Innovations in Automotive Transmission Engineering

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Preface

An automotive transmission is broad ranging, strong but invisible within its own environment, the vehicle—like a tiger in its native haunts. For years, engineers have been developing transmissions, mated with engines, to produce the optimum vehicle powertrain. For all of their thousands of creative mechanisms and patented ideas, the transmission engineer’s inventive genius has yet to meet all the needs of the customer and of society.

The automatic transmission has been in active development since the late 1930s. To commemorate the fiftieth anniversary of the automatic transmission, in March 1985, SAE International sponsored a panel discussion during its annual Congress held in Detroit, Michigan. Industry pioneers in the field discussed the latest transmission developments as well as the technical progress of the entire industry. And it is a major industry, currently measured in billions of dollars.

This book is designed to provide background and cohesive support for the manager who may have planning responsibility for directing the application of a transmission for a future vehicle application. Historical information is briefly reviewed as a basis for the state of development of current and future transmissions. Knowledge of past efforts helps to preclude repeating problems of the past. The format evolves naturally to the subject of transmissions of the future, identified as the “new” transmission. New transmission concepts are examined and tested to shed light on ways the engineer can help to meet the demands of the customer of tomorrow.

A transmission may take many forms and has various applications; therefore, for the purpose of the discussion in the following pages, some criteria have been established. First, the fundamental purpose of a transmission, as discussed herein, is to provide a cost-effective, efficient connection between a vehicle power source and its driving wheels. At first glance, this seems like a relatively straightforward objective. However, after vehicle criteria are established, some of which may appear to conflict among themselves, the problems to engineer a successful transmission, which will be accepted by the motoring public for a sufficient number of years to make it a profitable venture, may be quite formidable. The best example of conflicting criteria is to
economically produce a higher-performance vehicle engine–transmission with no compromise in fuel economy. As the following pages show, that ongoing objective is being met.

The discussion in the following pages will be limited to transmissions in passenger car or light truck applications, primarily in North America, to define a manageable scope of this vast and interesting subject.