The 2014 BMW X50i F15 (KR63) Rev A dated 07/13/17 by **Gary R. VanRemortel** vanremog@aol.com**.** Welcome to an in-depth review of the 2014 BMW X50i. As I learn more, I will update this article periodically to clarify aspects for other owners. Your comments and corrections are invited. Part numbers included here for convenience should be confirmed against your VIN prior to ordering. For parts links see:
http://www.realoem.com/bmw/enUS/partgrp?id=KR63-USA-10-2013-F15-BMW-X5_50iX
http://bmwfans.info/parts-catalog/F15/Europe/X5_50iX_4.4-N63N/L/oct2013/browse/





Engine: N63B44O1 4395cc [268 CID] DOHC aluminum alloy 32-valve 90° Twin Turbo V8
Bore/Stroke/Compression: 89mm / 88.3mm / 10:1
Max Power/Torque: 445hp SAE @ 5750rpm / 480 lb-ft SAE @ 2000-4500rpm
Spark Plugs/Gap/Socket/Torque: 8X Bosch ZR5TPP33S / .028" / 14mm 12-pt / 17 lb-ft
Oil Filter: Mahle OX353/7D
Fuel Capacity/Type/Range: 22gal / Premium Unleaded / 330mi before reserve
Avg Fuel Economy/Performance (0 to 62 mph): 17mpg / 4.9sec
Coefficient of Drag: 0.33
Max Speed (ECM limited): 155mph
Coolant/DI Water 50/50: 4gal BMW Blue (Zerex G48)
Turbocharger/Boost: 2X Garrett MGT22S / 11.5psig max
Alternator: 210A
Battery Main/Backup: 105Ah Duracell Ultra SLI95RAGM / 50Ah BMW 61219364597
Serpentine Belt: Gates K070649
A/C Compressor Belt: ContiTech Elast EB007
Transmission: ZF GA8HP75Z Gen2 8-Speed Automatic
Transfer Case Fluid: 2qt TF0870
Differential Fluid: 2X 1qt 75W-90 Redline Synthetic
Brakes Front/Rear: 2X 365X36mm / 2X 345X24mm
Brake Fluid: Pentosin DOT4 LV
Wheelbase/Width/Track/Length/Height: 115.5" / 76.3" / 65" / 192.4" / 69.4"
Curb/Gross Weight: 4870lb / 6360lb
Wheels Front/Rear: 2X 10JX20" / 2X 11JX20" (40mm offset)
Lug Bolt Circle/Thread/Socket Size/Torque: 120mm dia / M14-1.25 / 17mm / 103 lb-ft
Tires Front/Rear: 2X 275/40R20 RFT / 2X 315/35R20 RFT
Tire Pressure Front/Rear: 35psig / 39psig
Minimum Turning Radius: 21ft
Intake Air Filter: 2X BMW 13717638566 Mahle LX2991/1
Cabin Air Filter: BMW 64119248294 Mahle LAK221/S
Recirculated Air Filter: BMW 64319194098

Overview

BMW's third generation X5 F15 is arguably among the most highly refined SAVs in the world. It is an excellent traveling vehicle that gobbles up miles of open road effortlessly and allows comfortable backwoods access.

Many luxury vehicle owners don't work on their cars but, since most repair shops have adopted policies against installing non-BMW and/or owner-supplied parts, we all might be in a DIY situation if you wish to install uprated parts. Online retailers have competitive pricing for BMW parts and you should always comparison shop once you have a good part number. Always check for part number supersession to ensure you get the latest parts and not old downrev stock.

Shop repair info is still sparse for newer BMW models and we all need to share whatever documentation and maintenance/repair tips we can until shop repair manuals are available. I do my own repairs when feasible, because my experiences with the stealership have been less than stellar. Taking digital photos during disassembly is good practice and inexpensive USB endoscopic cameras are often useful in capturing detail within tight areas. Any good mechanic also needs a headband lamp and the Nathan Nebula Fire is a great USB rechargeable one. Overall the car is well designed and executed, but efforts at lightening and value engineering have yielded mixed results.

Torx drive fasteners are used extensively throughout. Be careful when starting fasteners and do not over-torque, as it is easy to strip metric tapped threads in aluminum. Thread engagement into aluminum should be ≥3 times fastener diameter (twice that of same size fasteners into steel). Plastic items can break easily as they embrittle with age in engine bay heat. **Always remove O-rings/seals using a soft smooth non-marring tool and lube prior to installation (I use Krytox RFE).**

I use the RC hobby equivalent of a turkey baster (Sullivan Products Glow Fuel Bulb), with a 6" length of RC fuel line to suck out old fluid from brake reservoir and refill yearly. I also have a small 12VDC fluid pump for larger extraction jobs. For safety's sake always chock opposing wheel set, use well placed jack stands and place jacking pads at major jacking points along with your trolley jack. I also have a pair of $45 six inch lift six ton rated Blitz Rhino plastic ramps. Terms left/right used herein are relative to driver's seated position.

Body

High-strength steel members throughout assure a rigid body, while front crumple beams flanking engine are designed to absorb forces in a crash. Aluminum pipe structural bracing runs from firewall to each strut tower and across radiator/grille/bumper supports. Despite robust design, the X5 is more car than truck.

To reduce weight, front fenders, wheel arch flares, windscreen edge moldings, lift gate window overhang and fuel filler door are molded plastic, hood is aluminum and dashboard structure is magnesium.

The horizontally split rear hatch has been a pain over the entire life of the X5 due to the way it closes and how the cabin racks going down the road. Getting lift gate stops greased and adjusted just right, ensuring latch engages properly and adding some soft material at ends of latch engagement boss goes a long way in quieting down rattles and knocks.

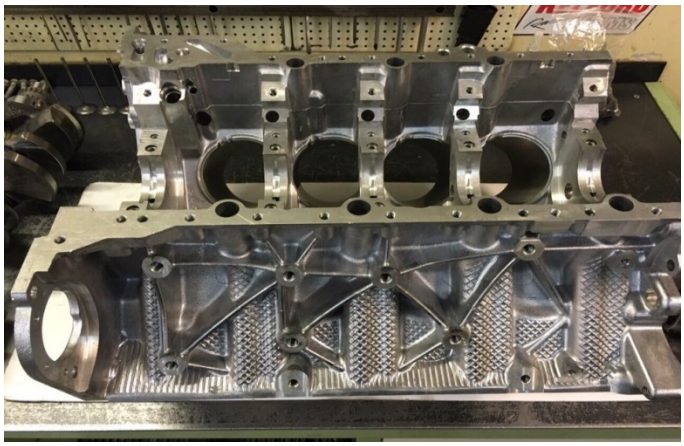
Engine

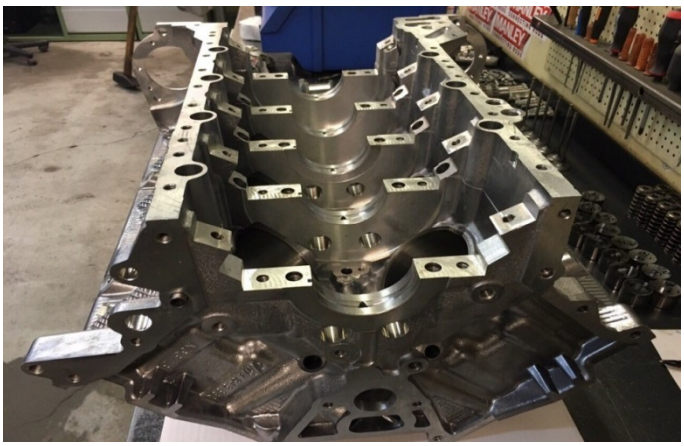
The N63B44O1 TVDI V8 engine (herein referred to as N63TU) has a forged C38 steel crank running in five Lead-free plain bearings (center being the thrust bearing) with 4 bolt bearing caps and is strong running all the way to its 6500 rpm redline. Torque curve is basically flat from 2000-4500 rpm and returns surprisingly good mileage at US freeway speeds.

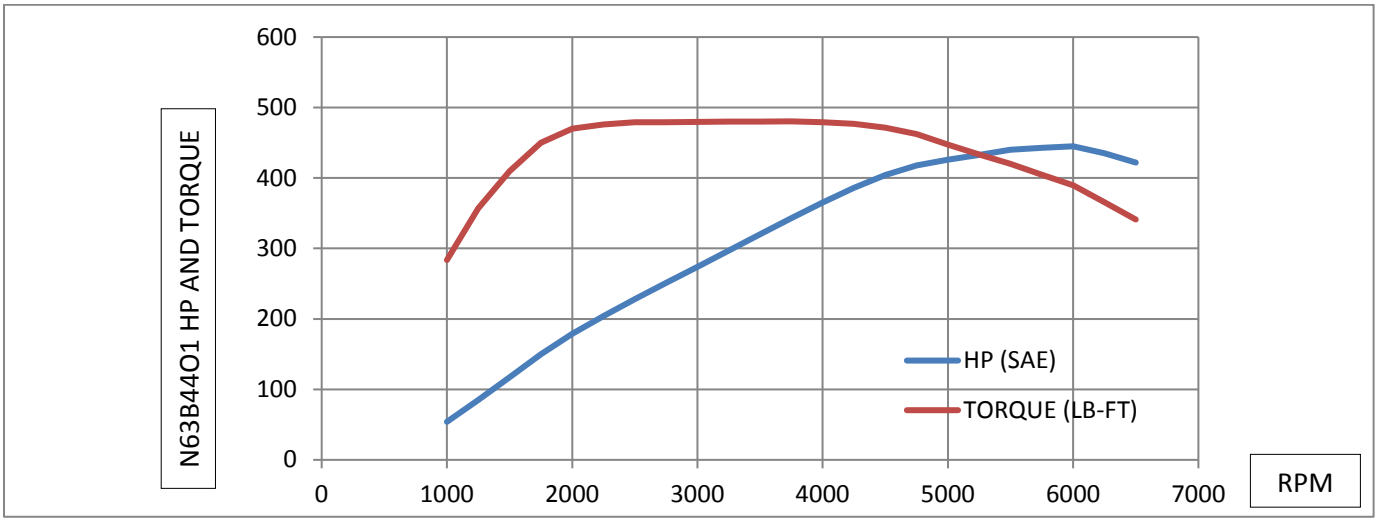




The BMW N62 4.8L engine established itself as a class leader in high power output and efficiency. It evolved into N63 with improved performance, lower emissions and better economy through addition of two valley mounted Garrett turbochargers and a reduction in displacement back to 4.4L, same as M62. Turbo waste gates are vacuum operated. Historically, all extensively revised BMW engines have had their share of teething problems, and N63 is no exception. Many got replaced under warranty as a result of turbocharger heat related issues. Mostly silver with black strip plastic covered engines are N63 and mostly black with silver strip are improved N63TU versions. BMW uses GL-AlSi917Cu4MG blocks and Alusil cylinder liners that are Nikasil plated and honed. BSFC is a very efficient 0.38 lb/hp/hr. Cold starting idle is around 1500rpm, dropping to 650 within 45sec.

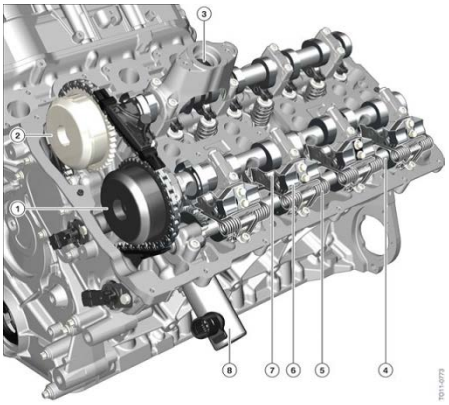






Valve Train

The reverse flow direct injection engine uses two specially designed roller primary chains. Double Vanos advances multi-piece camshafts up to 70° Intake and 55° Exhaust. Valves have 6mm diameter stems and cam timing is 6° different between banks to improve refinement/balance. Valvetronic 3 adjusts valve opening distance and exhaust valves are sodium filled.

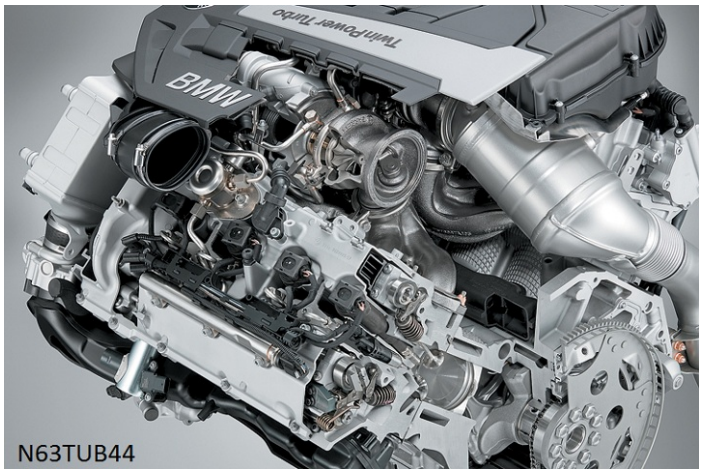




Ignition

Ignition is via Bosch MEVD17.2.8 electronic management, firing individual pencil coils. Coils are potted with a silicone compound that degrades upon contact with liquid fuel. Cylinder designations meet ISO standards, Bank 1 (right side) being 1, 3, 5 and 7 and Bank 2 (left side) being 2, 4, 6 and 8 front to back. Firing order is 1-5-4-8-6-3-7-2. DO NOT swap out ignition units to isolate problems, as all are uniquely programmed. Spark plugs should be replaced every 60Kmi and a deep 14mm 12-pt socket is needed. Any oil found within plug wells is either leaking from valve cover seals or plugs were not properly torqued. Changing plugs is an easy DIY job, taking about 90 min. The actual replacement is quite easy, but a lot of stuff in the way needs to be removed to get to them.

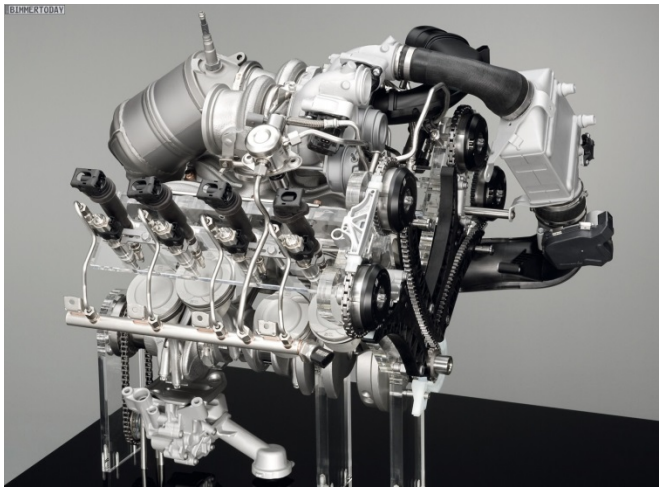


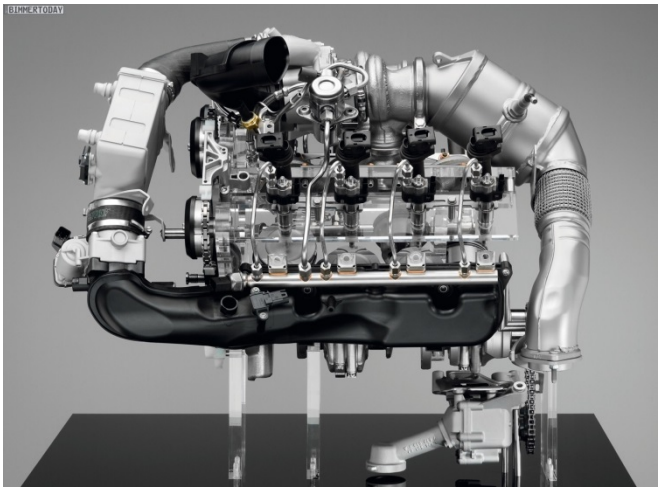


Lubrication

9 liters of 5W-30 (BMW 83212365946) BMW Twin Power Turbo GL-5 SL LL-01 full synthetic oil are recommended. In 2015, Shell (SOPUS) won rights to provide their PurePlus™ Technology based oils to BMW and it is likely their Pennzoil GL-5 SN Ultra Platinum oil is highly similar. I follow a straight 5Kmi oil replacement schedule due to high heat of the turbos and individual piston crown spray cooling, but BMW recommends following their computer's recommendation. There is no dipstick, Jimmy, so you must use iDrive system to periodically assess state of fill. If the system ever warns of low oil, STOP and top off immediately. I recommend always carrying a quart with you on the open road. If you develop oil leaks, Tracer Products makes a kit consisting of dye and black light. You will need a Burger Motorsports 83mm wrench to access oil filter cover from underneath. The Fumoto F-104 Oil Drain Valve (M18-1.5) is a good investment.

An oil cooler sits low in the right grille port. A 10yr replacement schedule for oil cooler hoses regardless of mileage makes sense because consequences of failure are so dire. A variable volume positive displacement oil pump chain driven off the crankshaft sits just in front of bell housing.





Cooling

A high exchange rate cooling system allows engine to reach operating temperature (221°F coolant temp) in <5min, contributing to ready drivability, low emissions and good fuel economy. The electric fan is rated 850W max.

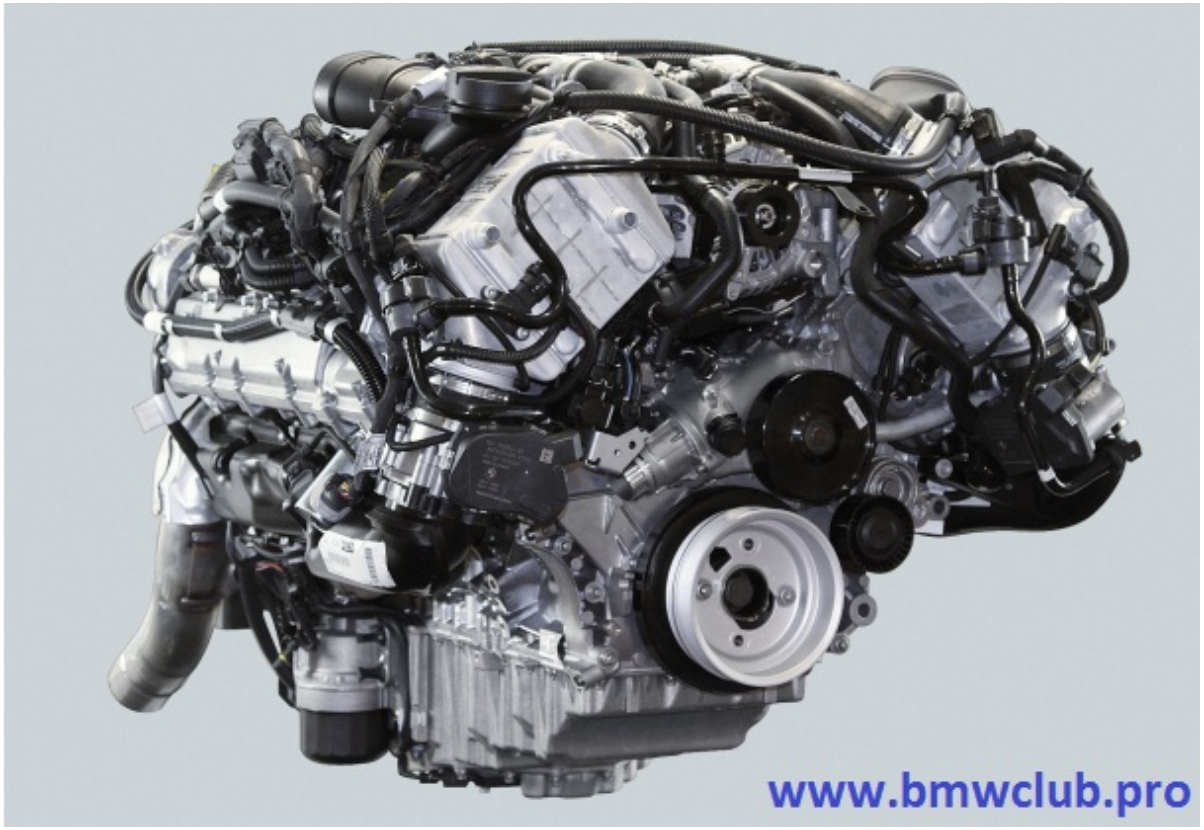
There are two separate liquid cooling circuits: A primary circuit cools engine block and turbos and a secondary circuit cools ECUs and intercoolers. A large primary expansion tank is on left side of engine bay and a smaller secondary tank on the right. Coolant additives are depleted in the process of protecting wetted aluminum surfaces, requiring a coolant change every 3yrs and anytime you replace a radiator or mechanical pump. The primary circuit also includes a heat exchanger for transmission fluid. The mechanical pump gets assist from a 20W electric pump. The secondary circuit heat radiator is mounted in front of primary and uses a 50W electric pump to circulate. Electric fan and pumps can run for many minutes after engine shutdown if ambient temperature is high.

Be sure to pressure test each system at 1bar (14.5psig) to check for leaks. I use a $70 Harbor Freight #69258 pressure tester. Yellow #3 adapter fits primary expansion bottle and Black #7 adapter fits secondary. Back flushing and flow testing should be done or radiators replaced somewhere around 150Kmi. I'm reluctant to start prying on plastic in the region of a normal radiator drain to gain access, so if someone understands how to drain the circuits, I would love to know.

Visually check for coolant seepage at weep hole on the mechanical coolant pump housing halfway between rear and front bearings. These pumps are well made, last for ~90Kmi and changing it is a 2hr DIY job. Change thermostat, mechanical pump, belts and check tensioner and deflection pulley bearings at the same time. Frankly, with all of the complex cooling going on, the front of engine has become quite a plumber's nightmare.

Drive Belts

Two separate belts are used and replacement is an easy DIY job taking about 60min. A unique slotted pulley arrangement is used in combination with an Elast belt driving A/C compressor instead of a conventional belt and tensioner, so you need to remove four bolts and turn the crank 180° to release pulley off center. Bearings in serpentine belt tensioner and deflection pulley assembly (used in lieu of a power steering pump in EPS equipped vehicles) are good for 150Kmi. Keep track of your gas mileage as the car ages, because increased friction of tensioner and deflection pulley bearings going bad shows up as progressively poorer mileage. They're cheap to replace.



Induction and Crankcase Ventilation Systems

The induction system begins with a ram air scoop centered above radiator feeding directly into air box where it divides into two separate circuits, one for each bank. Each circuit consists of an air filter, hot film MAF sensor, compressor portion of turbocharger, intercooler with integrated MAP sensor, throttle body, intake manifold, cylinder head, turbine portion of turbocharger, lambda sensor1, catalytic converter, lambda sensor2 and exhaust pipe. The two circuits join back up again at a rear transverse muffler.

A vacuum system provides power to brake servo and turbo wastegates. Vacuum pump is mounted at rear of Bank 1 cam cover and vacuum accumulator sits in the V-space.



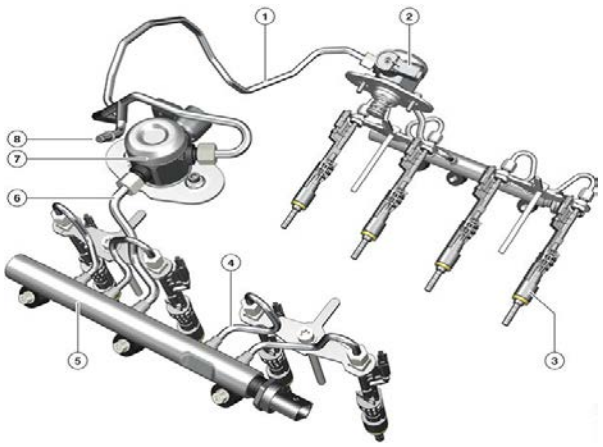


K&N E-0659 reusable filters are available for OEM air box. To service filters, loosen captive fasteners and remove cover. A single fastener holds both filters. If your air filters are working properly, you will only need to remove and clean your MAF sensors BMW 13628658527 every 90Kmi using a commercial aerosol MAF sensor cleaner. All air going into modern engines must be metered, so make sure all plumbing and seals are tight and can hold vacuum. A complex ventilation snorkel takes care of wringing out oil mist from crankcase gases but some oil still finds its way up into intake runners.

Removing entire intake and air box requires a bit more work. To remove ram air scoop, grab rear corners and lift straight up. Front tabs engage grille bracket like hinge fingers. Remove MAF sensors. Release band clamps between air box and intake runners and separate. The air box bottom rests on three rubber socketed ball mounts, one center front and one at rear of each end. You must pry up firmly at each mount to free it.

Direct Injection Fuel System

All submerged fuel pumps rely on fuel in tank for effective cooling and you should not routinely run below ¼ full. Do not overfill tank or you may foul vapor recovery system. Tank pump supplies fuel at 5.9bar (86psig). An exhaust cam lobe operated high pressure fuel pump on each bank provides 200 bar (2900psig) fuel pressure to the inward opening solenoid operated multi-hole Bosch HDEV5.2 direct injectors. Injectors are sensitive and uniquely characterized/coded, requiring compensation changes to the ECU if any are ever replaced.



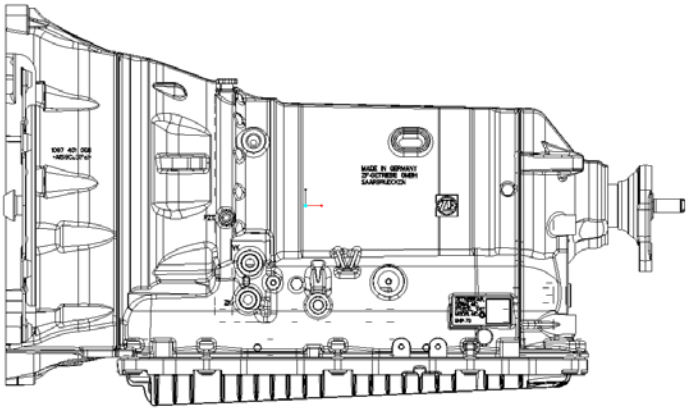
Throttle Pedal and Throttle Bodies

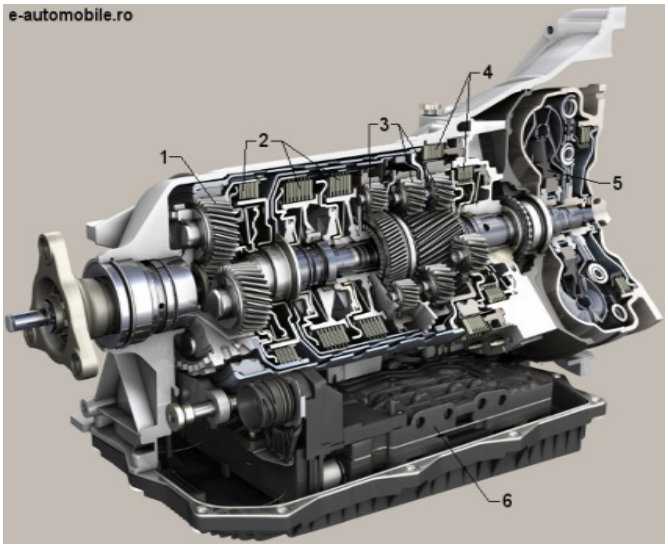
Throttle bodies are pretty trouble-free and just need periodic cleaning using B-12. The ECMs automatically adjust for throttle body butterfly position.

Automatic Transmission

The ZF GA8HP75Z Gen 2 gear box is a robust unit providing eight forward gears (ratios are 5.000, 3.200, 2.143, 1.720, 1.313, 1.000, .823 and .640) from four planetary gear sets and five shift elements and reverse (ratio 3.478). To shift out of park, depress button on side of shift handle first and when you want to park transmission, depress park button on top of shift handle or just shut down engine.

ZF specifies their clear Lifeguard8 fluid. The fluid and filter/pan BMW 24118612901 needs to be replaced every 60Kmi. Like many modern transmissions, there is no dipstick. Always confirm you can loosen fill plug before you remove drain plug. Only about 6-7liters of the 10liter capacity are accessible during filter/pan drainage (balance being trapped in torque converter, lines and cooler). Refilling involves pumping fluid, while running engine, shifting through all gears, measuring fluid temperature, pumping more fluid, until fluid drips out and reinstalling fill plug.





The driver can select between three automatic driving modes, ECO-Pro, Comfort and Sport. Each has differing characteristics that trade off best economy for increased performance. ECO-Pro sets suspension soft, provides best mileage of the three modes by coasting when possible and defaulting to turning engine OFF and back ON at full stops. Some aspects of ECO-Pro mode can be tailored to driver preferences via iDrive. Comfort Mode retains soft suspension setting, establishes nominal shift points and provides some engine braking appropriate for cruising the open road. Sport Mode firms up suspension, allows higher revs before hitting shift points and enables full engine braking on throttle let-off, all to suit a more spirited driving style. Auto engine START/STOP feature can be toggled ON/OFF anytime using the ringed collar surrounding switch (LED illuminates when the feature is disabled). Selecting M/S at any time allows manual gear selection for more direct driver control.

Driveline

The tubular rear driveline has a Guibo (also referred to as Jurid or Roto-Flex Coupling) BMW 26111229360 at transmission end and a center stabilization bearing for refinement. Guibos are good for about 120Kmi under normal driving conditions. Critical balancing of drivelines must not be disturbed and if you do work yourself, mark all bolt positions, keep them paired up with their specific nuts and don't allow anything to move until each fastener is restored to its original position. Study everything before disassembly and ensure you have it facing the right way during reassembly. Coat it with DC4 to keep it supple. The front driveline has a conventional U-joint.

Differentials
Rear drive ratio is 3.154. Do the differential fluid services before 120Kmi.

Exhaust
There are two each Bosch LSU ADV upstream and LSF4.2 downstream lambda sensors. They typically last 120Kmi. Replacing upstream sensors well before end of life is good practice. Remove sensors using a 7/8" [22mm] crowfoot wrench, lube threads with copper bearing anti-seize compound and torque to 37ft-lb.

Electrical
To start engine, depress brake pedal and START/STOP button. To power up without starting engine, just depress START/STOP button. To shut down engine and ignition, again depress brake pedal and START/STOP button. To shut OFF engine without powering down, just depress START/STOP button. Shutting OFF engine automatically puts transmission in PARK.

Rear lift gate and doors have electrically operated soft latching closures.

Modern vehicles have multiplexed electronics, similar to MIL-STD-1553B differential data bus in modern jet fighters. In contrast to conventional systems, where all features must be linked by dedicated hard-wired electrical connections, multiplexed systems control various vehicle functions over a network of interconnected electronic modules operated by low-current switching. Control commands are encoded at each output device, such as a switch or a sensor, to be utilized at a specific destination. This coding technique (in computer terms, a communications protocol) enables many messages to travel over a differential pair of wires, rather than dedicated hard connections between modules.

As your car ages, the potential for component failures becomes rather high but, if you can follow electrical diagrams, you are halfway to solving the problem.

The F15 X50i has two VRLA/AGM batteries. The main 92Ah BMW 61212353812 was upgraded by BMW on some vehicles to 105Ah 61212353814 under SIB to provide more capacity when some vehicles driven primarily around town in ECO-Pro mode were not fully recharging main battery. Second (backup) battery is 50Ah BMW 61217623131. Each battery has an outside vent tube.

The coin cell in remote fob is CR2032 and directions for replacement are in the Driver's Handbook. Expect driver side systems to wear out before passenger side due to higher usage. The turn signal sound is too soft to be easily heard while driving.

Most connections are made with Tin plated terminals/contacts that are less reliable than are noble metal (Silver/Gold) plated contacts. Even if modules are semi-reliably interconnected, most contain soldered connections. Soldered connections can become unreliable due to both poor initial build quality and removal of Lead (Pb) from solder formulations as a result of Restriction of Hazardous Substances (RoHS) efforts worldwide. Pb made soft soldered joints ductile and less prone to cyclic stress fatigue. Pure Tin (Sn) solder joints are made at temperatures 30°C greater than eutectic solders and can fail abruptly when overstressed. Although not generally a problem for most protected modules, those in harsh thermal and vibration environments (like engine bay) are somewhat at risk.

System complexity coupled with a lack of trained diagnostic personnel has led to a module replacement mentality (at high cost to consumer) vs repair be replacement of just the failed component(s). You can send these modules to specialists like www.modulemaster.com for repair or as core credit. If you can do some basic troubleshooting, rework and soldering, you can potentially save big bucks by repairing any obvious damage to module(s) yourself.

BMW color coding is abbreviated as follows in wiring diagrams.

SW	Schwarz	Black
BR	Braun	Brown
RT	Rot	Red
OR	Orange	Orange
GE	Gelb	Yellow
GN	Grün	Green
BL	Blau	Blue
VI	Violett	Violet
GR	Grau	Gray
WS	Weiß	White
RS	Rosa	Pink
TR	Klar	Transparent
NT	Natürlich	Natural
BO	Bordeaux	Burgundy
L-XX	Licht	Light

Coding/Recoding

Many control modules require special programming by the dealership if they ever need to be replaced. Recoding can enable/disable certain features to meet driver preferences, such as closing of rear lift gate using remote fob or allowing rear view camera to assist in trailer hook-up. www.codemycar.com has some resources to help. You will need a USB/Ethernet cable/adapter to interface your computer to the OBD2 port.

I intend to have these features recoded:

- Legal Disclaimers - Inactive
- Tire Pressure and Temperature – Both Active
- Seatbelt Chimes – Not Active
- Mirror Fold upon Locking - Active
- Radio/Navigation OFF upon Door Opening - Active
- Lift Gate Closing with Remote Fob - Active
- Door Handle Lights ON when Reversing - Active
- Seat Cooling Airflow - Increase
- Rear Camera Zoom – Active when Trailer Attached
- PDC with Trailer – Not Active when Trailer Attached
- Stability Control damps Trailer Swaying – Active when Trailer Attached
- Trailer Lamp Failure Notifications – Active when Trailer Attached

Suspension

Suspension systems rely on long-proven components. To prevent road surface noise and vibration from reaching cabin, suspension components are not attached directly to body. The Integral V adjustable rear suspension with air springs and without integral active steering is pretty solid. The compressor pump is now more compact and resides under the car.

Despite good dual wishbone design and progressive springs up front, low speeds yield a somewhat harsh ride over rough road surfaces such as brick or cobblestone. Front end rebound damping seems too light at the nominal setting. Anti-roll bars control body roll well in cornering. I always switch to Powerflex urethane anti-roll bar bushings when OEM rubber ones wear out, but make sure you lube them properly with Prothane Super Grease or they are guaranteed to squeak.

Steering
Rack and pinion steering is now all electronic, but many owners prefer the heavier steering feel of previous hydraulic power assisted steering. Electric Power Steering (EPS) provides a very neutral feel in all conditions, making parking less tedious for a vehicle of this size. The level of assist seems appropriate to me — not overly sensitive to slight steering wheel movement — yet providing good stability at highway speeds, but there clearly is a loss in road feel and a marked reduction in natural steering unwind with EPS. Perhaps tweaking steering geometry slightly could further improve steering dynamics to appease both camps.

Brakes
The parking brake is engaged by pulling up on center console brake paddle (LED illuminates) and released by pressing down (the LED extinguishes).

The brake system uses DOT4 fluid and I really like the low viscosity stuff from Pentosin. When brakes need replacement, I upgrade to Centric Power Stop drilled rotors with their semi-metallic pads. Limits on rotor wear are 34.4mm for front and 22.4mm for rear. Relube caliper pins with high temperature ceramic grease.

Speedbleeders SB1010-SS are available to make single person bleeding much easier. They also sell a tubing equipped plastic recovery bag (like an IV bag) to handily catch expelled fluid.

Wheels/Tires
BMW could easily have done a better job of either plating or painting wheel hubs, as they become quite a rusty mess after only a few years of trapped moisture. Pull wheels off and hit hubs with a wire brush and a light coat of black Rustoleum. Wheels are hub-centric so grease centering bosses to keep them from sticking to hubs and oil stud threads.

Make sure your tire guys do a good job of removing balance weight adhesive residue and crap from your wheels before they attach new weights in the same area or they can easily sling off. A toothbrush and some Coleman Lantern Fluid (Naphtha) will do the trick. Also ensure they pay attention to any High Spot marking on tires. Lead (Pb) wheel weights were discontinued years ago for environmental reasons without much fanfare and it now takes three times as many Iron/Steel (Fe) or Zinc (Zn) weights to do the same job.

My car came with Bridgestone Run-Flats and electronic tire pressure monitoring. We'll see what I replace them with at 60Kmi, as I am predisposed to Michelins and don't much like the rough ride of Run-Flats. Low profile tires make wheels prone to curb rash if you are careless.

Towing
X5s are decent towing vehicles, with the V8 and diesel engines being preferred for their low end torque. BMW rates max towing capacity of my X5 with third row seating at 7700 lbs and a tongue weight of 600 lbs. Invisihitch and Draw-Tite 75600 hitches are good Class III choices rated for 6000lbs and a tongue weight of 600lbs. OEM hitch is very expensive and has some not so good points IMO. 2" diameter BMW 82712349501 ball mount, 2 $_{5/16}$" diameter BMW 82712414452 ball mount and a Class II rated 2" square hitch receiver BMW 82712349502 are all available.

Wiring can vary from simple flat four contact connector “lights only” types, to those seven contact “active” types providing camera, brake, lighting and computer functions for travel trailer use. A connector mounting bracket will need to be made out of aluminum extrusion for OEM harness BMW 82712349500 if you go with an aftermarket hitch. For complete functionality an AAG-01 control module BMW 71606884357 is needed. Separate electric trailer braking systems are available. A Tow Ready 63201 J-Pin is recommended to reduce slop in hitch receivers, but receivers with a second hole are needed. Wider towing mirrors BMW 51162354903 are available. Use of weight distributing hitches on uni-body vehicles is discouraged by BMW.

To install hitches, break off three rear plastic rivets holding wheel arch flares to allow access to screws holding the forward portion of bumper fascia. Replacement rivets are BMW 07147293278 for black and BMW 07147391323 for white. They are installed using a conventional pop rivet tool. There are also screws underneath, hidden below light fixtures (remove two nuts and pull straight back) and behind rear reflectors (push out from underneath). The rest is all snap together tabs. Unplug sensor harness. The bumper fascia underside edge is scalloped to clear most hitches and trimming should no longer be required.





Windscreen, Washers/Wipers

Wipers are 24” (driver), 20” (passenger) and 12” (lift gate). The Guardian brand glass is soft and the windshield pits instead of cracks from road gravel hits.

Windshield washer fluid not containing alcohol (Methanol was removed years ago to render it less toxic) can foster bacteria growth in warm to hot conditions and specifically Legionella bacteria can be spread as it is aerosolized during use. Always add 2 to 3 cups of denatured or isopropyl alcohol per gallon to all washer fluid to fortify it, cut road grime better and improve resistance to freezing in Winter.

I use a little steamer vacuum cleaner filled with 70% Isopropyl Alcohol to clean the carpets. I modified a VAPamore MR-50 to allow both steam generator and vacuum to run simultaneously.

Covers

Front and rear towing hook access covers don’t always stay snap-fit in their fascia openings and some have lost them on the road, necessitating buying parts in primer and painting to match. Tethers break easily, so use a zip tie anchor instead. To release cover, press firmly on raised marking.

Interior

Seats are highly configurable for any driver and passenger shape/height. Rear seats can slide fore and aft and backs have adjustable recline. Large diameter cup holders are well positioned in the consoles. I like dash mats for my cars and DashMat makes a nice velour one. I also like having reflective red stickers on door edges so they can be seen at night when open.

My X5 center console cubby had a phone docking cradle to provide access to vehicle battery power and external roof antenna. The cradle blocked access to the cubby from passenger side, so I removed and replaced it with a solid rear plate BMW 51169252106. Air conditioning ducts through the center console keeping cubby quite cold, so you can park your soda or other adult beverage in there in summer.

The ashtray in front of the cup holders can be replaced with a non-smoking insert BMW 51169267952.

It is sad that ill-fitting interior plastic items have contributed to so much buzzing, rattling and creaking. Locating and resolving these irritants can be challenging and time consuming and are unexpected in a vehicle costing north of $80K new. It helps to have a roll of adhesive backed loop (smooth) Velcro tape and also some narrow thin EPDM foam tape. Dakota leather has a marked tendency for the color coat to crack, but repair can be done as needed.

Safety/Restraints

Extensive safety considerations are engineered into the F15 X5 such as front collision warning, passing vehicle sensing, forward and aft cameras, following alerts, seatbelt pretensioners, eight airbags, front and rear headrests.



Climate Control

Both a pollen microfilter and a recirculating cabin air filter are located in firewall plenum area. They should be replaced every 5 years or so, depending on how bad the air is in your area. A/C is conventional and low pressure charging port is the one closest to engine. Always hold can upright (and turn sideways briefly to agitate) to introduce just R134a vapor/gas into line (not liquid) or you can damage compressor seals. Some charging hose assemblies require use of a DVA1 adapter for newer non-piercing auto-shut-off cans.

iDrive

iDrive controls various media and display features. The controller allows button access to Multimedia/Radio – Menu – Telephone/Navigation – Back – Options, as well as a tactile mouse wheel. iDrive is organized as follows:

Multimedia
Radio (FM – AM – Satellite – Presets – Tone)
Telephone (Phonebook – Search)
Navigation (Enter Add – Add Book – Pts of Int – Stored Trips – Text Search – Last Dest – MAP)
Office (Current – Contacts – Calibration – Notes – New – Messages – Tasks)
Connected Drive (BMW Assist – Connected Store – BMW Online – Connection Status)
Vehicle Info (Quick Ref – Search by Pic – Manual – Info – Trip Comp – Status – Lighting Doors/Key)
Settings (Time/Date – Language/Units – Tone – Speed – Climate)

Engine Bay Heat Soak

Heat produced by modern alloy engines needs to be forcibly ejected from engine bay, so prolonged “stop and go” traffic should be avoided wherever feasible. Give turbochargers a chance to cool down from high usage by cruising the last several miles to your destination prior to shut-down to limit coking up bearings and piston rings with excessive heat. At speed engine bay temperature will be just slightly above ambient, but it rises to >220ºF within minutes after engine shutdown, staying quite high for 30min. Waste heat bakes into surrounding items such as the V-space, wiring, hoses, plastic and rubber parts.

Cleaning/Protection

Keep all hoses, and for that matter all rubber items (except drive belts), well coated with a good silicone oil spray for longest life. I recommend using industrial food grade low viscosity spray CRC 03040 (Fastenal carries it) for large area coverage and Easy Rider RT630A (paint ball aficionados use it) for coating small bushings, because it is thicker and clings better.

If your car is a daily freeway driver, you need to protect the front end against road FOD. Clear protective film bras are available, but they are expensive. To my knowledge there is currently no full coverage Naugahyde bra available for the F15 X5.

I use Armorall leather wipes to clean, then Surf City Garage Voodoo Blend Leather Rejuvenator to treat leather. Other protectants may be needed in different climates. Noxudol 750 anti-corrosion treatment cavity wax should be applied on and/or into all places subject to moisture ingress and road salt effects using the included snaky hose. If you can get the car up on a lift, look for lower areas prone to moisture entrapment and rusting (just don’t get it on braking surfaces or items that must move freely without binding).

Any little paint nicks get a little airbrush attention with DuPont Nason brand paint. I also use little foam ended makeup/touchup brushes to fill dings. A Meguiar's K2000 Mirror Glaze Unigrit Sanding Block dresses and levels rough areas. Before using, always forcibly submerge sanding block in clean water for a day or so, until it sinks to bottom on its own. I have a Porter Cable 7424XP buffer and use Mothers FX Syn-Wax. I use B-12 Chemtool to treat the fuel injection system at every oil change. For exposed plastic the best treatment I’ve found is Meguiar’s brand. For tires, I use Turtle Wax gel.

Lighting

My car has self-leveling LED headlamps with adjustable range and they are super. The anti-dazzle feature is very handy at night. Headlamp lenses are plastic and will benefit from an XPel protective film applique kit.

OBD2

Get a good list of Generic and BMW specific DTCs, so when your car throws a DTC you don’t recognize and your scan tool doesn’t have a DTC library in memory, you can at least have a rough idea of what the system is trying to tell you. Scan tools vary widely in sophistication and auto manufacturers are quite keen to keep some of their OBD2 details proprietary. I have an **Innova 3160e scanner** capable of capturing and graphing 12 minutes of live parametric data. Smartphone apps like Torque Pro and Bluetooth Adapters allow for cordless monitoring.

Baseline scan your car’s systems Key-ON Engine-OFF (KOEO) and read live data Key-ON Engine-Running (KOER) while driving at varying speeds when things are running right, so you will be able to recognize normal range readings. Don’t start replacing things on a single throw of a given DTC, but do use the OBD2 system to periodically monitor your car’s systems and track trends over time. Develop a good diagnostic sense, proceeding in a logical manner to pinpoint malfunctioning item(s). There are a number of YouTube videos to help you develop good troubleshooting skills.

All systems depend on each component doing its job correctly and consistently. Attempt to correlate or isolate problem(s) to a single component or module. The simplest answer to a problem is usually the correct one, often a failed sensor/module or bad electrical/wiring connection. Take care to not break other things in the process of fixing your initial problem. It's tempting to replace all other similar items when you have an assembly apart, but functioning parts are often best left alone, unless the consequences of their failure are dire and there is visual evidence of their impending failure. Modern cars are designed and built for ease of assembly, not necessarily for ease of repair.

Normal range OBD2 PIDs:
Fuel 1 (Open Loop KOEO, Closed Loop KOER after warm up)
Fuel 2 (Open Loop KOEO, Closed Loop KOER after warm up)
Load (0% KOEO, 0 to 100% KOER)
ECT (-30 to 230°F)
STFT B1 (0 ± 15%) lost at key OFF
LTFT B1 (0 ± 5%) retained at key OFF
STFT B2 (0 ± 15%) lost at key OFF
LTFT B2 (0 ± 5%) retained at key OFF
Fuel Press Hi (1000 to 3000 psi)
MAP (25 to 55 inHg)
RPM (0 to 6500 rpm)
Speed (0 to 155 mph)
Advance (0 to 50° BTDC)
IAT (0 to 130°F)
MAF (0 to 40 lb/min)
TP (0 to 100%)
Lambda B1 S1 (cycles from .5 ± .5 V KOER)
Lambda B2 S1 (cycles from .5 ± .5 V KOER)
CAT temp (1400 ± 200°F)
MIL (OFF)

Preowned X5 Buyer Advice

After reading and understanding information presented in this article, the following items should be included in your condition inspection. You should also line up a competent BMW mechanic to go over any target vehicle prior to money changing hands. Be aware that first owner costs are highest because of initial depreciation.

1. Overall Condition and Mileage. Does car look reasonably clean and well cared for? It should have no more than 90Kmi to be a good candidate and it helps your pocketbook immensely if you can troubleshoot problems and do most of your own repairs. Look for coolant-free oil and oil-free coolant. Ensure body panel colors match, body is free of dents/scratches and there are no unpleasant odors.

2. Service History and Seller Evaluation. Look for either parts receipts and labor invoices or seller mechanical knowledge and ability. Always speak to whoever maintained it and do a reality check on any claims made (trust but verify).

3. Cooling Systems. Check coolant color (blue) and level in both cooling circuits. Pressurize the cooling systems when cold for 60min at 15psig to check for leaks under the car. Inspect fans, radiator fins and hoses for good condition and proper operation. Start the car and observe exhaust during initial start and warm-up. Does coolant temperature come up to 223°F in five minutes and stay there?

4. Engine Condition, Fluid Leaks and Noises. Look for conditions indicating neglect or incomplete maintenance. Engine should crank and start readily. Check manifold pressure at idle and upon throttle application. Listen for unusual tappet or primary chain noises. If you can, disconnect each coil in turn for a few seconds to observe rpm drop. Perform a compression check on all cylinders (~200psig). Use an endoscope to inspect cylinder walls and piston crowns. Check oil level and condition.

5. Engine Bay. Look for cleanliness and attention to detail. Are all fittings and parts OEM equivalents? Check brake fluid level and condition. Test engine mount condition with a quick stab of throttle.

6. Drivetrain. Look for Guibo condition and leaking seals.

7. Suspension. Bounce on each wing to observe compression and rebound damping authority.

8. Steering and Brakes. Look for ease of rotation, absence of slop and good braking authority. Look under car in the area of brakes to ensure no caliper or hose leaks. If you can get each wheel up in turn, check ball joints, bearings and observe smooth wheel rotation.

9. Wheels and Tires. Visually evaluate tire type and tread, check for curb rash and condition.

10. Electrical and Lighting. Make sure all systems operate to spec both day and night. Check voltage at battery B+ (it should be about 14.5VDC engine running and greater than 12.35VDC engine OFF). With key ON, ensure all Instrument Cluster indicator lamps come ON and go out after engine start. Check to see that dimmer circuit works. Check condition of batteries and ensure terminals are free of corrosion.

11. Entertainment Center and Instruments. Operate all panel and console buttons and steering stalk functions both sides.

12. Interior and Seats. Inspect for leather condition, seat and steering column movement/position memory, lumbar function and headrests.

13. Climate Control. Ensure all functions of heater and air conditioning system work front and back as they should. Musty air conditioners can be treated to clean heat exchanger exterior.

14. Body, Paint and Corrosion. Operate all doors, lift gate, hood, fuel filler door and all locks both manual and remotely operated via the key fob. Look for nicks and overall finish condition.

15. Glazing. All BMW windshields will have some degree of pitting, but ensure glazing is otherwise in good condition with no chips or cracks. Ensure windows roll all the way up, all the way down and rear window heater is functional.

16. Plastic and Rubber. Check all plastic and rubber items in the engine bay, under car and window and door seals for splits/cracks.

17. Missing Items. Ensure there are two sets of driver keys with remote fobs.

18. Smog Reports. Review for trends. Check miles per gallon on dash computer display and see if it makes sense. Ensure there are no alert lamps illuminated and no squawks on the panel message center. Check exhaust tips for excessive carbon buildup.

19. OBD2 Scan. With your scanner attached, drive car and capture at least 10min of live data. Shut it down for a few minutes. Start it up and drive it back. It may take multiple start/stop events before OBD2 system logs a code. Look particularly at coolant temperature, long term fuel trims, lambda sensor readings and readings indicating catalyst condition.

20. Test Drive. Engine should idle smoothly and take throttle readily. Low end torque should be apparent and steering should be neutral. At low speed, suspension should be stiff and at freeway speeds (and up) car should be well under control regardless of road conditions. It should corner as though on rails with virtually no lean. Manually shift through gears under a variety of conditions and observe results. There should be smooth shifting and exhaust note should remain a low burble with no popping even under aggressive downshifting conditions. Engage and disengage cruise control and ECO-PRO, Comfort and Sport mode functions. Note all gauge readings and recheck miles per gallon on dash computer display.

BMW X5 Service	Every	Or
Inspect Wiper Blades and Fill Washer Fluid	7.5K mi	4-6 mo
Inspect Tire Tread and Pressures	7.5K mi	
Inspect for Engine Leaks and Unusual Noises	7.5K mi	
Inspect Brake Pads, Rotors and Hand Brake	7.5K mi	
Inspect Rubber Boots for Damage	7.5K mi	
Inspect Mirrors and Central Locking System	7.5K mi	
Inspect Horn, Headlamps, Fog Lamps and Hazard Flasher	7.5K mi	
Inspect Turn Signals, Brake Lamps and Interior Controls	7.5K mi	
Inspect Air Conditioning, Heating and Rear Defogger	7.5K mi	
Inspect Seats, Headrests and Safety Restraints	7.5K mi	
Inspect for Corrosion and/or Abnormal Wear	7.5K mi	
Change Oil and Filter	7.5K mi	
Add Berryman's B-12 to Full Fuel Tank	7.5K mi	
Replace Brake Fluid	15K mi	1-1½ yr
Lubricate Hinge Points and Door Locks	15K mi	
Silicone Spray Rubber Items	15K mi	
Noxudol 750 Rust Prone Areas/Items	15K mi	
Replace Main Battery	30K mi	2-3 yr
Pressure Test Coolant Systems	30K mi	
Replace Coolant	30K mi	
Replace Air Filters	60K mi	4-6 yr
Replace Fuel Filter	60K mi	
Replace Transfer Case Fluid	60K mi	
Replace Transmission Filter Pan and Fluid	60K mi	
Replace Spark Plugs	60K mi	
Replace Fluid in Differentials	60K mi	
Replace Aux Battery	60K mi	
Replace Thermostat	90K mi	6-9 yr
Replace Large Coolant Hoses	90K mi	
Replace Mechanical Coolant Pump	90K mi	
Replace Drive Belts	90K mi	
Replace Starter Relay	90K mi	
Clean Mass Air Flow Sensors	90K mi	
Replace Oil Cooler Hoses	120K mi	8-12 yr
Replace Front and Rear Anti-Roll Bar Bushings	120K mi	
Replace Front Shocks	120K mi	
Replace Driveline Flex-Disc	120K mi	
Replace Upstream Air/Fuel Sensors	120K mi	
Replace Rear Airsprings	120K mi	
Replace Rear Shocks	150K mi	10-15 yr
Replace Front, Rear and Steering Ball Joints and Bushings	150K mi	
Replace Radiators	150K mi	
Replace Tensioner and Deflection Pulley Bearings	150K mi	