sunnen hone
3. Students are instructed in the use of boring and honing equipment
4. Keystone, dykes, standard rings
   a. Ring fitting

AIDS: Use of Shop Tools movie showing use of Kwik-Way boring bar (8 min.)

Thursday, 8:30 a.m.

A. Crankshaft rebuilding

1. Orientation of crankshaft components
2. Older crankshaft discussion
3. Conversion from oil to new type crankshaft
4. Crankshaft interchangeability
5. Mixing crankshaft components same year modification
   a. Parts books and Parts Bulletins discussion by instructor
6. Crankshaft disassembly by students
7. Checking crank parts for wear
8. Crankshaft assembly by students
9. Aligning crankshaft by students
   a. The use and importance of crankshaft data sheets
AIDS: Old Crankshaft movie (25 min.). New Crankshaft movie using latest crank jig (18 min.)

Friday, 8:30 a.m.

A. Electrical
   1. Introduction to Yamaha Electro Tester
   2. Introduction to Yamaha point checker

B. Explanation of importance of continuity
   1. Resistance used as continuity or a measure of resistance in K/ohms
   2. Insulation used as continuity or a measure of resistance in M/ohms

C. Voltage
   1. D.C. voltage and its characteristics
   2. A.C. voltage and its characteristics
   3. How to tell what type electrical system is in use on different machines

D. Coil test
   1. Primary coil continuity
   2. Secondary resistance in k/ohms
   3. Coil leakage, windings to ground, m/ohm
   4. Coil spark quality test

E. Condenser
   1. Ability of condenser to load and hold
   2. Capacity of condenser
      a. Capacity and its effect on timing
3. The importance of checking new condenser before installing in the electrical system

F. Voltage D.C.

1. D.C. voltage
   a. Starting the generator
   b. If no or not enough voltage
      b-1 Cleaning system
      b-2 Checking brushes
      b-3 Checking field windings
      b-4 Checking commutator

G. Check for proper voltage through regulator

1. Visual inspection and condition of regulator
2. Setting and proper adjustment of regulator using Electrical Specifications Sheet
3. Quick and dirty voltage check at the battery

H. Voltage A.C.

1. Checking voltage at the magneto
2. Checking voltage at the battery side of rectifier or on D.C. side
3. Check rectifier both 1/2 wave and full wave
   a. Resistance reading of rectifier
   b. Spark test to check rectifier

I. Amperage

1. Comparison of amperage to voltage
2. How and where to measure amperage
3. Diagnosis of electrical system using quick and dirty checks
4. Learning the color code and how to use it

AIDS: Hitchi Electrical film (20 min.)

Electro-Tester, Pocket Tester, and Their Uses.
(48 slides)

SECOND WEEK

Monday, 8:30 a.m.

A. Movie Assembly, disassembly (45 min.)
   1. Discussion on tool handling
   2. Discussion on organization of disassembled parts

B. Students are instructed on parts ordering

C. Students are assigned complete motorcycle to take completely apart.
   1. Transmission discussion on each machine
   2. Shifter adjustment to insure proper shift pattern.
   3. Strict attention is stressed on the importance of seals and "O" rings
   4. Each motorcycle must be timed, carbs synchronized, clutch and brakes adjusted, oil pump setting checked
   5. All machines must run and shift properly after each group of students are finished

Tuesday and Wednesday, 8:30 a.m.

A. Same disassembly and assembly until all students have been through all types of 2-cycle Yamahas, including all 3 types of transmissions
1. Ball lock transmission
2. Drum shifter
3. Cam pawl shifter

Thursday, 8:30 a.m.
A. XSl 650 class disassembly and assembly
   1. Oil pump and filter
   2. Timing crank to cam shaft
   3. Timing the ignition
   4. Valve grinding and tolerance throughout the engine

Friday, 8:30 a.m.
A. Test on everything given during the 80-hour course
   1. Troubleshooting
   2. Piston & ring fitting
   3. Timing
   4. Carburetion
   5. Electrical
B. Parts discussion by Parts Department
C. Warranty discussion by Warranty Department
D. ABC Slide Program
   1. Ability
   2. Business planning
   3. Character

Three groups of 8 men in each - 2 men to each bench. Bench sections will be identified as A, B and C - 4 benches to a section. Men to be assigned 2 to a bench; that is Bench A-1, A-2, etc.

HOURS: 8 a.m. to 12 - 12:30 p.m. to 5.

Opening Class - Introduction, Grouping and Assigning Students.

<table>
<thead>
<tr>
<th>Monday Subject</th>
<th>SECTION A</th>
<th>SECTION B</th>
<th>SECTION C</th>
<th>CHAIR SESSION</th>
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</thead>
<tbody>
<tr>
<td>Transmission OHV &amp; Servi-Car</td>
<td>Electra Glide</td>
<td>Sprint</td>
<td>Allied Trades or Films</td>
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<td>Tuesday Subject</td>
<td>Transmission OHV &amp; Servi-Car</td>
<td>Electra Glide</td>
<td>Sprint</td>
<td>Scale-Micrometer Films</td>
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<td>Wednesday Subject</td>
<td>Transmission OHV &amp; Servi-Car</td>
<td>Electra Glide</td>
<td>Sprint</td>
<td>Hydraulic Lifters Film</td>
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QUIZ AT END OF SUBJECT

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1This material courtesy of: Richard Marshall, Senior Technical Instructor, Harley-Davidson, Milwaukee, Wisconsin 53201. October 27, 1971
<table>
<thead>
<tr>
<th>Day</th>
<th>Section A</th>
<th>Section B</th>
<th>Section C</th>
<th>Chair Session</th>
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<tbody>
<tr>
<td>Thursday</td>
<td>Generator, Alternator</td>
<td>Sportster</td>
<td>Mach. Shop Repair</td>
<td>Pre-Ignition Film</td>
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<tr>
<td>Friday</td>
<td>Generator, Alternator</td>
<td>Sportster</td>
<td>Mach. Shop Repair</td>
<td>Spark Plug Film</td>
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<td>Saturday</td>
<td>Quizzes, Brakes, Frames</td>
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<tr>
<td>Monday</td>
<td>Generator, Alternator</td>
<td>Sportster</td>
<td>Mach. Shop Repair</td>
<td>Valves Film</td>
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<tr>
<td>Tuesday</td>
<td>Regulators &amp; Trouble Shooting</td>
<td>Leggero - Rapido</td>
<td>Tillotson Carb. Servi-Car</td>
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<tr>
<td>Wednesday</td>
<td>Regulators &amp; Trouble Shooting</td>
<td>Leggero - Rapido</td>
<td>Tillotson Carb. Servi-Car</td>
<td>Diamond Or Duckworth Chain Co.</td>
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<tr>
<td>SECTION A</td>
<td>SECTION B</td>
<td>SECTION C</td>
<td>CHAIR SESSION</td>
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<tr>
<td>Thursday</td>
<td>Tour Capitol Drive &amp; Juneau Avenue Plant</td>
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<td>8:00 a.m.</td>
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<tr>
<td>12:30 p.m.</td>
<td>Regulator &amp; Trouble Shooting</td>
<td>Leggero - Rapido</td>
<td>Dick O'Brien Racing</td>
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<td></td>
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<td>Tillotson Carb. Servi-Car</td>
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<tr>
<td>Friday</td>
<td>8:00 - Continuation of Thursday P.M. subjects to 10:30.</td>
<td>10:30 - Examination - After examination dinner to 2:00 p.m.</td>
<td>Pick up parts, motorcycles or leave for home.</td>
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APPENDIX F: COMMENTS BY DEALERS AND OWNERS

Many of these comments were marginal notes and were in rough grammatical form. Wherever intent wasn't altered; spelling and grammar were corrected to improve reading.
There definitely is a need for a training program for mechanics.

Definitely think there should be a class available for motorcycle mechanics.

We need a program in the school. Very good idea.

I only speak as an average size shop. But cycle's are becoming big business. In the future more training will be needed.

A motorcycle mechanic's course would be a benefit even if it's only to service their own motorcycle.

Motorcycle mechanics are badly needed.

There is a great need for motorcycle mechanics and none are available.

Am sure there is a need for good mechanics.

Mechanics are the main basis of a good shop, and also the hardest thing to find.

There definitely is a need for motorcycle mechanics however it's pretty hard to keep them year around.

I have been in mtcy. work since 1941 - a qualified mtcy. mech. is a rarity. A good one can earn 8 to 10 thousand/yr. & more. But it takes time - my mechanics must pull their own weight!

There is a great need for good teachers for this class.

Training needed in school on Minor Adjust. + Repair.

We set up our last hired mechanic as a trainee under our longest employed mechanic.

I run the shop in my spare time and do all the selling + Repairing Service and parts in a small town is my main selling point.
Comments By Dealers (continued)

My feeling of what a good motorcycle mechanic should be is this:

Someone who thinks. He need not know everything about everything, but he should have a general understanding of all motorcycle components, how they function, and how they relate to one another. If he can think, he can then apply this general knowledge to specific repair + trouble-shooting.

Partially separate, but partially related, a good mechanic should have a mind for mechanical "things" + principles. He should "naturally" know how "tight" to tighten a bolt or screw; when a part fits properly or when something is misaligned. These requirements are hard to describe, and may seem trivial or extreme, but they inevitably make the difference between a mechanic and a good mechanic. They are things that I doubt can be learned from a textbook.

In short, almost anyone can be taught to replace parts or components, but it is a different matter, to be able to do efficient and faultless repair.

This extraneous note may be difficult for you to tabulate, but I think it may help you in planning your program.

Thank you for the chance to sound-off!

I'm interested in a man who can perform the necessary work in flat rate time and not have come backs. This I would pay for - trial time on the job before proper pay. Approx. 3 months into season. In otherwords, proof he can do.

Motorcycle mechanic: Need's to be careful with customer and to be able to learn new procedures.

You can't make a mechanic - must have the aptitude!! Must enjoy motorcycles!

Mental outlook mustn't make customer mad, all cycle riders are very proud of their equipment and take offence to small remarks about performance... Every cycle shop grows in direct result to the customer being happy with performance.

Keep in mind a mechanic is a person that can fix equipment any one can bolt parts together.

We are also an automobile dealer - Bike mechanics also work on cars. Biggest problem is factory labor rate on M/cycles is less than on cars. Mechanics do not appreciate this.

I'm a small operator, and intending to quit. Do you know any potential buyer?
Need for more men interested in.

I would consider on the job training very important!

A motorcycle mechanic must have years of experience before he can become an asset.

I question the value of public school training. 6 months experience in the shop + company service school seems to do better and you don't have to retrain them to your way of doing things.

Do you think there is a need for training programs for motorcycle mechanics in the public schools? No, because our distributor requires all mech. attend their schools expen. paid.

Do you think there is a need for training programs for motorcycle mechanics in the public schools? No, each company has schools.

Each brand has their own schools and I don't feel training on your level is at all necessary.

I feel that the rate of advancement of the motorcycle industry would make it impossible for a teaching program to keep up.

Advise young person to go into another field, car-truck mechanics.
Comments By Owners

I live less than one mile from my ... Dealer, ... and I am well pleased with his competent service.

Two free checkups were performed on my cycle. They were well done + thorough.

... I plan on having all work done by the dealer who sold me the machine. ... as I have neither the time, tools, nor knowledge to do so myself. I ... feel it is very important that it be in top shape for my safety.

A training program in the vocational schools would be a valuable asset in keeping the motorcycles on Iowa highways as safe as possible.

I am a motorcycle mechanic and have been for several years now. ... There is a great need for trained mechanics in all types of motorcycles ... I hope you succeed in getting a training program for motorcycle mechanics.

I believe there is a definite need for qualified motorcycle mechanics.

I think a training program like this would be excellent. The only trouble I've ever had getting a motorcycle worked on was due to a shortage of mechanics.

There are not Enough M/C Mechanics to do all the work Needed on the M/C's. So Most Riders Have Resorted to Doing Their Own Work & Repairs Because of the Lack of Mechanics. Also the Lack of Replacement Parts is a Great Disappointment When Going to Have You Bike Repaired or When Repairing the Cycle Yourself.

In my city the over all service to a motorcycle must be accomplished by the owner himself. The present facility for motorcycle repair leaves much to be desired.

If you have had any service performed on your m/c, how would you describe it? : We do it ourselves.

Check those catagories in which you have had service work done. : I've worked on these all myself.
Do you (will you) perform your own minor repair or service on your m/c? (change points, adjust brakes, carburetor, etc.) Reply: no If there was someway of learning how, I would.

I do all of my own major mechanical work.

Were mechanics available to get the work done? : Never had to have someone else do work on it.

I have always bought the parts and done my own work.

I have always done nearly all major repair + overhaul work on my own machines. Many of my riding acquaintances do their own work.

Major over haul was done by myself + by friends The ... shop doesn't do good work here + it takes for ever to get it done.

The local repair shops have good mechanics but they are so overloaded + few, that you have to book every minor repair far in advance. ... Repair parts are not always available + substitute parts must be used.

Getting work done on a bike is a real hassle. If you've got any kind of an overhaul that you cannot do yourself you might as well plan on having your bike down for quite a while. This gets to be a real pain, especially if it happens during the riding season.

The motorcycle shops in Des Moines are so busy that they will not work on bikes over 3 years old. Most all the shop's have a shortage of mechanic's.

It takes a long time just to get general repair. The mechanic they had was never there, he only cam in when he wanted to. Another shop, ... has pretty seedy looking mechanics that don't care how they do the work or when. ... I'm sorry I made it so messy, but I'm kind of excited. I've been waiting for something like this for a long time, to express my feelings about these shops.

I believe that most shops are good on service. There is one shop that is terrible though, ... They have but one mechanic. They never have the parts.
Comments By Owners (continued)

I have only had warranty work done. The shops are as independent as they can be and I think lack of competition makes them so. As to buying parts it is easily possible to spend 2 hours in a dealers shop just to get a turn at the parts window.

They [the dealer] sent it to some mickey-mouse shop because they were too busy. ... they had the bike one year and finally told me that they ... couldn't fix it. Then made me pay $25.00 to get it back in pieces. I would say that you need a course for motorcycle mechanics very much.

I can't get service to do a good job. I had points + plug put in a 70 + that is all. and it cost $27.00 I think it was too high. they had 2 1/2 hours labor. If knew how I could have done same job about 1 hour.

... local ... dealer ... told me to leave my bike for a minor tune up. It would be 5 - 6 WEEKS ... Since then I do it myself.

As a general rule - The M/c Mechanics in the Omaha-Council Bluffs are are doing only fair work - Many times things take a long time to get done + when it is done, it usually has to be done a second time.

The bike seemed to run better before they tuned it than after.

It appears to me that most mechanics have been self-trained and often fail to perform the most rudimentary (and often necessary operations in their repair work. For example, recently I had a new lower head casting put in my engine to replace a defective one. 4 months in the shop and each time they released it to me there was something wrong with it.

   eq. - head not tightened (torqued) down properly
   - cam sprocket put in backwards
   - exhaust pipes fastened insecurely and threads stripped on attachment bolts & nuts
   - improper carburetor adjustment

It has convinced me to perform my own repairs --- thanks for this opportunity to complain.

Mechanics wanted to argue but dealer was fair and just.
Comments by Owners (continued)

I serviced my own after buying. I ... do not believe we need any more schools to raise our taxes.

We do need more good cycle mechanics but the job in itself has to be a side line job with something else in order for a man to make a living.

I sincerely hope I have helped your research and if I may be of further help please contact me.