Contents

Introduction & about this book Warning	
1. History	8
Timeline	10
BMW model numbers	10
2. Buying a project car	
The 4- or 6-cylinder engine?	
List of common models	-
Rare models	
Inspection check list	
Exterior	
Interior	
Mechanicals	
On the test drive	

...

3. Common faults, servicing &

recommissioning2	1
Common faults2	1
Paint2	1
Panels2	1
Exterior trim and parts23	3
Wipers 23	3
Sunroof24	4
Glass24	4
Lights24	4
Wheels and tyres24	4
Hub bearings, suspension joints,	
and steering2	5
Interior2	5
Seat belts2	5
Seats2	5
Head lining20	
Door locks and handles20	3
Window winders20	ô
Steering wheel20	
Instrument panel2	7
Gauges2	7
Check control27	
Oil service and inspection indication.27	7
Handbrake2	7
Boot interior, spare wheel and	
tool kit27	
Under-bonnet (hood)2	7

Engine29	9
Intake and exhaust manifolds	9
Fuel-injection system or	
carburettors)
Exhaust system	
Gearbox (transmission), propshaft &	`
clutch	h
Wiring	
Battery	
Washer system	
Suspension	
Steering	
Subframes	3
Brakes	3
Rear axle	3
Servicing	3
Buying service parts	1
Fluids	4
Timing belts	
Window switches	
Hoses	
Intake ducts	
Door locks	
Recommissioning	
Detter:	+
Battery	
Coolant (antifreeze)	
Tyres/tires	
Brakes	
Oil	
Electrics	
Mechanicals	3
Screen/windshield wash	7
Bodywork	7
Interior	7
Engine	7
Removing rust from small parts	
· · · · · · · · · · · · · · · · · · ·	
4. Modification	3
Introduction	
The theory of cheap motorsport	
Thetrackday40	
Engine introduction40	
0	
Turbocharging	
Carburettors42	4

4-cylinder engine tuning......43

M1043
M40
M4244
M3S14
6-cylinder engine tuning45
M20 engines45
The 2.7 Eta engine
Porting and head work
Turbo or supercharging
Problems
Head cracking47
Engine swaps48
General guidance
The gearbox
The radiator49
Fitting a non-standard engine
Engine electrical connections
Duel mass flywheels
Immobilisers and ECU security
Net all 520 shalls are arriad
Not all E30 shells are equal
Fitting an M30 engine50
M50/5251
BMW V8, M60/6252
BMWV1253
Other engine manufacturers
BMW engine weights and powers
(approximate)
Turbo and supercharging53
Basic principle54
Turbo lag55
Gas55
Intercooler
Bearings and oil feed
Heat
Compression
Turbo size56
Tail mount turbo56
Intake hoses
Efficiency and power consumed by
the turbocharger
Cheap alternatives and small electric
'superchargers'
Alternative fuels
Petrol engines57
Ethanol/bioethanol58

Diesel engines	59
Bio-diesel and reclaimed cooking	
oil	59
Exhaust	
Pulse tuning	59
Heat	.61
Exhaust pipe bore	
Catalysts	
Stainless steel	. 61
Side exit	62
Intake tuning	
Maximising flow	
Cold air intake	.63
Air filters	
Noise	-
Airflow meter	64
Cooling system	. 64
Engineering the coolant	
Oil coolers	
Radiators	65
Checks	.65
Electric fans	
Visco drive engine driven fans	. 66
Replacing an engine driven fan	
with an electric one	66
Fuel-injection system	
Mapping	
Injector and fuel pump sizing	. 68
Air meter tuning	69
Throttle body injection systems	70
Throttle body injection systems Fuel pump, tank and filter	.70 .70
Throttle body injection systems Fuel pump, tank and filter	.70 .70
Throttle body injection systems Fuel pump, tank and filter Fuel coolers	70 70 70
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox	70 70 70 70
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil.	70 70 70 70 70 71
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos	70 70 70 70 71 71
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos	70 70 70 70 71 71
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever)	.70 .70 .70 .70 .71 .71 .71 .72
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links	.70 .70 .70 .70 .71 .71 .71 .72 .73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links	.70 70 70 71 71 72 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links	.70 70 70 71 71 72 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location	70 .70 .70 .71 .71 .71 .72 .73 .73 .73 .73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential.	.70 70 70 71 71 72 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification	70 .70 .70 .71 .71 .71 .72 .73 .73 .73 .73 .74 74
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios.	70 70 70 71 .71 .71 .72 73 .73 .73 .73 .74 74 75
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification	70 70 70 71 .71 .71 .72 73 .73 .73 .73 .74 74 75
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios.	70 70 70 71 71 71 72 73 73 73 73 73 74 75 75
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush	70 70 70 71 71 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling	70 70 70 71 71 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil	70 70 70 71 71 71 72 73 73 73 73 74 75 75 75 75
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling	70 70 70 71 71 71 72 73 73 73 73 74 75 75 75 75
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil Suspension	70 70 70 71 71 72 73 73 73 73 74 75 75 75 75 75 76
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil Suspension The starting point	70 70 70 71 71 72 73 73 73 73 73 73 75 75 75 75 75 76 76
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil Suspension The starting point Lowering	70 70 70 71 71 71 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil Suspension The starting point Lowering Spring rates	70 70 70 71 71 71 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling. Oil. Suspension. The starting point. Lowering. Spring rates. Spring quality.	70 70 70 71 71 72 73 73 73 73 74 75 75 75 75 75 76 77 78 77
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos Gearstick (shift lever) Rebuilding the links Solid links Control location Differential Identification Ratios Limiting slip Rear bush Cooling Oil Suspension The starting point Lowering Spring rates	70 70 70 71 71 72 73 73 73 73 74 75 75 75 75 75 76 77 78 77
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip. Rear bush. Cooling. Oil. Suspension. The starting point. Lowering. Spring rates. Spring quality. Adjustable ride height.	70 70 70 71 71 72 73 73 73 73 74 75 75 75 75 75 75 76 77 78 79 79 79
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling. Oil. Suspension. The starting point. Lowering. Spring rates. Spring quality Adjustable ride height. Suspension modifications.	70 70 70 71 71 72 73 73 73 73 74 75 75 75 75 75 75 76 77 78 79 79 79
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling Oil. Suspension The starting point. Lowering. Spring rates. Spring quality. Adjustable ride height. Suspension modifications Fitting an adjustable spring and	70 70 70 70 71 71 72 73 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling. Oil. Suspension. The starting point. Lowering. Spring rates. Spring quality Adjustable ride height. Suspension modifications.	70 70 70 70 71 71 72 73 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling Oil. Suspension The starting point. Lowering. Spring rates. Spring quality. Adjustable ride height. Suspension modifications Fitting an adjustable spring and	70 70 70 71 71 71 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip. Rear bush. Cooling. Oil Suspension The starting point Lowering. Spring rates. Spring quality. Adjustable ride height. Suspension modifications. Fitting an adjustable spring and damper kit Roll.	70 70 70 71 71 72 73 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling Oil. Suspension The starting point Lowering. Spring rates. Spring rutes. Spring quality. Adjustable ride height. Suspension modifications. Fitting an adjustable spring and damper kit Roll. Front strut top mounts	70 70 70 71 71 72 73 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links Solid links Control location. Differential. Identification Ratios. Limiting slip Rear bush Cooling Oil Suspension The starting point Lowering. Spring rates Spring quality Adjustable ride height Suspension modifications Fitting an adjustable spring and damper kit Roll Front strut top mounts 5-stud conversions	70 70 70 71 71 72 73 73 73 73 73 73 73
Throttle body injection systems Fuel pump, tank and filter Fuel coolers Gearbox Gear oil Autos. Gearstick (shift lever). Rebuilding the links. Solid links. Control location. Differential. Identification. Ratios. Limiting slip Rear bush. Cooling Oil. Suspension The starting point Lowering. Spring rates. Spring rutes. Spring quality. Adjustable ride height. Suspension modifications. Fitting an adjustable spring and damper kit Roll. Front strut top mounts	70 70 70 71 71 72 73 73 73 73 73 73 73

Steering	
Using an E36 rack	
Power steering	
Quality	
The wheel	
Wheels and tyres	
Wheels	
Offset	
Wheel spacers	
Tyres (tires)	
Hard acceleration	
Hard braking	86
Cornering	86
Tyre size	
Wheel and tyre width	
Pressure	
Temperature	
Driving the tyre	
Scrubbing in new tyres	
Buffing	
Brakes	
Improving what you have	
Pads	
Discs (rotors)	89
Big brake kits	90
ABS	
Problems	
Exterior and aerodynamics	
Fit for use	
The E30 shape	
Securing body kits or panels	
Paint	
Interior	
Driver feedback and control	
Impact	
Dash	97
Air	97
Electrics	97
Additional circuits	
Battery	
Battery Earth	
Battery Earth Cut-off switch	
Battery Earth Cut-off switch Ignition switch	98 98 99
Battery Earth Cut-off switch Ignition switch Airbags	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip	98 98 99 99 100
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows Sound-deadening	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows Sound-deadening Cooling	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows Sound-deadening Cooling Exhaust.	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows Sound-deadening Cooling Exhaust Bumpers	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows. Sound-deadening Cooling Exhaust Bumpers Fuel tank	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows. Sound-deadening Cooling Exhaust Bumpers Fuel tank Wheels and tyres	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows. Sound-deadening Cooling Exhaust. Bumpers Fuel tank Wheels and tyres Big savings	
Battery Earth Cut-off switch Ignition switch Airbags Dim dip Engine Making connections Sticky tape Stripping weight Basic stripping Plastic windows. Sound-deadening Cooling Exhaust Bumpers Fuel tank Wheels and tyres	

Body strengthening and roll cages 106
The basics106
Suspension loads106
Roll cage106
Strut braces108
Seam welding109
Race safety equipment109
Fire extinguisher109
Battery box110
Cut-off switch (electrical section)110
. , , , , , , , , , , , , , , , , , , ,
Rain light111
Towing brackets111
Decals111
Sunstrip111
Catch tank111
Harnesses112
5. Case studies113
Introduction113
PBMW Championship racers113
318is 'Ring master113
Road/track 325i114
The basics
Engine
Suspension114
Wheels and tyres114
Brakes114
Conclusion114
The 335115
Basics115
Engine and transmission
Suspension115
Wheels and tyres116
Conclusion
The M3 Touring Car Racer116
Engine
-
Shell
Suspension117
Steering117
Brakes117
Wheels
Interior117
6. Technical specifications118
6. Technical specifications118 4-cylinder petrol models118
6. Technical specifications118 4-cylinder petrol models118 6-cylinder petrol models119
6. Technical specifications118 4-cylinder petrol models118 6-cylinder petrol models119 Diesel models119
6. Technical specifications
6. Technical specifications
6. Technical specifications
6. Technical specifications1184-cylinder petrol models1186-cylinder petrol models119Diesel models119M3 models120Tyres120Other BMW models120
6. Technical specifications1184-cylinder petrol models1186-cylinder petrol models119Diesel models119M3 models120Tyres120Other BMW models1207. Contacts122
6. Technical specifications
6. Technical specifications. .118 4-cylinder petrol models. .118 6-cylinder petrol models. .119 Diesel models. .119 M3 models. .120 Tyres. .120 Other BMW models. .122 Clubs, websites and forums. .122 BMW specialists. .122
6. Technical specifications. .118 4-cylinder petrol models. .118 6-cylinder petrol models. .119 Diesel models. .119 M3 models. .120 Tyres. .120 Other BMW models. .122 Clubs, websites and forums. .122 BMW specialists. .122 Parts suppliers. .122
6. Technical specifications. .118 4-cylinder petrol models. .118 6-cylinder petrol models. .119 Diesel models. .119 M3 models. .120 Tyres. .120 Other BMW models. .122 Clubs, websites and forums. .122 BMW specialists. .122 Parts suppliers. .122 Race parts. .122
6. Technical specifications. .118 4-cylinder petrol models. .118 6-cylinder petrol models. .119 Diesel models. .119 M3 models. .120 Tyres. .120 Other BMW models. .122 Clubs, websites and forums. .122 BMW specialists. .122 Parts suppliers. .122
6. Technical specifications.1184-cylinder petrol models.1186-cylinder petrol models.119Diesel models.119M3 models.120Tyres.120Other BMW models.1207. Contacts.122Clubs, websites and forums.122BMW specialists.122Parts suppliers.122Race parts.122Oil coolers, fuel and brake parts.122
6. Technical specifications. .118 4-cylinder petrol models. .118 6-cylinder petrol models. .119 Diesel models. .119 M3 models. .120 Tyres. .120 Other BMW models. .122 Clubs, websites and forums. .122 BMW specialists. .122 Parts suppliers. .122 Race parts. .122