

Preface

A rocket streaks across the sky, guided by electro-mechanical gyroscopes and accelerometers. A cardiologist diagnoses a patient, helped by an electro-mechanical electro-cardiograph. A scientist explores a law of nature on a computer, its data stored on electro-mechanical tape and disk memories. And the cardiologist and the scientist eat breakfasts prepared with electro-mechanical toasters.

In the real world, mechanical engineering and electrical engineering are inextricably entwined. Every electrical device is a mechanical device designed for its electrical properties and manufactured in a factory of mechanical machines; many mechanical devices are partly electrical and most are made by machines that are electrically powered and electrically controlled. Electro-mechanical engineering is interdisciplinary. Electro-mechanical engineering deals with devices and systems combining electrical and mechanical phenomena. The art has been growing for over a century, but only recently has a new name—mechatronics—been applied, whence the title of this book [A54].

A voltage amplifier is purely electrical; a steam engine is purely mechanical; but a motor, solenoid, switch, computer disk drive, and autopilot are electro-mechanical.

This book is for engineers who are already involved with electro-mechanical devices and systems and for those who only want to broaden their general knowledge. It is for both electrical and mechanical engineers and for engineering students who are considering entering the field. Because the book contains almost no mathematics, it can be understood by technicians and laypersons who do not have formal engineering training. It will help engineering managers to understand and judge what their peo-

