

Preface

I feel great pleasure in presenting this book of "Automobile Engineering Practical", since there was a long felt need of good quality book on this subject due to which trainees and Instructors/Training Officers had been facing great difficulty. I trust that this book will solve the problem to a great extent.

In this book, each of the operations has been described in such a manner that trainees can understand it themselves and prepare their Practical Copy. In various operations, necessary information tables, specifications and typical details and diagrams have been provided, so that trainees can increase their knowledge. Special attention has been given to the quality of figures and photographs. As far as possible they have been shown as they look real.

Supplementary diagrams for various practicals have been given to provide latest knowledge about new technological developments in the field. In last chapters, Traffic Road Signs, Driving Rules and other important information has been given. Specifications of some of the popular vehicles in our country has also been given.

I thank my publishers for motivating me to write this book and publishing the same in such a nice get-up and in such short time.

— Author

Dedication

In memory of my grand father

(Late) Lala Khushiram Malhotra

and my grand mother

(Late) Smt. Lakshmi Devi Malhotra

— N. Malhotra

Contents

1. Filing Practice	1
2. Practice of Filing At Right Angle	2
3. Practice of Hacksawing	3
4. Marking Practice	4
5. Drilling Practice	5
6. Reaming Practice	6
7. Tapping Practice	8
8. External Threads Cutting	10
9. Measurement With Engineering Foot Rule	11
10. Measurement With Outside Micrometer (Inches And Milimeters)	13
11. Knowhow of Chassis Parts	15
12. Gasket Cutting Practice	19
13. Tightening of Nuts And Bolts	21
14. Jacking Up The Vehicle	23
15. Servicing of Vehicle	26
16. Repairing of Punctured Tube	30
Table — Tyre Pressure of Various Types of Vehicles	33
17. Front Wheel Bearing Play Adjustment	35
18. Overhauling of Semi- Elliptical Leaf Springs (Jeep)	37
19. Overhauling of Semi - Elliptical Leaf Springs (Ambassador Car)	39
20. Overhauling of Front Axle (Jeep)	41
21. Replacing Torn-out Dust Boots of Constant Velocity Type Front Wheel Drive Axle (Indica Car)	43
22. Overhauling of Front Axle Beam King Pin	46
23. Telescope Shock Absorber (Double Acting)	49
24. Adjustment of Steering Linkage (Jeep/Ambassador)	52
25. Overhauling of Independent Suspension (Torsion - Bar Type) (Ambassador Car)	55
26. Overhauling of Vertical Guide Suspension System (Mcpherson Type Independent Suspension) (Maruti – 800)	58
27. Overhauling of Worm And Roller Steering (Jeep)	61
28. Overhauling of Steering Assembly (Rack And Pinion)	63
29. Overhauling of Continuous Ball Chain (Recirculating Ball) Type Steering (Tata – 407)	66
30. Wheel Balancing (Using Computerised Videographic Wheel Balancing Machine)	69
31. Wheel Alignment By Computerised Video Graphic-precision Machine	71
32. Toe – In Adjustment	75
33. Overhauling of Mechanical Brakes	79
34. Overhauling of Wheel Cylinder	81
35. Riveting of Brake Shoe Lining	83
36. Overhauling of Master Cylinder	85
37. Overhauling of Hydraulic Brakes	87
Supplementary Diagram — Hydraulic Disc Brake used in Maruti-800 Car	90
38. Over Hauling of Air Brake Chamber	91
39. Overhauling of Multi Plate Clutch	93
40. Overhauling of Single Plate Clutch (Release Lever Type)	95

41. Overhauling of Single Plate Clutch (Diaphragm Type)	99
<i>Supplementary Diagram</i> — Fluid Wheel Clutch (Automatic Clutch)	101
42. Overhauling of Synchromesh Gear Box (3 - Speed)	102
43. Overhauling of Constant Mesh Type Gear Box	105
44. Overhauling of 4 - Speed Synchromesh Gear Box (Maruti - 800)	109
45. Overhauling of Constant Mesh Type Gear Box (Ashok Leyland)	112
<i>Supplementary Diagram</i> — Constantmesh Gear Box Assembly used in Heavy Duty Commerical Vehicles	116
<i>Supplementary Diagram</i> — Latest Synchromesh Gear Box Assembly used in Heavy Duty Commerical Vehicles (Bus/Truck)	118
46. Brake Pedal Free Play Adjustment	120
47. Replacing Flywheel Ring (With Dismounted Engine)	121
48. Overhauling of Front Axle Four Wheel Drive (Jeep)	123
49. Propeller Shaft Replacing Universal Joint Of Propeller Shaft	126
50. Overhauling of Differtial (Hypoid Type)	128
51. Overhauling of Complete Rear Axle Assembly	132
52. Overhauling of Fully Floating Type Rear Axle Shaft	134
53. Overhauling of Semi Floating Rear Axle	136
54. Overhauling of Differential (Maruti - 800)	138
55. Practice of Dismantling And Assembling of An Unserviceable Engine	140
<i>Supplementary Diagram</i> — Maruti-800 Car Engine	143
56. Removing Cylinder Head (Jeep Petrol)	144
57. Measuring Cylinder Bore (Ambassador)	147
58. Measurement of Crank Shaft (Ambassador)	152
59. Decarbonising of Single Cylinder And Fitting of Piston Ring (Two Stroke Petrol Engine)	154
60. Decarbonising of Multi Cylinder Engine (Ambassador, Petrol)	156
61. Valve Seat Cutting Practice	160
62. Valve Timing (Ambassador And Jeep)	162
63. Changing of Valve Timig Belt (Maruti – 800)	164
64. Fitting of Piston And Piston Rings	166
<i>Supplementary Diagram</i> —Different Types of Compression Rings and Oil Rings Used in Modern Engine	169
65. Over Hauling of Simple Carburetor	171
66. Overhauling of Solex Carburetor	173
67. Overhauling of S.U. Carburetor	176
68. Cleaning of Petrol Fuel Injector (MPFI)	178
69. Overhauling of Distributor Assembly (Lucas – TVS)	180
70. Overhauling of Electronic Distributor	183
71. Compression Pressure Testing (Dry And Wet Test) Ambassador Car	186
72. Overhauling of Rotor Type Oil Pump	189
73. Overhauling of Gear Type Oil Pump	191
<i>Supplementary Diagram</i> — Vane Type Oil Pump	193
<i>Supplementary Diagram</i> — Gear and Crescent Type Oil Pump (Maruti-800)	194
74. Servicing of Air Cleaner (Wet Type)	195
75. Replacing Oil Filter Element	197
<i>Supplementary Diagram</i> — “Full Flow” and “By Pass” Oil Filter	199
76. Ignition Timing Setting (Lucas – TVS Distributor)	200

<i>Supplementary Diagram</i> — Coil Ignition Circuit of Three Cylinders	202
<i>Supplementary Diagram</i> — Coil Ignition Circuit of Four Cylinders	203
<i>Supplementary Diagram</i> of Coil Ignition Circuit of Six Cylinders	203
77. Engine Tune Up (Tappet And Slow Running Setting)	204
78. Removing And Checking Of Thermostat Valve (Maruti Car)	206
79. Overhauling of Inlet And Exhaust Manifold System	209
80. Servicing of Diesel Fuel Filter Element (Pre And Fine)	211
<i>Supplementary Diagram</i> — Diesel High Pressure Fuel System and Over Flow Fuel Return System of a Commerical Vehicle (Bus/Truck)	213
<i>Supplementary Diagram</i> — Diesel Fuel Supply System from Tank to Fuel Filters of Commerical Vehicles (Bus/Truck)	214
81. Overhauling of Mechanical Fuel Pump	215
82. Overhauling of Electric Fuel Pump (Diaphragm Type)	217
83. Overhauling of Water Pump	219
84. Injector Testing	221
85. Injector Testing Chart of Various Vehicles	224
86. Overhauling of Fuel Injection Pump	225
<i>Supplementary Diagram</i> — Diesel Mechanical Governor of Fuel-Injection Pump	229-230
87. Overhauling of Distributor Type Fuel Injection Pump (Rotary Pump) (Lucas – CAV Tata Sumo)	231
88. Overhauling of Cylinder Head of Diesel Engine	234
<i>Supplementary Diagram</i> — Six Cylinder Diesel Engine of Commercial Vehicle (Bus/Truck)	237
89. Overhauling of Feed Pump	239
90. Overhauling of Dynamo	242
91. Overhauling of Self Starter	246
92. Overhauling of Horn (Electric Wind Tone Type)	248
93. Battery Maintanence	250
94. Valve Refacing (Grinding)	253
95. Overhauling Of Alternator (Maruti-800)	255
96. Road Signs	259
97. Traffic Police Hand Signals	262
98. Traffic Light Signals	263
99. Hand Signal (For Drivers)	264
100. Study of Dash Board Panel (Heavy And Light Vehicle)	265
101. Preparation Before Starting Of Running A Vehicle	267
102. Driving Method And Line Markings	268
Annexure	
I. Technical Specifications Of Different Vehicles	271
II. Rules For Writing Number Plate	279
<i>Supplementary Diagram</i> — Ignition Circuit of Six-cylinder Old CNG Model Commercial Vehicle (TATA Bus - LPO 1510)	280
<i>Supplementary Diagram</i> — Fuel System of Six-cylinder Old CNG Model Commercial Vehicle (TATA Bus - LPO 1510)	281
<i>Supplementary Diagram</i> — Latest Modified Fuel System of CNG	282