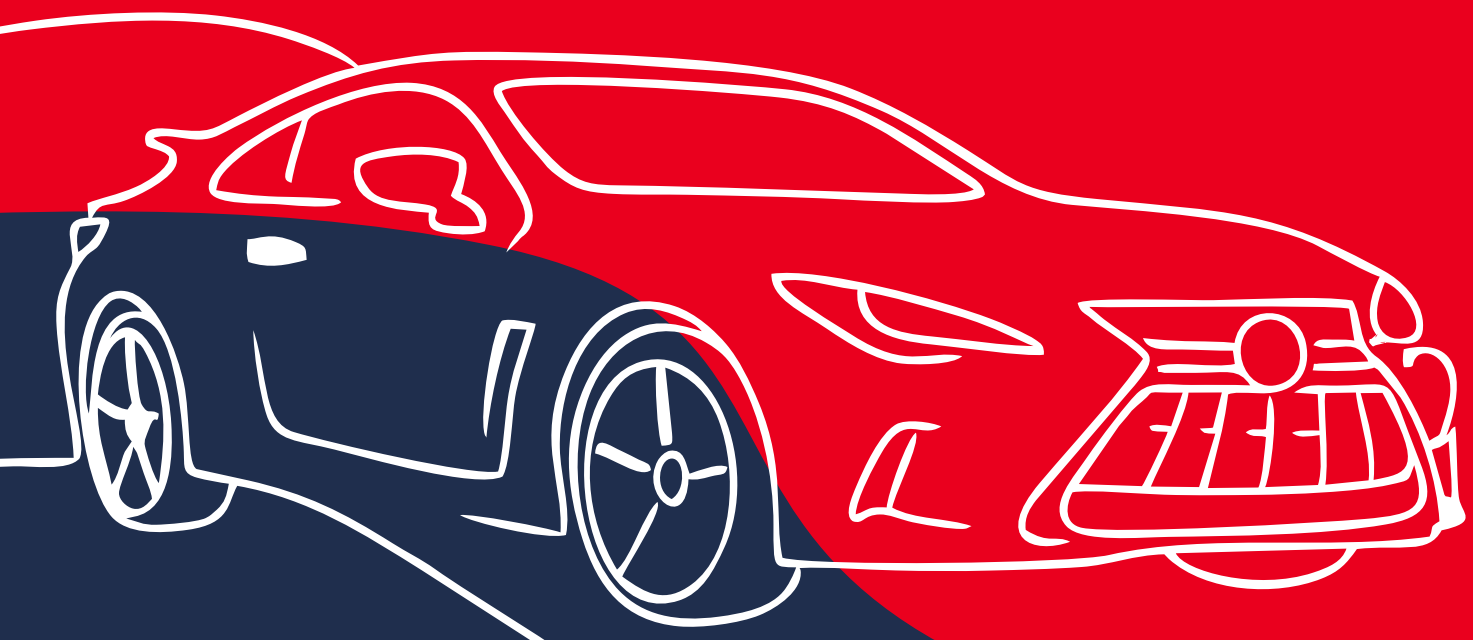
# Engine Swap of 2016 BMW F22 for Performance Upgrade

## User Manual



*Please keep this manual for future reference on driving and maintenance tips.*

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# About This Manual

**Engine Swap of 2016 BMW F22 for Performance Upgrade**

The Manual is about an engine swap for performance purposes. All of the practical knowledge & steps are given in theory, so that the buyer can know exactly what is happening with the car.

## 1. Introduction

This user manual comprehensively describes the engine swap procedure for a 2016 BMW F22, replacing the stock N20 2.0L turbo engine with a used S55 3.0L twin-turbo inline-6 engine. Essentially for enhancement, the process is seen as a swap from one performance setup to another. The steps taken into consideration here are purely practical. Part compatibility, tools, and real-world challenges are explained in easy to understand language.

## 2. Vehicle and Engine Specifications

- Base Vehicle: BMW 228i, F22 chassis, 2016 model year
- Original Engine: N20B20, 4-cylinder turbocharged, 2.0L
- Replacement Engine: S55B30, inline-6 twin-turbocharged, 3.0L (2018 M3 donor)
- Transmission: 6-speed manual (F80 donor)

## 3. Tools and Equipment Needed

**The following tools must be available for a proper swap:**

- Engine hoist/lift
- BMW ISTA+ or E-System software for ECU coding
- Torque wrench with metric specs
- Custom motor mount fabrication kit
- Welder (TIG preferred for aluminum brackets)
- Full socket set, Torx drivers, Allen wrenches
- Multi-meter
- Cooling system pressure tester
- Digital scale (optional for weight distribution check)

## 4. Removal of Original Engine

**Steps to Follow:**

- Disconnect the battery (ground and positive terminals).
- Draw off all the fluids from the engine, transmission & from other places.
- First remove all the piping and air box & then engine cover
- Label and disconnect all electrical connectors from engine harness.
- Detach exhaust manifold from downpipe.
- Unbolt the driveshaft and transmission cross-member (if doing transmission swap).
- Support the engine from above or below using a hoist.
- Unbolt motor mounts and lift the engine out carefully.

# 5.Pre-Swap Preparations and Fitment Adjustments

## A. Custom Engine Mounts:

- S55 does not bolt directly to F22 chassis mounts. You will need to fabricate steel brackets to match the frame holes of the F22 and the mount pattern of the S55.

## B. Driveshaft and Transmission:

- F80 transmission output shaft and driveshaft are longer than F22's. Cut and balance a custom-length driveshaft. Use the M4 clutch and flywheel assembly for reliable performance.

## C. Cooling System Modifications:

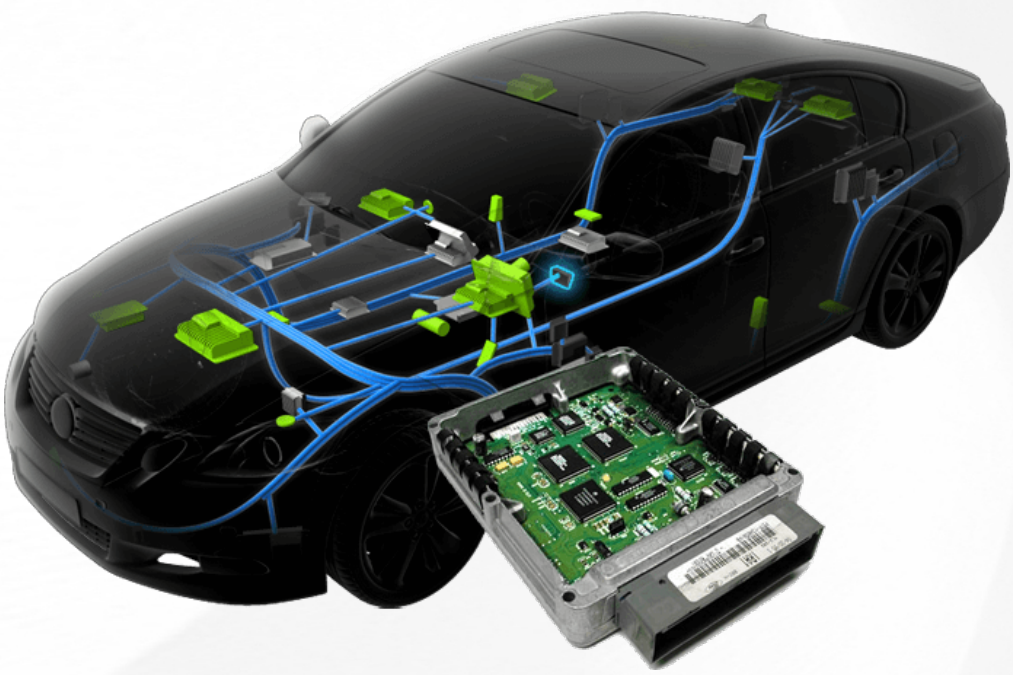
- Stock F22 radiator cannot manage S55 heat output. Upgrade to a CSF or aluminum radiator. Use S55's external oil cooler and plumb it to the factory location or custom mount.

## D. Fuel Delivery Upgrades:

- The original in-tank pump cannot support the S55. Use a high-flow pump from the 335i or choose an aftermarket option. Ensure line pressure matches the S55's demand. Which is over 200 bar in some cases.

## E. Electrical and ECU:

- Swap the S55 DME (engine ECU) with matching CAS (immobilizer) and key. You must reprogram the cluster to sync with the new DME using BMW ISTA or E-Sys.



## 6. Engine Installation Procedure

**Steps:**

- Lower the S55 into position using a hoist.
- Align custom mounts with chassis brackets and tighten all bolts to specification.
- Bolt transmission to engine using M4 bell housing bolts.
- Connect the custom driveshaft to the diffrential and transmission.
- Install radiator, intercooler, oil cooler, and all related hoses.
- Wire the engine harness to the new DME. Use donor harness for accurate pin-out.
- Fill coolant, engine oil and transmission fluid (BMW MTF-LT-5 or equivalent).
- Next, turbo piping and the intake should be installed.
- After connecting the battery make sure you have checked all the connections again.

## 7. Initial Start-Up & System Checks

- Before commencing any work, connect the vehicle to ISTA+ or INPA and do a complete scan.
- Using the software, manually prime the fuel pump.
- Turn key to ignition, for 30 seconds.
- If engine does not ignite on the first crank, check fuel and ignition signals again.
- Once it is running, monitor coolant temperature, oil pressure, and AFR.
- Check around oil lines, fuel fittings, and coolant hoses for leaks.
- Any DTCs that come in must be fixed before driving.

# 8. Performance Testing & Fine-Tuning

## Dyno Tuning:

- Baseline horsepower on S55 with stock map was 406 WHP. After tuning via Bootmod3, the setup reached 470 WHP with 489 lb-ft of torque.

## AFR Monitoring:

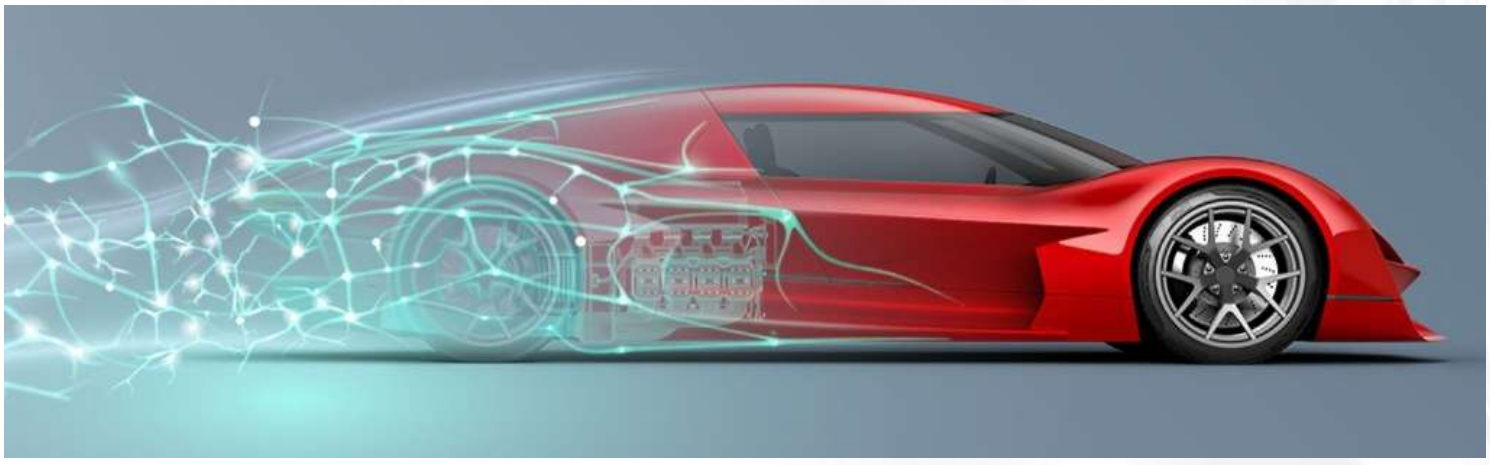
- Ideal target for air fuel ratio during wide open throttle(WOT) is 12.5:1. If higher, reduce boost or upgrade injectors.

## Daily Driving vs. Track Use:

- Tested over 1,500 miles. Daily driving is smooth with no abnormal behavior. Suspension tuning recommended due to front-heavy balance shift.

## Temperature Checks:

- Coolant temps remain stable under load. Oil temperatures controlled via larger cooler.



# 9. Maintenance after Swap

- Recheck all bolts after 500 miles.
- Change engine oil after 1,000 miles.
- Re-torque driveshaft flange bolts.
- Keep tuning software and DME backups ready in case of re-flashing needs.
- Keep an eye out for early wear in mounts, due to increase in the torque.

## 10. Cost Breakdown

- S55 engine + turbo: $7,200
- 6-speed manual transmission: $2,000
- Custom driveshaft & mounts: $1,100
- Labor (DIY hours): ~$0 (client-installed) or $2,500 (shop)
- Fluids and misc. parts: $700
- ECU coding and software: $1,000

**Total Estimate:** ~$14,000–$15,500 depending on self vs. shop install

## 11. Conclusion

Swapping the S55 into a 2016 BMW F22 isn't plug-and-play, but it's doable with correct planning. The performance gain is real and transforms the character of the car completely. The key is doing it right — parts, wiring, and tuning must be precise.

If you plan to upgrade your engine with confidence, start with trusted parts.

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# Manual for Engine swap Steps and Related Precautions

Refer this manual if there is any question related to the process of the engine swap or for any particular step

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