Automotive Technology

List of Chapters:

P	re	fa	ce

Acknowledgements

Automotive technical abbreviations

1 The reciprocating piston petrol engine

- 1.1 Modern requirements
- 1.2 Engine nomenclature
- 1.3 Operating principles
- 1.4 Basic structure and mechanism
- 1.5 Cylinder and crankthrow arrangements
- 1.6 Cylinder block, crankcase and head
- 1.7 Pistons and connecting rods
- 1.8 Crankshaft assembly and main bearings
- 1.9 Crankshaft torsional vibration dampers
- 1.10 Valve train
- 1.11 Timing drive
- 1.12 The principles of valve timing

2 The diesel engine

- 2.1 Suitability for road transport
- 2.2 Operating principles
- 2.3 Cylinder block, crankcase and head
- 2.4 Pistons and connecting rods
- 2.5 Crankshaft assembly and main bearings
- 2.6 Valve train and timing drive

3 Combustion chambers and processes

- 3.1 Basic layouts of combustion chambers
- 3.2 Combustion in the petrol engine
- 3.3 Petrol engine combustion chambers
- 3.4 Combustion in the diesel engine
- 3.5 Diesel engine combustion chambers
- 3.6 Cylinder charge agitation

4 Engine lubrication

- 4.1 Friction and wear
- 4.2 The lubrication process
- 4.3 Engine lubricating oils
- 4.4 Engine lubrication systems
- 4.5 Oil pumps and pressure relief valves
- 4.6 Oil filtration and cooling
- 4.7 Oil retention and crankcase ventilation

5 Engine cooling, vehicle heating and air conditioning

- 5.1 Heat transfer and cooling media
- 5.2 Engine air-cooling system
- 5.3 Engine water-cooling system
- 5.4 Engine cooling systems for passenger cars and heavy vehicles
- 5.5 Engine coolant
- 5.6 Interior ventilation and heating
- 5.7 Introduction to passenger car air conditioning systems
- 5.8 Principles of refrigerated air conditioning
- 5.9 Refrigerated air conditioning system components
- 5.10 Full air conditioning systems
- 5.11 Commercial vehicle refrigeration units

6 Carburation and fuel injection

- 6.1 Fuel supply system
- 6.2 Fixed-choke carburettors
- 6.3 Variable-choke carburettors
- 6.4 Multiple and compound carburettors
- 6.5 Electronically controlled carburettors
- 6.6 Petrol engine fuel injection
- 6.7 Multipoint fuel injection (MPI)
- 6.8 Single-point fuel injection (SPI)

Automotive Technology

12 Rotary piston engine

12.1 Rotary piston engine

Intake and exhaust systems 13 Friction clutches Air cleaner and silencer Types of single-plate clutch 7.1 13.1 7.2 Intake and exhaust manifolds 13.2 Clutch control systems Exhaust system 7.3 13.3 Clutch centre plate Construction 7.4 Vacuum gauge and exhaust gas 13.4 Direct-release clutch analyser 13.5 Centrifugally operated clutches Multiplate clutches 13.6 Diesel fuel injection systems Angle spring clutch 13.7 Fuel supply system Clutch misbehaviour in service 8.1 13.8 8.2 The in-line fuel injection pump Flywheel and clutch housing 13.9 Governing the in-line fuel injection alignment 8.3 pump 14 Layshaft gearboxes The distributor fuel injection pump 8.4 8.5 Governing the distributor fuel 14.1 Purpose and elements of the gearbox Constant-mesh gearboxes injection pump 14.2 8.6 Timing in-line and distributor fuel 14.3 Synchromesh gearboxes injection pumps 14.4 Gear selector mechanisms 8.7 Fuel injectors 14.5 Heavy-vehicle gearboxes Common-rail unit injector system Gearbox lubrication and sealing 8.8 14.6 Introduction to electronic diesel Gearbox misbehaviour in service 8.9 14.7 control 8.10 Cold starting devices 15 Fluid couplings and torque converters Fluid couplings 15.1 Improvements to fluid couplings Forced induction 15.2 Torque converters 9.1 Natural aspiration and forced 15.3 induction Improvements to torque converters 15.4 9.2 Methods of pressure charging Fluid couplings and torque 15.5 converters in service 10 Ignition and starter systems 10.1 Coil ignition equipment 16 Epicyclic gearboxes 10.2 Ignition coil and capacitor 16.1 Basic epicyclic gearing 10.3 Ignition distributor and sparking 16.2 Operation of epicyclic gear trains plugs 16.3 Friction brakes for epicyclic 10.4 Introduction to electronic ignition gearboxes systems 10.5 Types of electronic ignition system 17 Semi-automatic and automatic 10.6 Ignition timing transmissions Damp ignitioin in service 10.7 17.1 Semi-automatic transmissions for 10.8 The starter system passenger cars 17.2 Semi-automatic transmissions for 11 Engine emission control heavy vehicles 11.1 Petrol engine pollutants 17.3 Automatic transmissions for Petrol engine emission control 11.2 passenger cars Diesel engine pollutants Hydraulic control systems 11.3 17.4 Electrohydraulic control systems 17.5

17.6

17.7

17.8

17.9

Automatic transmission fluid

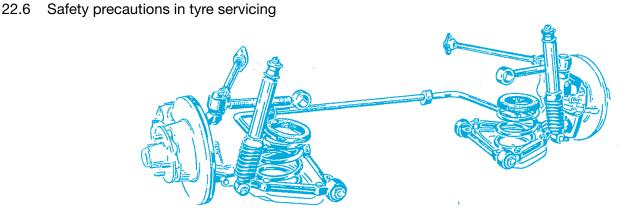
Automatic layshaft gearboxes

Checking the level and changing the

Continuously variable transmissions

Automotive Technology

18 Overdrive gears 23 Suspension systems Purpose and position of an overdrive Basic ride considerations 18.1 23.1 23.2 Types of suspension Basic handling considerations 18.2 Epicyclic overdrive gears 23.3 18.3 Layshaft overdrive gears Types of suspension spring 23.4 18.4 Automatic transmission overdrive Tandem axle suspension 23.5 23.6 Shock dampers aears Adaptive suspension systems 23.7 19 Drive lines 23.8 Active roll control systems Suspension misbehaviour in service 19.1 Universal joints 23.9 19.2 Constant-velocity joints 19.3 Propeller shaft construction 24 Manual steering 19.4 Drive line arrangements 24.1 Steering principles and layout 19.5 Rear-wheel drive and front-wheel Front end geometry and wheel 24.2 drive layouts alignment 19.6 Front-wheel drive shafts 24.3 Steering and suspension ball joints Manual steering gears 19.7 Tandem axle drives for heavy 24.4 Inspecting and adjusting the steering vehicles 24.5 19.8 Drive lines for public service vehicles mechanism 24.6 Conventionally steered and self-20 Final drives and rear axles steering axles for heavy vehicles 20.1 Final drive gears and bearings 24.7 Steering wheel airbags 20.2 Adjusting the final drive gears 20.3 Differential gears 25 Power-assisted steering 20.4 Rear axle construction The need for power-assisted steering 25.1 20.5 Final drive lubrication and sealing 25.2 Principles of hydraulic power-20.6 Rear axle misbehaviour in service assisted steering Hydraulic power-assisted steering 20.7 Heavy-vehicle rear axles 25.3 components Speed-sensitive hydraulic power-21 Four-wheel-drive systems 25.4 21.1 Types of four-wheel drive assisted steering Basic considerations of four-wheel 21.2 Hydraulic power-assisted steering 25.5 drive misbehaviour in service Part-time four-wheel drive 21.3 25.6 Electro-hydraulic power-assisted 21.4 Full-time four-wheel drive steering 25.7 Introduction to electrical power-22 Tyres, road wheels and hubs assisted steering 22.1 Tyre requirements Electrical power-assisted steering 25.8 22.2 Introduction to tyre characteristics components 22.3 Tyre construction 25.9 Types of electrical power-assisted 22.4 Road wheels and hubs steering 22.5 Wheel balancing



Automotive Technology

26 Four-wheel-steering systems 29 Anti-lock brakes and traction control 26.1 The need for four-wheel steering Background to anti-lock braking 29.1 26.2 Types of four-wheel steering 29.2 Components of anti-lock brake systems 27 Hydraulic brake systems 29.3 Types of anti-lock brake system Output control channels for anti-lock 27.1 Drum brake arrangements 29.4 27.2 Disc brake arrangements brakes 27.3 Brake friction materials 29.5 Anti-lock air brakes for heavy 27.4 Hydraulic brake systems and vehicles Traction control systems components 29.6 27.5 Hydraulic brake fluids 29.7 Vehicle dynamics control 27.6 Vacuum servo-assisted braking 27.7 The parking brake system 30 Vehicle structure and aerodynamics 27.8 Hydraulic power brakes 30.1 Integral body construction 27.9 Maintenance of hydraulic brakes 30.2 Aluminium body construction 27.10 Brake efficiency and testing 30.3 Multi-purpose vehicles 30.4 Commercial vehicle chassis frames 28 Air and endurance brake systems 30.5 Trailer and caravan couplings Introduction to vehicle aerodynamics 28.1 Principles of air brakes 30.6 Basic considerations of vehicle 28.2 Compression and storage 30.7 28.3 System control aerodynamics 28.4 System actuation 30.8 Heavy vehicle aerodynamics 28.5 Hand-operated brake valves and other equipment 28.6 Air disc brakes Index 28.7 Endurance brake systems