Third Edition

Automotive Steering, Suspension, and Wheel Alignment Shop Manual



Contents

Chapter 1 — Safety Precautions, Shop Practices, and Special Tools 1 Objectives 1 Introduction 1 Safety Precautions 1 Shop Practices 9 Special Tools 9 Wheel Alignment Equipment 20 Occupational Safety and Health Act 20 Hazardous Waste 21 Resource Conservation and Recovery Act (RCRA) 21 Clean Air Act 22 Material Safety Data Sheets (MSDS) 22 The Dangers of Exposure to Asbestos 22 Asbestos OSHA Standards 22 Asbestos EPA Regulations 23 Asbestos Handling Guidelines 23 Used Brake Fluid 23 Used Oil 24 Disposal of Used Oil 24 Used Oil Storage 24 Solvents 25 Solvent Hazardous and Regulatory Status 26 Used Solvents 26 Coolant Disposal 26	Analyzing the Information 34 Strategy-Based Diagnostics 43 Chapter 3 — Electrical and Electronics Basics 51 Objectives 51 Introduction 51 Safety 52 Electricity and Electronic Principles 52 Electrical Test Instruments and Testing 56
	Chapter 4 — Steering Wheel, Steering Column, and Steering Gear Service 67 Objectives 67 Introduction 67 Steering Wheel and Column 67 Steering Column Diagnosis 68 Steering Gears 80 Standard Steering Gears 81 Rack and Pinion Steering Gears 90
	Chapter 5 — Steering Linkage Service 113 Objectives 113 Introduction 113 Identifying the Steering Linkage 113 Inspecting and Replacing Components 114 Measurements and Adjustments 134
Lead-Acid Battery Waste 27 Battery Hazardous and Regulatory Status 27 Battery Handling and Storage 27 Fuel Safety and Storage 27 Airbag Handling 28 Used Tire Disposal 28 Air-Conditioning Refrigerant Oil Disposal 29	Chapter 6 — Power-Assisted Steering System Service 141 Objectives 141 Introduction 141 Power Steering Fluid 142 Drive Belt Service 147 Power Steering Testing 153 Hoses And Fittings 155 Power Steering Pump 157 Power-Assisted Steering Gears 165
Chapter 2 — Chassis Problem Diagnosis 31 Objectives 31 Introduction 31 Gathering Information 32	Chapter 7 — Four-Wheel Steering System Service 191 Objective 191 Introduction 191

Identifying a Four-Wheel Steering System 193 Rear Steering Gear, Actuator, or Power Cylinder 194 Steering Angle Transfer Shaft 201 Electronic and Hydraulic Controls 203 Power Steering Pump 204 Rear Steering Linkage 204	Driveline Joints 320 Diagnosis of Driveshaft and U-Joint Problems 322 Driveshaft Balance 323 Chapter 12 — Electronically Controlled Suspension Service 331 Objective 331 Introduction 331 Identifying Electronically Controlled
Chapter 8 — Shock Absorber, Strut, and	· · ·
Spring Service 213	Suspensions 331
Objectives 213	Electronic Suspension Precautions 333
Introduction 213 Identifying Shocks, Struts, and Springs 214	Electronic Control System Inspection 335 Electronic Component Service 342
Shock Absorbers 217	Specific Manufacturer System
Struts 221	Diagnosis 346
Springs 229	Nissan Vehicle Damping System
	(VDC) 350
Chapter 9 — Suspension Linkage Service 269	Chapter 13 — Wheel and Tire Service 355
Objectives 269	Objectives 355
Introduction 269	Introduction 355
Suspension Ball Joints 269	Wheel and Tire Service 356
Bushings 277	Basic Wheel Bearing Service 369
Knuckles 279	Basic Drum Brake Service 380
Control Arms 284	Basic Disc Brake Service 383
Chapter 10 — Rear Suspension	Runout 385
Component Service 295	Balancing 390
Objective 295	Tire Rotation 397
Introduction 295	Chapter 14 Wheel Alignment 417
Trailing and Semi-Trailing Arms 295	Objectives 417
Antiroll Bars and Other Suspension	Introduction 417
Links 300	Prealignment Inspection 418
Rear Axle Steering Knuckle and Ball	Computerized Four-Wheel Alignment 424
Joint 303	Measuring Alignment Angles 429
Chapter 11 — Basic Axle and Driveline	Measuring Wheel Alignment With Rear-
Service 309	Wheel- Steering 430 Computerized Four-Wheel Alignment 433
Objectives 309	Two-Wheel Alignment 434
Introduction 309	Alignment Angle Adjustments 435
Axles 309	Special Considerations 445
Driveshafts 316	-p-0.00 - \$11010010010 110