Quick and easy stirling engine Full Version

Quick And Easy Stirling Engine

Quick and Easy Stirling Engine: A Simple Guide to Understanding and Building Your Own

quick and easy stirling engine projects are becoming increasingly popular among

hobbyists, students, and eco-conscious individuals interested in renewable energy and mechanical innovation. The Stirling engine, a fascinating heat engine operating on temperature di?erences, o?ers a unique blend of simplicity and e?ciency that makes it an excellent educational tool and a practical device for small-scale power generation. If you?ve ever wondered how to build one yourself or simply want to understand the mechanics behind it, this guide will walk you through everything you need to know.

What Is a Stirling Engine?

At its core, a Stirling engine is an external combustion engine that converts heat energy into mechanical work. Unlike traditional internal combustion engines, it runs on an external heat source?this could be anything from a simple candle ?ame to solar energy. The engine operates by cyclic compression and expansion of air or other gases at di?erent temperature levels, creating a pressure di?erential that drives a piston or a rotor.

The Basic Principle Behind the Engine

The Stirling engine runs on a closed thermodynamic cycle involving a ?xed amount of gas. When one part of the engine is heated, the gas inside expands, pushing a piston and

generating motion. When this gas moves to the cooler side, it contracts, pulling the piston back. This continuous expansion and contraction, driven by heat exchange, keep the engine running.

Why Choose a Quick and Easy Stirling Engine Design?

For beginners and enthusiasts, building a quick and easy Stirling engine is an engaging way to explore principles of thermodynamics and mechanical design without needing complex tools or expensive materials. These simpli?ed models serve as great educational projects that demonstrate energy conversion and e?ciency in a hands-on manner.

Bene?ts of a Simple Stirling Engine Model

Accessibility: Uses readily available materials like soda cans, glass jars, or

1.

lightweight metal parts.

Educational Value: Perfect for science fairs, classroom demonstrations, and DIY

2.

learning.

Eco-friendly: Showcases renewable energy concepts by utilizing heat sources such

3.

as solar power or biomass.

Low Cost: Avoids expensive components, making it a?ordable for hobbyists.

4.

Building Your Own Quick and Easy Stirling Engine

Creating your own Stirling engine may seem daunting initially, but with the right guidance and materials, it can be a rewarding and straightforward project. Here?s a step-by-step overview of how to build a basic model.

Materials Needed

Two soda cans (or similar lightweight metal containers)

Rubber tubing or ?exible plastic tubing

A small piston or syringe to act as the displacer

A ?ywheel or small wheel to convert piston movement into rotation

Heat source, such as a candle, alcohol burner, or even sunlight concentrated with a magnifying glass

Adhesive such as epoxy or hot glue

Basic tools: scissors, pliers, screwdriver

Step-by-Step Assembly

Prepare the Cylinders: Cut the soda cans to create two chambers. One will serve

1.

as the hot cylinder, and the other as the cold cylinder.

Connect the Chambers: Use the rubber tubing to connect the two chambers,

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allowing the gas to move between them.

Install the Piston: Attach the piston inside the cold cylinder. This piston will move

3.

back and forth as the gas expands and contracts.

Add the Flywheel: Connect the piston to a ?ywheel. The ?ywheel helps maintain

4.

momentum and smooth out the engine's motion.

Apply Heat: Place a heat source under the hot cylinder. As the heat warms the

5.

gas, it expands and pushes the piston.

Test and Adjust: Fine-tune the connections and piston ?t to reduce friction and

6.

improve e?ciency.

Understanding the Performance of Your Stirling Engine

Once your quick and easy Stirling engine is up and running, it?s fascinating to observe

how subtle changes can a?ect its performance. Factors like temperature di?erence, piston

seal tightness, and ?ywheel mass all play crucial roles.

Maximizing E?ciency

Temperature Gradient: The larger the temperature di?erence between the hot

and cold sides, the more power the engine can generate. Try using ice or cold water

on the cold side to enhance this e?ect.

Reducing Friction: Ensure all moving parts are smooth and well-lubricated.

Friction can sap energy and slow down the engine.

Optimizing Flywheel: A heavier ?ywheel stores more kinetic energy, maintaining

smoother operation but may require more initial e?ort to start.

Common Challenges and Tips

Sealing Issues: Air leaks can signi?cantly reduce engine e?ciency. Use proper

adhesives and test for leaks regularly.

Piston Fit: The piston should move freely without too much play. A tight ?t causes

friction; too loose, and the engine loses pressure.

Heat Source Management: Monitor the heat source to avoid overheating or

damaging components.

Applications and Educational Value of Quick and Easy Stirling

Engines

Beyond just being a fun DIY project, quick and easy Stirling engines o?er valuable insights into sustainable energy solutions. They demonstrate how alternative heat sources?including solar, geothermal, and waste heat?can generate mechanical power.

Teaching Thermodynamics

Educators use Stirling engines to teach concepts such as heat transfer, thermodynamic cycles, and energy conversion. The visible movement and simplicity of the engine make

abstract concepts tangible and engaging.

Renewable Energy Demonstrations

Because Stirling engines can run on a variety of heat sources, they serve as excellent models for exploring renewable energy technologies. For instance, pairing a Stirling engine with a solar concentrator shows how sunlight can be converted into motion and electricity.

Exploring Advanced Variations

Once comfortable with the basics, enthusiasts often explore more sophisticated Stirling engine designs, such as:

Gamma-type engines: Featuring separate cylinders for displacer and power piston

for improved e?ciency.

Beta-type engines: With a single cylinder housing both pistons, o?ering a

compact design.

Free-piston Stirling engines: Using pistons that move freely without mechanical

linkage, often paired with linear generators for electricity production.

Each variation o?ers di?erent performance characteristics and learning opportunities.

Building and understanding a quick and easy Stirling engine opens the door to a fascinating world where heat meets mechanics. Whether you?re a curious learner, an educator, or a green energy enthusiast, creating your own Stirling engine model is a rewarding experience that combines science, creativity, and environmental awareness in

one exciting package.

Question

Answer

What is a quick and easy

Stirling engine?

A quick and easy Stirling engine is a simple model of a

Stirling engine designed for rapid assembly and

demonstration, often using basic materials to illustrate the

engine's working principles.

What materials are

commonly used to build a

quick and easy Stirling

engine?

Common materials include soda cans, paper clips,

balloons, straws, small motors, and simple metal or plastic

parts that are easy to source and assemble without

specialized tools.

How does a Stirling engine

work in simple terms?

A Stirling engine operates by cyclically heating and

cooling a gas inside the engine, causing it to expand and

contract, which moves pistons and generates mechanical motion.

Can a quick and easy Stirling engine generate useful power?

While quick and easy Stirling engines are primarily educational models, they can generate small amounts of mechanical power, enough to demonstrate the engine's principles but not for practical energy production.

What heat sources can be used for a quick and easy Stirling engine?

Common heat sources include a candle ?ame, a small alcohol burner, a heat lamp, or even warm water, as long as there is a su?cient temperature di?erence to drive the engine.

Are there any safety tips when building or operating a quick and easy Stirling engine?

Yes, always handle heat sources carefully to avoid burns,

work in a well-ventilated area, and ensure moving parts

are secure to prevent pinching or injury.

Where can I ?nd

instructions or kits for

building a quick and easy

Stirling engine?

Instructions and kits can be found online on educational

websites, science kit retailers, YouTube tutorials, and

maker community forums that provide step-by-step

guides and materials lists.

Quick and Easy Stirling Engine: An In-Depth Exploration of Simplicity and E?ciency

quick and easy stirling engine designs have garnered considerable attention from

hobbyists, educators, and renewable energy enthusiasts alike. The Stirling engine, an

external combustion engine known for its quiet operation and ability to run on various

heat sources, o?ers a unique blend of simplicity and e?ciency. This article delves into the

mechanics behind these engines, explores why quick and easy Stirling engines are

particularly appealing, and evaluates their practical applications in today?s eco-conscious

landscape.

Understanding the Stirling Engine: Basics and Bene?ts

At its core, a Stirling engine operates by cyclically compressing and expanding air or another gas at di?erent temperature levels, converting thermal energy into mechanical work. Unlike internal combustion engines, Stirling engines rely on an external heat source, which can range from solar energy to burning biomass or even waste heat recovery.

The appeal of a quick and easy Stirling engine lies in its straightforward construction and minimal moving parts. This simplicity translates to lower maintenance requirements and enhanced longevity compared to conventional engines. Additionally, the external combustion process results in cleaner operation, producing fewer pollutants.

Key Features of Quick and Easy Stirling Engines

External Heat Source Usage: The engine?s reliance on an external heat source allows it to run on diverse fuels and renewable energy, making it highly adaptable.

Quiet Operation: Due to the absence of internal explosions, these engines operate with minimal noise.

Low Maintenance: Fewer moving parts reduce wear and tear, simplifying upkeep.

Versatility: Suitable for educational kits, small power generation, and experimental setups.

Design Considerations for Quick and Easy Stirling Engines

When crafting a Stirling engine with a focus on quick assembly and ease of use, several design aspects come into play. These include material selection, component geometry, and heat management.

Material Selection and Construction

Materials must withstand temperature ?uctuations without signi?cant deformation. Aluminum and stainless steel are common choices due to their thermal conductivity and durability. For quick builds, lightweight and readily available materials such as acrylic sheets or even recycled metal parts are often employed.

Heat Source and Thermal E?ciency

The e?ciency of a Stirling engine depends heavily on the temperature di?erential between the hot and cold sides. Quick and easy Stirling engines typically utilize simple heat sources, such as a small alcohol burner or concentrated sunlight via a magnifying lens. While these sources are accessible, they may limit the engine?s overall e?ciency compared to industrial-grade heat exchangers.

Comparative Analysis: Quick and Easy Stirling Engine vs. Traditional Engines

In comparison to traditional internal combustion engines, quick and easy Stirling engines present distinct advantages and disadvantages.

Fuel Flexibility: Stirling engines can operate on a variety of heat sources,

1.

including renewable ones, whereas internal combustion engines rely on speci?c fuels like gasoline or diesel.

Noise Level: Stirling engines are notably quieter, an advantage in residential or

2.

educational environments.

Power-to-Weight Ratio: Traditional engines generally provide higher power

3.

density, making Stirling engines less suitable for high-power applications without

complex designs.

Maintenance: The simplicity of Stirling engines reduces maintenance needs,

4.

contrasting with the intricate mechanisms in internal combustion engines.

Applications Enabled by Quick and Easy Stirling Engines

The adaptability and simplicity of these engines open doors for a range of practical uses:

Educational Tools: Their transparent operation makes them ideal for

1.

demonstrating thermodynamic principles in classrooms.

Renewable Energy Projects: Small-scale power generation from solar or biomass

2.

sources.

Waste Heat Recovery: Utilizing industrial waste heat to improve overall energy

3.

e?ciency.

Remote Power Supply: Providing electricity in o?-grid or low-infrastructure areas.

4.

Challenges and Limitations of Quick and Easy Stirling Engines

Despite their advantages, these engines are not without drawbacks when built for quick and easy assembly.

E?ciency Constraints

While Stirling engines can theoretically achieve high e?ciency, simpli?ed models often sacri?ce performance for ease of construction. Quick and easy builds may su?er from poor sealing, suboptimal heat exchange surfaces, or inadequate temperature di?erentials.

Scaling Di?culties

Scaling a quick and easy Stirling engine design to produce signi?cant power is challenging. Larger engines require more precise engineering and materials, which complicates the assembly process and increases costs.

Cost vs. Performance Trade-o?s

Materials that facilitate rapid assembly may not o?er optimal thermal properties or durability. Conversely, high-performance components increase complexity and expense, undermining the ?quick and easy? premise.

Building a Quick and Easy Stirling Engine: Practical Tips

For those interested in constructing their own Stirling engine, focusing on simplicity without sacri?cing functionality is key.

Start Small: Use miniature kits or DIY tutorials that emphasize basic mechanics.

1.

Use Common Materials: Aluminum cans, glass jars, and metal rods are often

2.

su?cient.

Ensure Good Sealing: Preventing air leaks is crucial for operational e?ciency.

3.

Optimize the Heat Source: Consistent and controllable heat improves

4.

performance.

Experiment with Displacer and Power Pistons: Their dimensions and weights

5.

impact engine speed and torque.

Educational and Hobbyist Resources

Numerous online platforms provide detailed guides, video demonstrations, and community support, making the process accessible even to novices. Educational kits designed for quick assembly also serve as e?ective tools to understand thermodynamics and mechanical engineering.

As the world moves towards sustainable and alternative energy solutions, the quick and easy Stirling engine remains a compelling study in balancing simplicity with functionality. Its ability to harness various heat sources with minimal environmental impact ensures it

will continue to attract interest among innovators and educators seeking practical,

e?cient energy conversion technologies.

Stirling engine design, homemade Stirling engine, DIY Stirling engine, small Stirling

engine, Stirling engine plans, Stirling engine kit, Stirling engine model, e?cient Stirling

engine, Stirling engine construction, Stirling engine parts

BMW M42 ENGINE NUMBER LOCATION

BMW M42 engine number location is a common query among car enthusiasts, restorers, and mechanics working on classic BMW models. Knowing where to find the engine number on the BMW M42 is essential for tasks such as verifying authenticity, sourcing parts, registering the vehicle, or performing detailed maintenance. The M42 engine, produced in the late 1980s and early 1990s, is a 1.8-liter inline-4 engine renowned for its reliability and smooth performance. In this article, we will explore the exact location of the BMW M42 engine number, how to identify it, and tips for reading and recording this vital information.

Understanding the BMW M42 Engine

Before diving into the specifics of the engine number location, it?s helpful to understand what the BMW M42 engine is and its significance in BMW history.

Overview of the BMW M42

The BMW M42 was introduced in 1989 as a successor to the M40 engine. It featured double overhead camshafts (DOHC), electronic fuel injection, and an aluminum cylinder head, making it a modern and efficient engine for its time. It powered several BMW models, including the E30 316i and 318i.

Importance of the Engine Number

The engine number (also known as the engine serial number or engine ID) is a unique identifier stamped onto the engine block. It helps verify the engine's originality, production details, and authenticity, especially important for classic car collectors and restorers.

Locating the BMW M42 Engine Number

The engine number on the BMW M42 is typically stamped directly onto the engine block. Its precise location is crucial for accurate identification.

Primary Location of the Engine Number

The most common and accessible location to find the BMW M42 engine number is on the engine block, specifically:

- **On the timing cover side:** Usually on the front of the engine block, near the timing chain cover.
- **Near the cylinder head:** Sometimes stamped on the surface just below or adjacent to the intake manifold.
- **On the engine block surface:** Close to the oil filter housing or on the cylinder block's side.

How to Locate the Engine Number on Your BMW M42

Follow these step-by-step instructions:

- **Ensure safety:** Turn off the engine, remove the key, and allow the engine to cool to prevent burns or injuries.
- **Open the hood:** Access the top of the engine compartment for better visibility.
- **Locate the timing cover:** The timing chain cover is at the front of the engine, directly accessible when the hood is open.
- **Inspect the area:** Look for a stamped or engraved series of characters on the flat surface of the timing cover or nearby engine block area.
- **Clean the surface if necessary:** Use a clean cloth or brush to remove dirt or grease that may obscure the stamping.
- **Identify the engine number:** The engine number will typically be a sequence of letters and numbers, often starting with a letter indicating the model or engine type.

Additional Locations and Tips for Finding the Engine Number

While the primary location is on the timing cover, some models or manufacturing variations may have the engine number stamped elsewhere.

Other Possible Locations

Depending on the specific BMW M42 model and production year, the engine number may also be

found:

- On the side of the engine block near the oil filter housing
- On the rear of the engine block, accessible from underneath or through the wheel well
- Stamped onto the cylinder head or intake manifold area

Tips for Accurate Reading

To ensure you correctly identify the engine number:

- Use a flashlight if needed to illuminate darker areas.
- Clean the surface thoroughly to remove dirt, grime, or paint that may hide the stamping.
- Compare the stamped number with documentation or vehicle registration papers for verification.
- If the stampings are difficult to read, use a mirror or take a high-resolution photograph for better clarity.

Understanding the Engine Number Format

The BMW M42 engine number typically contains a sequence of characters providing information such as production date, factory, and serial sequence.

Common Format and Meaning

While formats can vary, a typical engine number might look like: *0 261 200 123* or similar, with specific segments indicating:

- Factory code
- Production year and month
- Serial sequence number

Knowing how to interpret the engine number can be useful when verifying engine originality or sourcing parts.

Why Knowing the BMW M42 Engine Number Matters

Understanding the location and significance of the engine number offers multiple benefits:

Verification of Authenticity

Ensuring that the engine matches the vehicle's documentation and original specifications.

Facilitating Repairs and Maintenance

Accurate identification helps sourcing the correct parts and understanding the engine's production details.

Resale and Valuation

A verifiable engine number adds credibility and value during resale.

Historical Records and Restoration

Maintaining accurate records for restoration projects or historical documentation.

Conclusion

The **BMW M42 engine number location** is primarily on the front of the engine block, near the timing chain cover. Properly locating and reading the engine number is essential for verifying engine authenticity, sourcing correct parts, and maintaining your vehicle's history. By following the step-by-step guide outlined above, you can confidently identify the engine number on your BMW M42 engine. Remember to always handle engine components carefully, ensure the engine is cool, and keep documentation handy for comparison. Whether you're restoring a classic BMW or performing routine maintenance, knowing where to find your engine?s unique identifier is a fundamental step toward proper vehicle care and preservation.

BMW M42 Engine Number Location: A Comprehensive Guide

The BMW M42 engine holds a special place in automotive history as one of the company's notable four-cylinder powerplants introduced in the late 1980s. Renowned for its reliability, performance, and engineering sophistication, the M42 has become a popular choice among enthusiasts and restorers. For those working on vintage BMW models, whether for maintenance, restoration, or resale purposes, locating the engine number accurately is crucial. This article provides an in-depth overview of the BMW M42 engine number location, offering practical insights for mechanics, hobbyists, and collectors alike.

Understanding the BMW M42 Engine

Before diving into the specifics of the engine number location, it's essential to grasp the context of the BMW M42 engine itself.

What is the BMW M42?

The BMW M42 is a four-cylinder inline engine produced from 1989 to 1996. It was designed as a successor to the BMW M40 engine and was used primarily in the E30 3 Series models, including the 318i and 318is. The M42 is notable for its dual overhead camshaft (DOHC) configuration, electronic fuel injection, and lightweight construction, making it a favorite among enthusiasts looking for a balance of performance and efficiency.

Key Specifications:

- Displacement: 1.8 liters (1796 cc)
- Power Output: Approximately 138 horsepower
- Configuration: Inline 4-cylinder
- Fuel System: Bosch LE-Jetronic fuel injection
- Bore x Stroke: 84 mm x 81 mm

Significance of the Engine Number

The engine number serves as a unique identifier for each engine produced. It is vital for several reasons:

- Verification of authenticity: Ensures the engine is genuine and matches the vehicle's documentation.
- Maintenance and repair: Facilitates ordering the correct parts specific to that engine.
- Resale and valuation: Helps establish the engine's originality and history.
- Theft prevention: Assists authorities in tracking stolen engines.

Knowing the precise location of the engine number is fundamental for accurate identification.

BMW M42 Engine Number Location: The Key Areas

The engine number on the BMW M42 is typically stamped or engraved in specific locations. Depending on the vehicle's age, manufacturing plant, and model year, the exact position may vary slightly. However, the most common and reliable locations are detailed below.

Primary Location: The Timing Cover Area

The most accessible and consistent location for the M42 engine number is on the timing cover, also known as the front engine block.

Details:

- Position: On the front of the engine block, just above the crank pulley and below the cylinder head.
- Appearance: The number is usually stamped or engraved directly into the metal surface, often on a flat section of the timing cover.
- Procedure to access: It may require removing a plastic cover or components such as the fan or belts for clear visibility.

Visual Indicators:

- The engine number is often a combination of letters and digits, such as "M42 1234567."
- It is stamped deeply enough to withstand cleaning and engine wear processes.

Secondary Location: The Engine Block Side

In some models or production years, the engine number can also be found on the left side of the engine block, near the timing chain cover.

Details:

- Position: Visible when looking directly at the side of the engine, typically on the engine block's flat surface.
- Appearance: Engraved or stamped into the metal surface, sometimes covered with a thin layer of paint or grime.
- Access: Might require removing or cleaning surrounding components for a clear view.

Note: This location is less common but is still worth checking, especially in older or earlier production models.

How to Locate the M42 Engine Number: Step-by-Step Guide

For enthusiasts and mechanics, here is a practical step-by-step process to locate the engine number on an M42 engine:

- Ensure Safety and Access

- Turn off the engine and allow it to cool.
- Disconnect the battery if necessary.
- Remove the hood for unobstructed access to the engine bay.

- Identify the Timing Cover

- Locate the front of the engine, where the timing chain and belt are housed.
- The timing cover is usually a plastic or metal cover just above the crank pulley.

- Clear the Area

- Remove any plastic covers, belts, or accessories blocking the view.
- Use a clean cloth or brush to remove dirt, grease, or debris around the area.

- Locate the Stamp or Engraving

- Look for a series of characters stamped into the metal surface.
- The number is often located on a flat, visible section of the timing cover.

- Record the Number

- Use a camera or note down the number for future reference.
- Confirm that the number matches the vehicle?s documentation.

Additional Tips for Accurate Identification

- Clean the Surface: If the engine number is obscured by dirt or grime, gently clean the area with a degreaser or brake cleaner.
- Use Proper Lighting: A flashlight can help illuminate the stamping area for easier reading.
- Consult the Owner?s Manual: Some manuals provide specific guidance on engine number locations.
- Seek Professional Help: If unsure or unable to locate the number, a qualified mechanic or BMW

specialist can assist.

Common Challenges and Solutions

Challenge 1: Obscured or Faded Number

- Solution: Carefully clean the area, avoiding damage to the stamping.

Challenge 2: Damaged or Illegible Stampings

- Solution: Consult a professional for possible re-stamping or verification through other VIN data.

Challenge 3: Variations in Location

- Solution: Cross-reference with the vehicle?s production year and model to narrow down the search area.

Importance of the Engine Number for Collectors and Restorers

For enthusiasts restoring classic BMWs, the engine number is not just a technical detail but a vital part of the vehicle's history. Authenticity can significantly influence a car?s value, especially if the engine matches the original specifications.

- Matching Numbers: Ensures the engine is original to the vehicle.
- Registration and Documentation: Necessary for legal registration or verification.
- Historical Research: Helps trace the engine?s manufacturing details and service history.

Final Thoughts

Locating the BMW M42 engine number is a straightforward but essential task for anyone involved with these classic engines. Primarily situated on the front timing cover, the engine number provides critical identification data that can aid in maintenance, restoration, and verification processes. By following the outlined steps and tips, enthusiasts and mechanics can confidently find and record the engine number, ensuring their BMW M42 remains a well-documented and cherished part of automotive history.

Whether you're restoring a vintage BMW, verifying an engine?s authenticity, or preparing for

maintenance, knowing the precise location of the M42 engine number is an invaluable piece of knowledge that supports all your automotive endeavors.

QuestionAnswer Where is the engine number located on a BMW M42 engine? The engine number on a BMW M42 is typically located on the engine block, near the timing cover or on the cylinder head, often stamped into the metal surface. How can I identify the engine number on my BMW M42? You can identify the engine number by inspecting the side of the engine block, usually on the cylinder head or the timing cover area, where it is stamped or engraved. Is the BMW M42 engine number the same as the VIN? No, the engine number is different from the VIN. The engine number is specific to the engine itself and is used for identification and registration purposes. Can I find the BMW M42 engine number in the vehicle's registration documents? Typically, the vehicle registration documents list the VIN rather than the engine number. To find the engine number, you need to inspect the engine physically. What tools do I need to locate the BMW M42 engine number? You may need a flashlight and a mirror to see into tight spots, along with a clean cloth to wipe away dirt for a clear view of the stamped engine number. Why is it important to know the location of the BMW M42 engine number? Knowing the engine number is important for identification, maintenance, verifying authenticity, and when ordering parts or registering the vehicle. Are there any visual differences in the engine number location between different BMW M42 models? While the general location remains consistent, minor differences may exist depending on the model year or specific vehicle setup, so consulting a repair manual can help. How do I verify that the engine number on my BMW M42 is genuine? Compare the stamped engine number with official records or documentation from BMW. Also, ensure the stamping appears authentic and not tampered with. Can I find the BMW M42 engine number online or through a database? Some BMW enthusiast forums or official BMW databases may help you verify engine numbers, but physical inspection of the engine is the most reliable method.

Related keywords: BMW M42 engine number, M42 engine identification, BMW engine number location, M42 engine code, BMW engine serial number, M42 engine specs, BMW engine stamping, M42 engine markings, BMW engine identification guide, M42 engine details

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