

# **BMW 2002**

## ***turbo***



### **Technical Supplement**

# Introduction

The first BMW Turbo was the Paul Bracq concept design originally shown in 1972, this spectacular sleek concept car with gull-wing doors had a M10 turbo-charged engine at the heart of it. The scarlet show car never made it into production but did impress the motoring world of what BMW could do with a four-cylinder 2.0 litre engine.

Munich's finest now turned their attention to developing a more powerful 02, engineers still felt that the 2002 chassis could still take more power. Designed around the already tried and tested Tii, they chose the KKK (Kuhnle, Kopp and Kausch) turbocharger with 0.55 overpressure that was sufficient to add another 40 Bhp to the already powerful 130 Bhp Tii. The compression ratio was modified from 6.9:1 to 9.5:1 and an oil cooler added. Bigger brakes were fitted to cope with the extra power, a limited slip differential for better high-speed cornering, and high-speed tyres fitted to wider wheels under the "screwed" on wide arches.

The interior had a much more sportiness about it, the standard seats were replaced with comfortable sports seats, a leather three spoked steering wheel faced the driver, a turbo pressure gauge was added to the right of the dashboard cluster with the clock used in the Tii's, all topped off with a red-facia dashboard to emphasis the sporting agility of the car.

BMW engineers claimed it could cover a dash of 0-60 Mph (0-100 Km/h) in a mere 7.0 seconds and keep going right up to 130 Mph (211 Km/h). It caused quiet a storm in the mid-70's. BMW had successfully produced Europe's first turbo-charged production road car that could only be beaten by a Porsche Carrera with 210 Bhp, in its day.

External styling was very "boy-racer" Motorsport stripes were added down each flank, with a boot spoiler to aid high-speed stability, wide arches to house 185 x13 wheels, and aggressive front spoiler and no front bumper. Press models had "2002" and "turbo" added to the front spoiler in reverse script, so any car in front of the Turbo would know exactly what had just suddenly appeared behind him. The Press had a field day with BMW's irresponsibleness, so it was decided to drop the reverse lettering on all production models. Many lucky owners today have added after-market reverse scripting, to ensure that many other modern cars on today's roads know exactly what they are dealing with.

The car often described as 'Jekyll and Hyde', "a punch in the kidney's" said some motoring journalists when the turbocharger suddenly cut-in at just above 4000 Rpm. Famous for it's turbo-lag, "floor the accelerator and nothing, then suddenly a whoosh of power and off you'd shoot, like a bullet from a gun". Understandably many ended up embedded in trees, making numbers today even more scarce. One thing can be sure the BMW 2002 Turbo is the ultimate 2002 and the lucky few owners that own one today are exclusive members of a very unique club.

In the 1970's increasing road traffic accidents and reforms of road traffic laws, saw speed limits introduced on most major roads in Germany and just as the production started the OPEC countries of the Middle East announced their oil embargo. Know to us as the "70's Oil Crisis", this lead to a ban on Sunday driving and massive energy saving measures was suddenly introduced. The BMW 2002 Turbo was frowned upon in this new era, ultimately this lead to it's demise in 1975 after only producing 1672 models, all left hand drive, as the steering column for right-hand drive cars couldn't be fitted as there wasn't the clearance near the exhaust manifold.

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## Chapter 1.

### Technical Specifications

**Engine:**

Fiscal; 121.8 Cu in (1997 cc)

Effective; 121.4 (1990 cc)

**Maximum Output:**

170 Bhp (DIN/125 kW @ 5800 Rpm)

**Maximum Torque:**

173 ft/lb (24.5 mkp) @ 4000 Rpm

**Output per litre:**

85.5 Bhp (DIN)/63 kW

**Maximum Engine Speed:**

6400 Rpm

**Maximum continuous Engine Speed:**

6000 Rpm

**Compression Ratio:**

6.9:1

**Stroke/Bore Ratio:**

80/89 mm (0.9)

**Mean Piston Speed:**

3050 ft/min. (15.5 m/sec) @ 5800 Rpm

**Torque/Weight Ratio:**

163 ft/lb per ton. 22.6 mkp/1000 kg

**Output/Weight Ratio:**

In road trim with full tank – 13.9 lb/Bhp (6.35 kg/Bhp)

All Seats occupied & luggage – 18.6 lb/Bhp (8.47 kg/Bhp)

**Fuel Consumption:**

27 Mpg (10.5 litres/100 km)

**Cylinder Head:**

“121” Ti, spherical-shaped combustion chamber

**Fuel System:**

Schafer PL 04 Mechanical Fuel Injection with KKK BLD Turbocharger, operating @ 7psi.

**Fuel Tank:**

15.4 Imp Gallon/70 Litres

**Clutch:**

Single dry plate with disc plate and torsion vibration damper, automatic wear compensation and increased trust pressure plate (Fichel & Sachs MF 228). Pre-engaged throw-out bearing.

**Gearbox:**

Manual, 4-Speed Borg-Warner synchromesh 235/5. strengthened Getrag 242/3  
5-Speed with Porsche synchromesh 235/5, strengthened (special equipment).

**Propeller Shaft:**

Standard on all models

**Final Drive:**

Pinion/Crown wheel 3.36:1 No. of teeth 37:11 Contact pattern Klingelberg  
ZF disc type limited slip differential, locking value of 40%

**Front Axle:**

As Tii, Torsion bar stabiliser 20mm diameter (Optional 22mm)  
Toe-in normal loaded +1.5mm (+1 or 0.5mm)

**Camber Angle:**

Normal loaded - + 0 degrees 30' +/- 30' positive

**Caster Angle:**

4 Degrees +/- 30'

**Kingpin Angle:**

8 Degrees 30'

**Toe-in on turns:**

(For 20 degrees deflection of inside wheel) – 1 Degrees

**Maximum Wheel Lock:**

Inside wheel 42 Degrees  
Outside wheel 34 Degrees

**Spring Travel:**

Front 180 mm (7")  
Rear 190 mm (7.4")

**Steering/Rear Axle:**

As Tii, with Torsion bar stabiliser 16mm diameter (Optional 18mm)

**Toe-In:**

Normally loaded +2 +/- 1.5mm 0 degrees 16' +/- 16'

**Camber Angle:**

Normally loaded + 2 Degrees 30' +/- 30' negative

**Springs and Shock Absorbers:**

Boge shock absorbers all round

**Steel Wheels:**

5.5 J x13 H2

**Wheel dish related to centre:**

19mm (0.74")

**Alloy Wheels:**

6 J x13 H2 (Optional)

**Wheel dish related to centre:**

13mm (0.5")

**Tyres:**

185/70 VR13 with inner type and metal screw-in valve 40G DIN 7771

**Makes:**

Michelin XWX

Pirelli CN 36 SM

**Dimensions and Weights:**

Length	4220 mm (13'10")
Width	1620 mm (5'3 1/2")
Height	1410 mm (4' 7")
Wheelbase	2500 mm (8'1 1/2")
Ground Clearance	100 mm (3' 7/8")
Front overhang	709 mm (2' 3 1/2")
Rear overhang	1003 mm (3' 3")
Front Track	
5.5 J	1375 mm (53.6")
6 J	1387 mm (54.9")
Rear Track	
5.5 J	1362 mm (53.1")
6 J	1374 mm (53.6")
Minimum track circle diameter	9.60 M (31' 6")
Minimum turning circle	10.40 M (34' 2")

**Vehicle Weight (empty)**

In road trim, full tank	1080 kg (2376lb)
Special equipment light alloy parts	1035 kg (2277lb)

**Performance:**

Maximum Speed	211 kph (131 mph)
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**Maximum gradients:**

1 <sup>st</sup> gear	59%
2 <sup>nd</sup> gear	43%
3 <sup>rd</sup> gear	23%
4 <sup>th</sup> gear	14%

**Acceleration (kph):**

0-50	2.4
0-80	5.1
0-100 (0-60 mph)	6.9
0-120	10.1
0-140	13.4
0-160	18.4
Standing kilometre start	28.0
Average speed over this distance	80 mph/129 kph
Terminal speed	116 mph/186kph

**Electrical System:**

Battery	12 V 44 Amp
Coil	Bosch KB 12 V
Distributor	Bosch J.F.U.D 4 P/N: 0.231.180.014

**Ignition Advance**

Centrifugal: Starts at 1000 rpm ends at 150 rpm Max adjustment range: 25 Degrees +/- 2 Degrees on crankshaft

Vacuum: Starts at 200 mm Hg ends at 310 mm Hg Max adjustment range: 10 degrees +/- 2 degrees on crankshaft

Ignition Timing 25 Degrees BTDC @ 2500 rpm  
The distributor advance curve should be checked with Engine idling at 800-950 rpm. Advance angle is -2 to -8 degrees on crankshaft

Dwell Angle 62 +/- 3 degrees

Contact Breaker cap 0.016" (0.4 mm)

Alternator Bosch K 1/14 V 45 A 22 (630 kw)

Voltage regulator Bosch AD 1/14 V

Starter Bosch GF 12 V 1HP  
Bosch W200 T30, WG200 T 30

Spark Plugs Bosch W7DC  
Bosch W7DP  
Champion N8Y  
Beru 200/14/3A

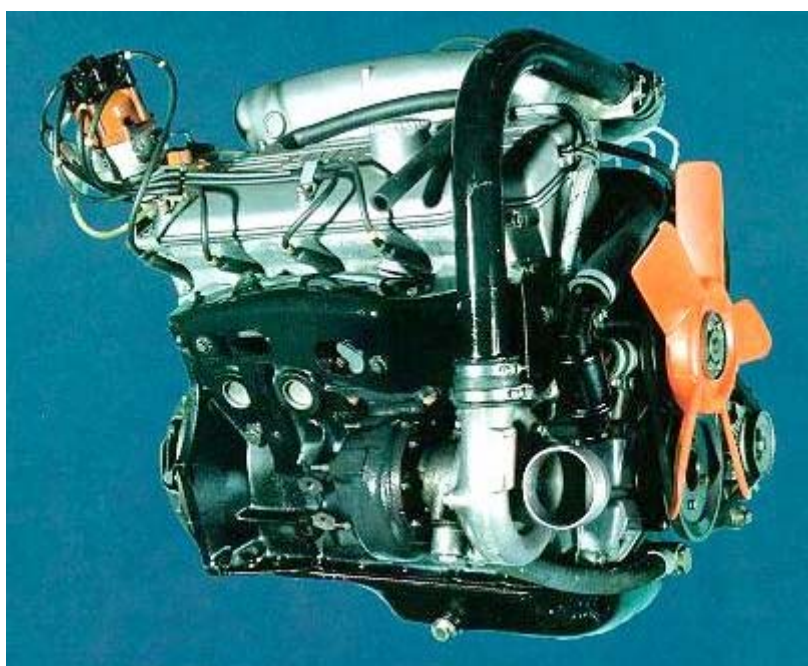
Spark Plug Gap 0.24" (0.6 mm)

Horn 1-Single tone

Headlights Quartz-Halogen H4 (55/60W)

**Capacities:**

Cooling system including heater	1.28 Imp gallon (7 litres)
Engine Oil	SAE 20W 50 HD, 7 Imp pints (4 litres) + 0.44 Imp (0.25 litres) If oil filter is changed. + 1.3 Imp (0.75 litres) in oil cooler
Manual Gearbox	
Use SAE 80 Gearbox Oil	
4-Speed	1.8 Imp pints (1 litre)
5-Speed	2.5 Imp pints (1.4 litres)
Final Drive (Use SAE 90 Branded Hypoid oil)	1.7 Imp pints (0.95 litres)
Steering Box (Use SAE 90 Branded Hypoid oil)	0.55 Imp pints (0.3 litres)
Control Piston Housing (back of injection pump)	0.018 Imp pints (0.01 litre) HD oil
Drive Mechanism of injection pump	0.018 Imp pints (0.01 litre) HD oil





## Chapter 2.

### Service Intervals.

The 2002 Turbo has its own service schedules. The standard 5,000-mile oil service and 10,000 miles major services do not apply to the Turbo. The Turbo retains the 4,000-mile service intervals with an additional engine oil and filter change every 2,000 miles.

1 <sup>st</sup> Inspection	600 miles
Oil service	2,000 miles
Oil service (+ optional vehicle safety check)	4,000 miles
Oil service	6,000 miles
Major service	8,000 miles
Oil service	10,000 miles
Oil service (+ optional vehicle safety check)	12,000 miles
Oil service	14,000 miles
Major service	16,000 miles

Gearbox oil must be changed at 600 and 16,000 miles, and then every 16,000 miles

Rear axle oil must be changed at 600, 4000, 8000 and then every 8,000 miles. A special oil only must be used; Zepf gear oil HT 90 EP universal or Motul gear oil HD 90.

Every 8,000 miles the oil in the level control piston housing of the injection pump must be checked and topped up with engine oil if required. The level plug is blue, has an allen screw head, and is positioned (as arrowed) on the engine side of the piston housing (see fig 1.)

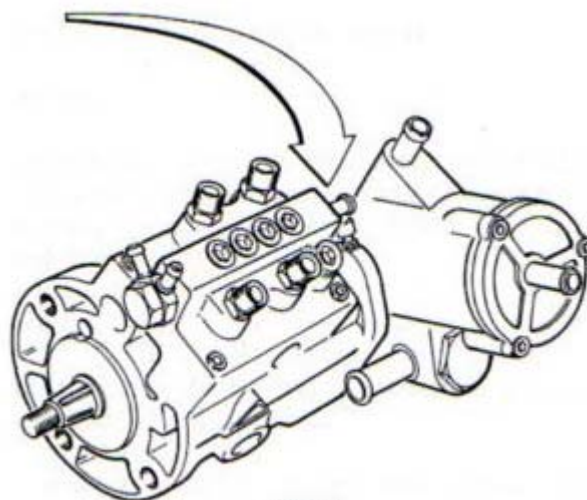


Fig.1

Brake fluid must be renewed at least every six months.

## Chapter 3.

### Service and Major Service routines.

Engine Oil: Branded HD oil for Otto cycle engines, 20 W 50. Oil change with filter every 2,000 miles. It is recommended to use a synthetic lubricant, such as Mobile 1, which does not carbonise in the oil ways of the turbocharger under extreme heat conditions.

#### 1<sup>st</sup> Inspection at 600 Miles or 1,000 Kilometres.

- Change the oil while normal operating temperature, replace oil filter.
- Change gearbox oil while normal operating temperature.
- Change final drive oil while normal operating temperature.
- Rear Axle half-shafts; check bellows for leaks.
- Check steering box for leaks, check oil level and top-up if required.
- Check coolant level, top-up if required.
- Check brake system, lines, unions for leaks, damage and secure fitting. Check brake level fluid in reservoir and top-up if required.
- Check oil supply lines and unions, oil filter, oil pressure switch flange, for leaks.
- Tighten cap nuts of injection lines and fastening nuts of throttle linkages.
- Check V-belt tension and re-tension if required.
- Tighten nuts and bolts on engine (check torque settings), left and right engine mountings, intake and exhaust manifolds, exhaust manifold flange, supercharger flange, exhaust manifold flange to supercharger joint, exhaust pipe, exhaust mounting on gearbox, oil sump and finally cylinder head bolts.
- Check valve clearances and adjust as necessary.
- Tighten nuts and bolts on the front axle, steering, gearbox, prop-shaft, half-shafts, rear axle, brakes and wheel nuts.
- Tighten nuts and bolts on front bonnet and rear boot, hinges and locks, door locks, striker plates and exhaust system.
- Check steering box for absence of play in straight-line position, adjust if required.
- Check footbrake, adjust (only rear brakes) and bleed if required, check handbrake and adjust if required.
- Check front wheel bearings for play, adjust if required.
- Check front wheel toe-in and adjust if required.
- Check tyre pressures are correct.
- Check lighting system, instruments readings, horn, controls, and rear view mirror.
- Check headlamp beam alignment.
- Carry out prescribed engine test, adjust engine idling and CO emissions.
- Final inspection of items affecting road safety, brakes, steering, and clutch.

#### BMW Oil Service

Every 4,000 miles or 6,000 km, beginning at 2,000 miles or 3,000 km.

Change engine oil while at normal operating temperature. Replace oil filter.

#### BMW Oil Service

Every 8,000 miles or 12,000 km, beginning at 4,000 miles or 6,000 km.

Change engine oil while at normal operating temperature. Replace oil filter.

Note:

When carrying out the Oil Service at 4,000 miles, tighten the cylinder head bolts and change the oil in the final drive while at normal operating temperatures.

### **BMW Vehicle Safety Test**

- Check steering;  
Steering box, steering linkage, joint disc, screwed joints, leaks, oil level, V-belt tension.
- Check Brakes;  
Brake pads (remove and refit wheels), brake discs, lines and hoses, unions, brake fluid level, and handbrake cable (adjust if necessary).  
Replace Brake fluid every six months (minimum)
- Check condition of tyres and wheels;  
Tyre pressures, tread depth (minimum 2mm across  $\frac{3}{4}$  width), check wheels for damage.
- Check lighting;  
Headlamps (beam alignment), parking lights, tail lights, number plate lights, indicators, and hazards.
- Check warning instruments;  
Horn, Headlamp flasher, and Rear fog lamp (where fitted).
- Check Screen wash unit;  
Check Wiper blades, Washer jets clear, Reservoir level and adjust jets if necessary.
- Test drive with CO Emission levels, if necessary take to specialist garage.

### **BMW Major Service**

Every 8000 Miles or 12,000 km.

- Renew spark plugs.
- Renew contact breaker points. Use small amount of grease on cam at heel of breaker.
- Change engine oil, once normal operating speed is determined, add two drops of oil to form pad in middle of distributor shaft. Check oil level in control piston housing of the injection pump, top up if required.
- Check gearbox oil level. Change gearbox oil at 16,000 miles (24K km) and then every 16,000 miles (24K km).
- Change final drive (Differential) oil at normal operating temperature.
- Drive-shafts check for leaks on rubber bellows.
- Check oil level in steering box, top up if required.
- Check coolant level, top up if required.
- Check battery level and top up with distilled water. Newer batteries are sealed not required.
- Check brake fluid level, top up if required.
- Check V-Belt tension and re-tension if required.
- Oil and lubricate joints and bearings of injection pump and throttle valve actuation mechanism.

- Tighten nuts on Exhaust manifold – check torque settings, check rubber mountings and exhaust for corrosion.
- Check valve clearances and adjust if necessary.
- Replace air filter element.
- Check steering for play, examine all ball-joints and track rod ends.
- Propshaft and drive-shafts, check joints and rubber couplings.
- Front Disc brakes, check total thickness of brake pads and surface condition of discs, renew if required.
- Tighten nuts and bolts (note torque settings) for steering box and brake calliper mountings.
- Check front wheel bearings for play, adjust if required.
- Check tyre pressures are correct, check condition of tyres. If there is uneven wear get wheels alignment checked and adjusted.
- Check brake lines, unions for leaks, damage and securely fitted. Check brake drums and rear linings for excessive wear. Adjust handbrake cables if required, adjust rear brake shoes if required.
- Check oil supply lines and unions – oil filter, oil pressure switch flange, injection pump, oil cooler for leaks, damage and secure.
- Tighten nuts and bolts for doors, door locks and striker plates.
- Oil hinges for doors and bonnet, grease rear boot lock, door catches and strikers. Check operation.
- Carry out prescribed engine CO emission test, adjust if necessary.
- Final inspection of item affecting road safety (brakes, steering, clutch, headlight alignment, lighting system, instruments, horn, controls, and rear view mirror).

Note: Road wheels can be balanced on request.

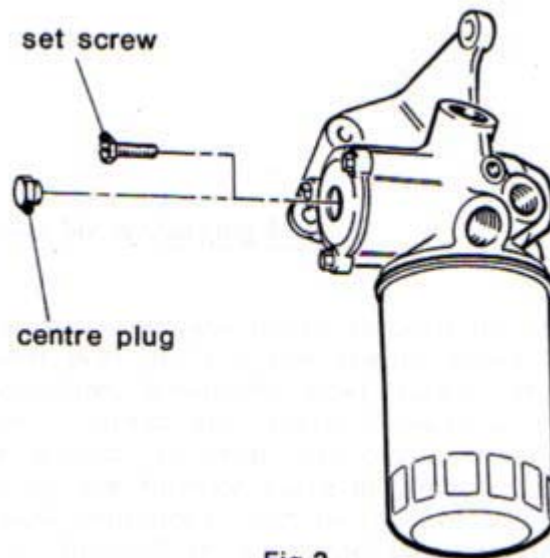
Every 40,000 miles (60,000 km) Clean pre-filter in the injection unit. Renew main fuel filter, Renew air filter at altitude compensator.

Tighten nuts and bolts (note torque settings).

Check left and right hand engine rubber mountings, intake fuel pump and exhaust mountings for wear. Check clutch drive plate for wear.

As you are aware, an engine oil cooler is standard usage and is mounted behind the front spoiler. Should it be necessary for any reason to remove or renew the cooler, cooler pipes or oil filter housing, it will be necessary to bleed the lubrication system.

This is done simply by removing the centre plug on the oil filter housing, inserting a 30mm set screw, and cranking the engine on starter motor until the oil light goes out. Remove the set screw and refit plug. This procedure is, of course, not necessary during a normal service.



Special care must be taken when fitting a front number plate to ensure the plate does not obscure the oil cooler aperture in the centre front spoiler.

## Chapter 4.

### **Description, Service and adjustment of the BMW Exhaust Gas Supercharger/Fuel Injection unit.**

#### **The principle of Turbocharging or Exhaust Gas Supercharging (Fig. 3)**

A determined amount of exhaust emission (black arrows) is fed through the turbine impeller as a result of the throttle valve position and engine speed. The turbine impeller (27), which is thus set in motion, drives the supercharger rotor (28) mounted to the same shaft. This draws in fresh air (white arrows) and feeds it into the engine under pressure. The amount of fresh air drawn in and the supercharger pressure are thus determined by the throttle valve butterfly position, the volume and temperature of the exhaust emissions, and by the efficiency of the turbine. The supercharger pressure is limited by a charge pressure limiting valve (26) located before the air collector (23).

The supercharger system just described requires a special fuel flow system. Unlike the injection pump which is used on the BMW 2002 tii model, and where the fuel quantity injected is dependent on the throttle valve position and engine speed, fuel flow in the supercharger engine depends upon the throttle valve position and the inlet manifold pressure.

The fuel quantity required for the varying engine loads is determined by the position of the three-dimensional control cam in the injector pump housing, and thus by the throttle valve position and the pressure in the inlet manifold. When the accelerator is pressed and the throttle valve opens, the control cam in the fuel injection pump is moved along its axis at the same time. The control cam is also rotated on its axis as a function of the inlet manifold pressure generated by the turbo supercharger. These two movements determine the amount of fuel injected. The inlet manifold pressure acts upon the control piston in the pressure regulator (24), which is linked, to a rack in the injection pump. A pinion moves along this rack thus rotating the control cam.

The position of the control piston depends upon the pressure below and above the piston. The pressure above the system is the same as the pressure in the inlet manifold; the pressure below is the same as the atmospheric pressure regulated by the altitude compensator (25).

The other components of the injection unit are the same as for the normal BMW 2002.

**Diagram of the BMW exhaust Gas Supercharger/Fuel Injection unit.**

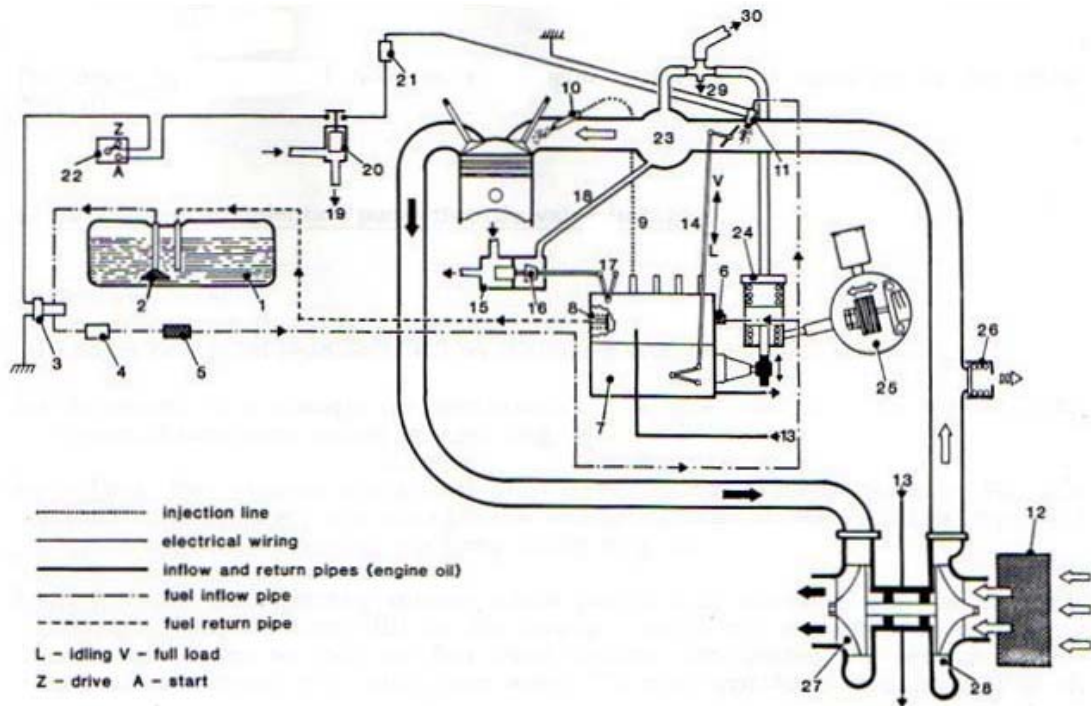


Fig. 3

- |  |  |
|--|--|
| 1. Fuel tank with induction unit                                     | 16. Air regulation cone                  |
| 2. Fine-mesh filter in induction unit                                | 17. Lever for eccentric shaft            |
| 3. Fuel pump   | 18. Line for additional air              |
| 4. Expansion vessel for pressure filter                              | 19. Coolant line                         |
| 5. Main fuel filter  | 20. Temperature/Time switch              |
| 6. Fine-mesh filter in fuel tank                                     | 21. Time switch (relay)                  |
| 7. Injection pump  | 22. Ignition switch                      |
| 8. Fuel return with pressure valve                                   | 23. Inlet manifold/Collection plenum     |
| 9. Injection line  | 24. Pressure regulator                   |
| 10. Injection valve  | 25. Altitude compensator with air filter |
| 11. Starter valve  | 26. Supercharger pressure limiting valve |
| 12. Air filter   | 27. Exhaust turbine                      |
| 13. Inflow and return of engine oil                                  | 28. Supercharger                         |
| 14. Adjustment of engine idling and full load (by accelerator pedal) | 29. Line to charger pressure indicator   |
| 15. Warm-up unit with expansion element                              | 30. Line to brake servo                  |

## Maintenance of the Fuel Injection Unit.

The basic adjustment of linkages and the engine idling is the same as for the BMW 2002 Tii.

### 1. Adjustment of the Injection pump/throttle valve linkage

- Remove cover
- Loosen hexagonal-head bolts [C] on the clamp unit (Fig. 5.)
- Disconnect the linkage bar and check to ensure that  $L=85\text{mm}$  (3.346"), adjust if necessary, and reconnect (Fig. 5.)
- Holding the injector pump regulator lever in the relaxed position; put the 5 mm diameter set-pin through the elongated hole of the regulator lever [A] and insert into the bore in the pump casing (Fig. 5.)
- Adjust the corresponding throttle valve positions by inserting a 4 mm diameter set-pin into the bore [B] in the casing. Press the eccentric lever slightly with the finger so the flat front surface just touches the set-pin, there should be no play. The idling stop screw [D] must not touch the lever (Fig. 4.)
- Tighten the hexagonal-head bolts [C] at the clamp unit. In doing so the eccentric shaft in the throttle valve housing must be pushed down. The clearance between the clamp unit and the throttle valve housing must not exceed 1.5 mm
- Check the procedure by pulling out the set-pin in the pump regulator lever, press the eccentric lever slightly with the finger against the inserted 4 mm set-pin. It must be now be possible to insert the 5 mm set-pin on the pump regulator lever without any tension or stress. If this is not the case, repeat the adjustment procedure.

The accuracy of the setting-up procedure is very important as it will have an effect on the following adjustments, and subsequent smooth and satisfactory running of the engine.

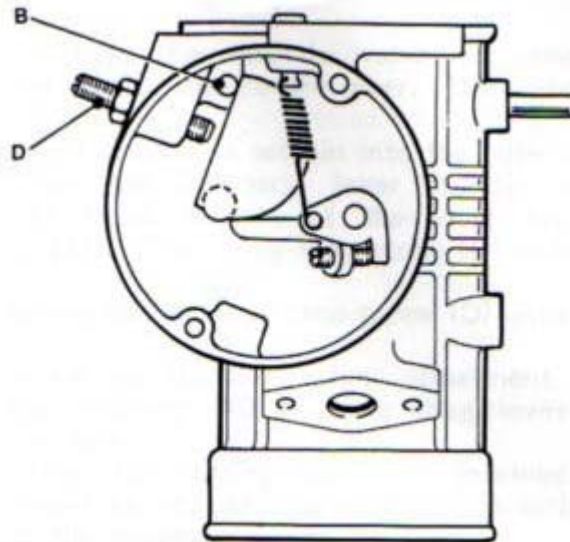


Fig.4



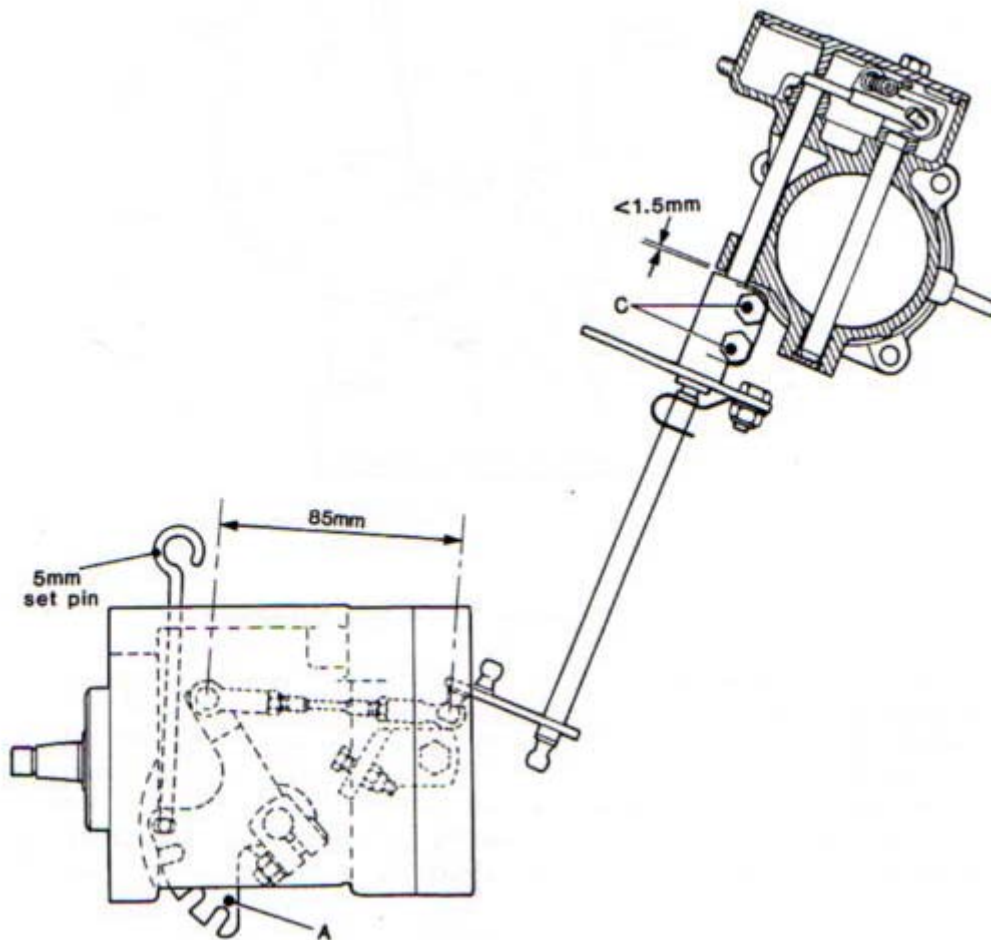


Fig. 5

## 2. Idling Adjustment (Fig. 6.)

Adjustment should be made with engine at normal running temperature.

- Unscrew the throttle valve adjustment screw [E] until it no longer touches the stop on the return lever. The throttle valve is closed.
- Insert the 4 mm set-pin into the bore [B] in the throttle valve housing. Press the eccentric lever slightly with the finger (arrow F) so that the flat front surface of the lever just touches the set-pin – there should be no play. The idling stop screw [D] must not touch the lever at this point.
- Screw in the idling stop screw [D] until it just touches the eccentric lever.
- Screw in the throttle valve adjustment screw [E] until it reaches the stop on the follower [M] and drag lever [S] rests on the eccentric lever without any play.  
After this setting has been obtained, the throttle valve adjustment screw [E] should be screwed in until the throttle valve is opened sufficiently for warming up the engine.  
Engine speed: 800-950 Rpm

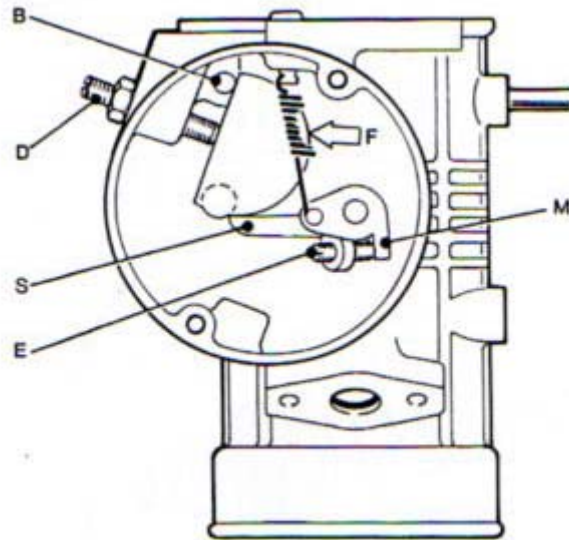


Fig. 6

### Checking the Warm-up Unit.

When the engine is warm, the enrichment lever must lie with the stop screw against the fuel pump body. When the warm-up unit has an effective temperature of  $+20 \pm 2$  degrees, the check gap between the enrichment lever stop screw and the stop on the pump body which should be  $3.6 \pm 0.4$  mm. If correction is necessary or if there is any damage to the linkage between the enrichment lever and the warm-up unit, please have this adjustment carried out by an experienced Technician familiar with the Kugelfischer Injection systems.

### **3. CO Adjustment (Fig. 7.)**

The adjustment of the CO content must be made at the altitude compensator (Fig. 7.) with the engine running at its normal temperature.

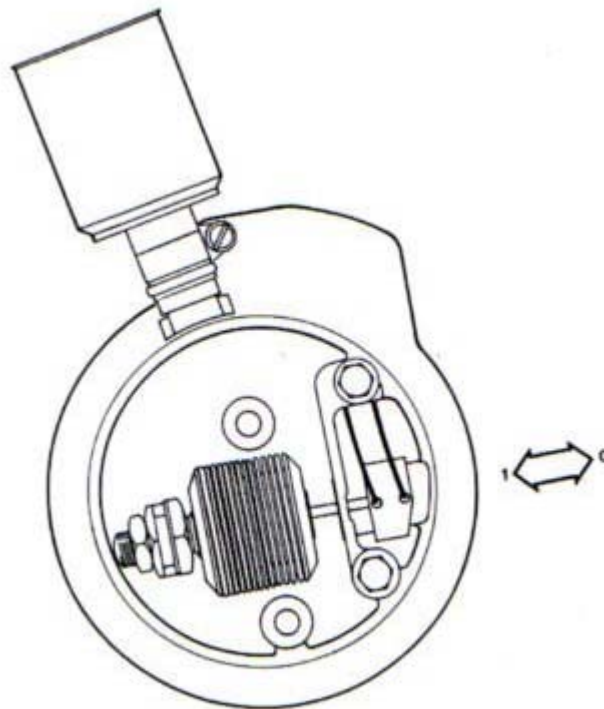
Remove the cover on the altitude compensator and loosen the locknut of the barometer bellows. The CO content can now be set to give a smooth idle by turning the barometer bellows (Fig. 5.) to obtain a CO reading of 3 – 4 %.

Moving the barometer bellows towards “0” (right) gives a lower CO content, turning toward “1” (left) increases the CO content.

Note: Turn the barometer bellows by the means of lateral shaft (8 mm) – do not take hold of the bellows. Tighten locknut.

Lightly tap the altitude compensator housing after this adjustment to eliminate any tension in the device.

Remove the cover – do not forget the O-ring – and tighten the hexagonal nut.

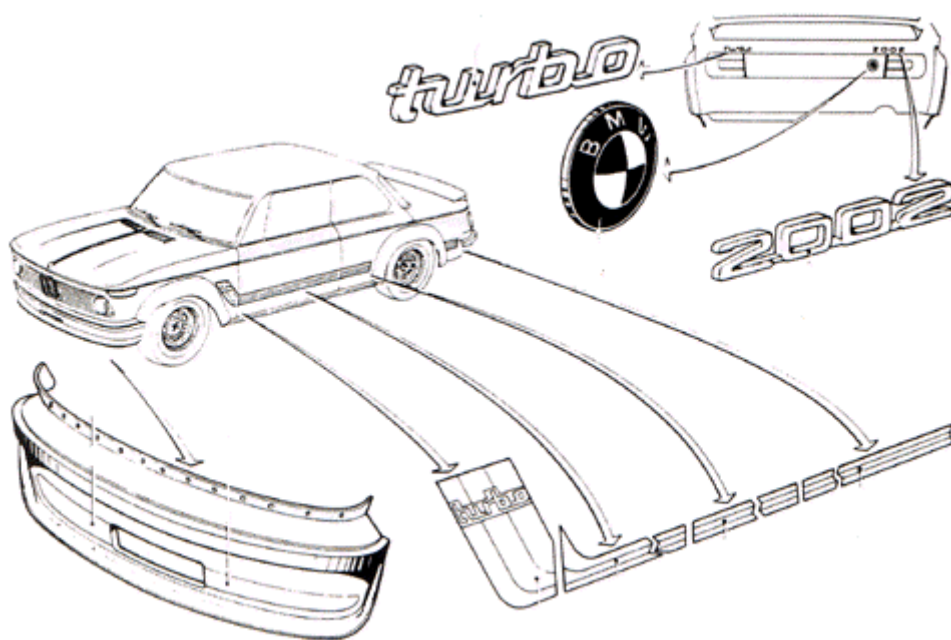


**Fig-7**

## Appendix I

### Tightening torques differing from BMW 2002 Tii;

Exhaust manifold to cylinder head	39.7 ft/lb (5.5 mkp)
Supercharger flange to exhaust manifold	39.7 ft/lb (5.5 mkp)
4-bolt flange of exhaust pipe to exhaust turbine	26 + 2.8 ft/lb (3.6 + 0.4 mkp)
V-belt pulley to crankshaft	14.5 +/- 7.2 ft/lb (20 +/- 1 mkp)
Altitude compensator cover	3.6 +/- 0.7 ft/lb (0.5 +/- 0.1 mkp)
Locknut on barometer bellows	7.2 + 2.1 ft/lb (1 + 0.3 mkp)



## Appendix II

### Trouble shooting chart.

This trouble-shooting chart assumes that the following are according to specifications.

1. Normal and even compression on all cylinders
2. Valve clearance correctly adjusted
3. Dwell angle and ignition timing correct adjusted
4. All components of ignition system functioning correctly
5. Pump timing correct

### Diagnosis

Condition	Cause	Correction
Engine will not start when cold although fuel pump is running	Fuel delivery pressure too low	Check ground connection to fuel pump. Replace fuel pump
	No, or too little fuel injecting from starting valve	Check all electrical connections, start valve, temperature time switch.
	Fouled spark plugs	Clean plugs or replace..
	Fuel tank empty	Fuel-up.
Engine will not start when warm	Starter operated for too short period	Operate the starter for a longer period.
	Fuel delivery pressure too low	Check ground connection to fuel pump, replace fuel pump.
	Fuel pressure too high	If necessary, replace regulating valve, clean return fuel line.
	Start valve does not cut off	Check temperature time switch, relay, pressure valve, fuel pump pressure.
Fuel pump does not work	Fuel tank empty	Fuel-up.
	Fuse	Replace fuse.
	Electric wires interrupted	Check all electric wires to pump, if necessary – replace.

<b>Condition</b>	<b>Cause</b>	<b>Correction</b>
Engine Surging at Idle, engine in warm conditions	Idling too lean	Adjust idle with infrared CO tester.
	Ignition advance too early	Adjust ignition timing.
	Sealing rings on intake pipes leaking	Remove and replace sealing rings.
	Throttle valve adjustment not matched to injection pump	Synchronise throttle valve to injection pump.
Engine will not start after cold start	Injection pump not properly adjusted	Replace injection pump.
	Air regulating cone dirty	Press up and clean slots in regulating cone.
	Warming up device incorrectly adjusted	Adjust warm-up device.
Idle speed too high, engine at operating temperature	Warm-up device jammed	Replace warm-up device.
	Idle adjustment incorrect	Adjust idle with infrared CO tester.
	Ignition timing incorrect	Adjust ignition timing.
	Throttle valve adjustment not matched to injection pump	Synchronise throttle valve linkage to injection pump
Idle speed too low, engine at operating temperature	Throttle butterfly and shaft jammed, or blocked with carbon deposits	If idle changes after stepping on accelerator, change or clean throttle body.
	Idle adjustment incorrect	Adjust idle with infrared CO tester.
	Ignition timing incorrect (too late)	Adjust ignition timing.
	Throttle valve adjustment not matched to injection pump	Synchronise throttle valve linkage to injection pump
	Warming-up device jammed	Replace warm-up device

<b>Condition</b>	<b>Cause</b>	<b>Correction</b>
Engine cutting out, misfiring	Throttle valve adjustment not matched to injection pump  Defective injection valve  Piston stuck in pump  Delivery valve leaks  Suction valve defective  Fuel pump pressure not steady, or too low	Adjust throttle valve linkage.  Replace injection valve.  Replace or overhaul pump.  Replace delivery valve.  Replace suction valve.  Check all electrical connection and ground connections, or replace fuel pump. Check fuel filters and replace.
Engine backfiring on deceleration	Throttle valve adjustment not matched to injection pump  Throttle does not return to the idle position  Idle adjustment incorrect	Adjust throttle valve linkage.  Replace throttle or overhaul housing.  Adjust idle with infrared CO tester.
Insufficient engine power output (see also low boost)	Fuel pump pressure too low  Defective injection valve  Throttle valve adjustment not matched to injection pump  Throttle does not go to full throttle position	Check all electric connections to fuel pump, check and replace filters, check pressure valve.  Replace injection valve.  Adjust throttle valve linkage.  Adjust linkage.
Too High fuel pressure	Warm-up regulator does not cut out  Cold start valve leaking  Throttle valve adjustment not matched to injection pump  Injection pump not adjusted properly	Remove hose clamp and bleed cooling system. Replace warm-up transmitter.  Replace cold start valve.  Adjust throttle valve linkage.  Replace or overhaul injection pump.

Condition	Cause	Correction
Low boost pressure	Exhaust manifold cracked	Replace manifold.
	Faulty turbocharger (cracked or burned out)	Replace turbocharger ( <i>"ouch"</i> ).
	Intake pipe leaking	Check all joints. Replace if necessary.
	Inlet pressure limiting valve faulty or mal-adjusted	Check, replace, or re-adjust to original specification. (Warning: tempering with the inlet pressure limiting valve to increase boost above manufacturers specification can lead to damage to the engine.
Will not enrich under boost	Pressure sensing valve on injection pump faulty	Check and replace or overhaul as necessary.

### Appendix III

#### Chassis Nos. From 4-290-001 to 4-291-672

Available in Polaris Silver or Chamonix White. Although it's believed a few other colour examples were commissioned. Price when new: £4299 (20,780 Marks).

#### **Additional useful reading:**

BMW 2002 Gold Portfolio. ISBN 1 85520 2204 Brooklands Books

BMW '02 Restoration Guide. ISBN 1 85520 451 7 Brooklands Books

The BMW 02-Series – The Cult Car. BMW Part No: 01 09 0 035 276 (No.3 in the Profile series)

#### **Additional information Web sites:**

[www.bmw2002.co.uk](http://www.bmw2002.co.uk)

[www.bmw-2002-turbo-club.de/](http://www.bmw-2002-turbo-club.de/)

[www.bmw-02-club.de/index2.html](http://www.bmw-02-club.de/index2.html)

[www.bmw2002faq.com/talkshop/forum/](http://www.bmw2002faq.com/talkshop/forum/)

#### **Parts:**

Your local BMW Dealer, [www.jaymic.com](http://www.jaymic.com), and [www.wallothnesch.com](http://www.wallothnesch.com)