Preface

Eternal vigilance in seeking more efficient and economical motor transportation must be everpresent to maintain the industry's enviable growth and stature.

The trucking industry is continually faced with spiraling costs which must be offset by more efficient application of equipment through improved methods and concepts in transportation.

The industry must challenge and change these deterrents that limit its scope and potential growth through better utilization of the nation's vastly improved highway systems.

New technologies are pressing increased demands on owners, operators and manufacturers. These demands must ultimately lead to radically improved vehicle standards for safer, faster and more reliable and efficient transportation. Intelligent Vehicle Highway Systems (IVHS) technology will enhance increased efficiency and improved traffic management, and the trucking industry will become the first beneficiary. In the future, environmental concerns will influence these designs and operations. Rising public concern about automotive safety and environmental matters prompts congressional demands for cleaner air and safer more efficient vehicles.

The major challenges facing our industry during this decade will be energy and the environment with continued improvement in safety and conservation.

Mobile technology will continue to improve and meet the economic requirements of manufacturers, owners and operators.

Motor transport leaders will find this handbook significantly helpful and above all useful in coping with these problems. Motor truck executives have an unprivileged responsibility to assure that motor vehicles are operated on the highways in a safe and efficient manner so as to reflect credit on both the industry and the operators.

This handbook will also serve as a ready reference for motor truck data and solutions to many motor vehicle problems. The trucking industry must create a
more favorable image by keeping the general public as well as governmental people better informed on the values of its many services.

The fourth edition updates the basic truck engineering data from previous editions and introduces the latest advancements in electronic applications to truck power trains and operations, assuring optimum performance and economy with a safer and cleaner environment.

Useful data from official government tests on anti-lock brakes and traction enhance this edition. Likewise, environmental concerns are addressed through the use of non-polluting vehicles using alternative fuels and electrical energy.

This handbook is dedicated to my many friends in the industry who have so generously given of their time and specialized knowledge to help make this book more informative, more authoritative and more readable.

JWF
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter I</th>
<th>THE TRUCKING INDUSTRY</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Industry scope and truck facts. Registrations, revenues. The state of the art. Fundamentals of Metrics. IVHS.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter II</th>
<th>SELECTING THE SIZE AND TYPE OF VEHICLE</th>
<th>15</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Chapter III</th>
<th>ROAD PERFORMANCE</th>
<th>57</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Chapter IV</th>
<th>FUEL ECONOMY AND OPERATING COSTS</th>
<th>83</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factors affecting fuel economy including engine design, lightweight materials, aerodynamics, radial tires, electronics, transmissions and rear axle ratios, driver ability and vehicle configuration. Operating and ownership costs. Fuel cost and maintenance, taxes and depreciation.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter V</th>
<th>CHASSIS COMPONENTS</th>
<th>109</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle frames, cooling systems, supporting equipment including lightweight components, electronic equipment, air shields, air cleaners and exhaust systems. Fasteners.</td>
<td></td>
</tr>
</tbody>
</table>
Chapter VI ENGINE TYPES ................................................................. 125

Chapter VII TRANSMISSIONS ............................................................. 169
ics, electronic integration, gear-fast/run-slow concept, Allison World automatic transmissions.

Chapter VIII REAR AXLES ................................................................. 207

Chapter IX AXLE SUSPENSIONS .......................................................... 225
Chapter X  BRAKES AND RETARDERS ........................................... 239

Chapter XI  DRIVETRAINS AND DRIVELINES ............................... 301

Chapter XII  STEERING GEOMETRY .......................................... 317
Fundamentals governing good steering design. Factors and adjustments affecting steering geometry and front-drive axes. Types and application of power steering. Determining turning radii and off-tracking for single and combination vehicles.

Chapter XIII  WHEELS AND TIRES ........................................... 335
Chapter XIV  ALTERNATIVE FUELS ................................................ 357
Available alternative fuels, ethanol, methanol, reformulated
fuels, compressed natural gas (CNG), natural gas, electric
energy. Emissions, fuel economy, costs of converting, dual
fuel operation, various engine conversions, dedicated en-
gines. Electric vehicles, solar power, gasoline engines, LP
gas engines, gas turbines, steam power.

Chapter XV  ENVIRONMENTAL REGULATIONS ......................... 377
Clean Air Act, emission regulations, air contaminants and
sources, emission limits for heavy-duty trucks, EPA emission
controls, smoke standards, Federal and state noise standards.
Reducing vehicle noise.

Appendix  Weights and measures (English-Metric) ...................... 395
Vehicle tests, charts and tables.

Glossary  Terms and abbreviations used in the trucking industry ...... 405

Index ............................................................................................................. 435