SOFTWARE & TECH

Tillotson Carb Diagram

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Understanding the Tillotson Carb Diagram: A Comprehensive Guide for Small Engine Enthusiasts

For anyone who works with small engines, chainsaws, go-karts, or outdoor power equipment, the name "Tillotson" is synonymous with reliable diaphragm carburetors. These carburetors have powered everything from vintage motorcycles to modern two-stroke engines for decades. Yet, for the uninitiated, a Tillotson carb diagram can appear as a bewildering maze of passages, jets, and diaphragms. This guide will walk you through every component of the Tillotson carb diagram, explain how the system works, and show you how to use the diagram to diagnose problems and tune your engine for peak performance. Whether you are rebuilding your first carburetor or simply trying to understand why your engine will not hold an idle, mastering the Tillotson carb diagram is an essential skill.

What Is a Tillotson Carburetor?

Tillotson is a brand of diaphragm carburetors most commonly found on chainsaws, leaf blowers, string trimmers, go-karts, and small engines from the 1950s through the 1990s. Unlike float-style carburetors that rely on a bowl of fuel and a floating valve, Tillotson carburetors use flexible diaphragms and spring-loaded valves to regulate fuel flow. This design allows them to operate in any orientation, making them ideal for handheld equipment that is tilted and rotated during use. The Tillotson carb diagram is the key to understanding this intricate device, as it maps out the fuel path, air passages, and adjustment points that make the carburetor function correctly.

Because these carburetors are now vintage, many need rebuilding with fresh gaskets and diaphragms. Without a clear Tillotson carb diagram, reassembly can lead to misaligned check valves, incorrect gasket placement, and an engine that simply will not run. The diagram is not just a reference; it is an indispensable tool for any successful rebuild.

The Core Components of a Tillotson Carb Diagram

Before diving into the diagram itself, it is helpful to understand the main functional sections of a Tillotson carburetor. Most models share the same fundamental layout, though specific jet sizes and passage locations vary between the HL, HD, HU, and other series. A standard Tillotson carb diagram will include the following major areas.

Fuel Inlet and Filter Screen

Fuel enters the carburetor through the inlet fitting, which is connected to the fuel line from the tank. Inside the inlet bore, a fine mesh screen filters out debris. On the typical Tillotson carb diagram, you will see this screen located just inside the inlet port. If the screen becomes clogged, the engine will run lean or starve for fuel. Many rebuilds fail because the original screen is not cleaned or replaced, so this small component deserves close

attention when studying the diagram.

The Metering Diaphragm and Metering Lever

Perhaps the most critical section of any Tillotson carb diagram is the metering chamber. This is governed by the metering diaphragm, which works in concert with the metering lever and inlet needle. The metering diaphragm is a flexible rubber disc that moves in response to engine vacuum. When the engine is running, vacuum pulls the diaphragm downward, which in turn pulls the metering lever down, opening the inlet needle and allowing fuel to enter the metering chamber. When the chamber fills, the diaphragm relaxes and the lever closes the needle. This simple yet elegant system maintains a constant fuel level inside the carburetor. In the diagram, the metering diaphragm is typically shown on the bottom section of the carburetor, with the lever arm positioned directly above it.

The metering lever height is critical. If the lever is set too high, the inlet needle will not seat properly, causing flooding. If it is set too low, the carburetor will not deliver enough fuel, causing a lean condition. Most Tillotson carb diagram specifications call for the lever to be flush with the gasket surface or slightly below it, measured with a straight edge. Getting this wrong is one of the most common mistakes during a rebuild, and the diagram is your guide to getting it right.

The Pump Diaphragm and Check Valves

Tillotson carburetors are also equipped with a fuel pump section, which uses a pump diaphragm and a set of one-way check valves (usually small flaps or umbrella valves) to draw fuel from the tank and push it toward the metering chamber. The pump diaphragm is driven by pressure pulses from the engine crankcase, which create a pumping action. On the Tillotson carb diagram, the pump side is typically on the opposite side of the carburetor from the metering diaphragm. It is easy to install the pump diaphragm upside down or to misalign the check valves, which will completely stop fuel delivery. The diagram clearly shows which side of the diaphragm faces the carburetor body and how the valves must be oriented.

The High-Speed and Low-Speed Adjustment Needles

Most Tillotson carburetors feature adjustable high-speed and low-speed needle valves. These are shown on the diagram as tapered screws that regulate fuel flow through the corresponding circuits. The low-speed needle adjusts the fuel mixture at idle and just off-idle, while the high-speed needle controls the mixture at wide-open throttle. The diagram will indicate the location of these needles on the carburetor body, as well as the internal passages that connect them to the venturi and throttle plate area. Understanding this part of the diagram is essential for tuning the engine after a rebuild.

How to Read a Tillotson Carb Diagram Effectively

When you first look at a Tillotson carb diagram, it is easy to be overwhelmed by the number of lines and labels. However, you can break it down into a logical sequence. Begin by identifying the fuel inlet and trace the path of the fuel as it enters the carburetor. Follow it through the filter screen, into the pump chamber, through the check valves, and then into the metering chamber. From the metering chamber, the diagram will show the fuel traveling to the main nozzle and the idle circuit. By following the fuel path step by step, you can identify where restrictions or blockages are likely to occur.

Pay special attention to the orientation of gaskets and diaphragms in the diagram. Tillotson carburetors use very specific gasket layouts that, if reversed, will block critical passages. For example, a gasket that has a small hole on one side and a slot on the other must be oriented exactly as shown. Many technicians mark the gaskets with a permanent marker during disassembly to ensure they go back the same way, using the diagram as a final confirmation.

Common Numbering Systems and Model Variations

Tillotson carb diagrams are typically model-specific. An HL model diagram will look different from an HD or HU model, even though the operating principles are the same. The diagram will often include a parts list with reference numbers corresponding to each component. When ordering replacement parts, always cross-reference the Tillotson carb diagram and the model number stamped on the carburetor body. Do not assume that a diaphragm from one model will work on another, as the shape, hole pattern, and thickness can vary. Using the correct diagram ensures you purchase the right rebuild kit and install every part correctly.

Using the Tillotson Carb Diagram for Troubleshooting

When your engine will not start, runs poorly, or floods, the Tillotson carb diagram becomes a diagnostic tool. By understanding which components affect which symptoms, you can narrow down the issue quickly.

Engine Will Not Start

If the engine gets spark and compression but will not fire, the problem is often fuel delivery. Using the diagram, check the fuel inlet screen for debris. Then inspect the pump diaphragm for cracks or stiffness. The diagram shows how the pump diaphragm must be flexible enough to pulse with the engine. A hardened diaphragm will not pump fuel. Also, verify that the check valves in the pump section are sealing. The diagram will indicate their location on the carburetor body. With a small amount of carburetor cleaner, you can spray into the passages to confirm they are open.

Engine Runs but Will Not Idle

A common complaint with Tillotson carburetors is that the engine runs only at high speed but dies when the throttle is released. This typically points to an issue in the low-speed circuit. Refer to the Tillotson carb diagram to locate the low-speed needle, the idle port, and the transition ports near the throttle plate. A clogged idle passage is often the culprit. The diagram helps you identify small drilling holes that must be cleaned with a fine wire or carburetor cleaner. Additionally, check the metering lever height, as a lever that is set too low will starve the engine of fuel at idle.

Engine Floods or Runs Rich

Excessive fuel consumption, black smoke, or wet spark plugs indicate a rich condition. Using the diagram, inspect the metering lever height. If the lever is set too high, the inlet needle remains open, causing fuel to overflow the metering chamber. Also, check the inlet needle and seat for wear. The diagram shows how these components fit together, and a worn needle will not seal even with the correct lever height. Another possibility is a ruptured metering diaphragm, which allows fuel to be pulled directly into the engine. The diagram will show the correct orientation and condition of the diaphragm for your inspection.

Rebuilding a Tillotson Carburetor with the Diagram

A complete rebuild is often the best approach for a carburetor that has been sitting for years. The Tillotson carb diagram is your step-by-step guide for disassembly and reassembly. Before you start, take a photo of the carburetor from each side. Then, disassemble the carburetor in a clean workspace, laying out parts in the order they are removed. When you remove the diaphragms, note their orientation relative to the gaskets and the carburetor body. Compare what you see with the Tillotson carb diagram to confirm you have the correct layout.

Clean the carburetor body thoroughly using a quality carburetor cleaner and compressed air. Be sure to blow out every passage shown on the diagram. Do not use wire or drill bits on jets unless you have the exact size, as you can damage the calibration. Once clean, install the new parts from the rebuild kit, following the diagram for gasket order. Always torque screws to the manufacturer's specification, if available, or tighten gently to avoid stripping the soft aluminum threads.

Setting the Metering Lever Correctly

This step is the most critical and the most common source of error during a rebuild. The Tillotson carb diagram typically includes a specification for metering lever height. For most models, the lever should be flush with the gasket surface of the carburetor body, or slightly below (usually 0.015 to 0.020 inches below). Place a straight edge across the gasket surface and check that the lever just touches it. If adjustment is needed, bend the lever gently using a small screwdriver or pliers. Recheck after each adjustment until it matches the diagram specification.

Installing Diaphragms and Gaskets

The Tillotson carb diagram will show the exact order of the gasket and diaphragm for both the metering and pump sides. In most cases, the gasket goes against the carburetor body, with the diaphragm on the outside, followed by the cover. However, some models use a different stacking order, so always verify with the specific diagram for your carburetor. Installing the diaphragm backwards will seal off the fuel passages and prevent the carburetor from functioning. This is a simple mistake that the diagram can help you avoid.

Adjusting and Tuning After Reassembly

Once the carburetor is rebuilt and installed, you will need to tune the mixture using the adjustment needles. The Tillotson carb diagram provides the starting point: typically, turn both needles in gently until they seat, then back them out one turn for low-speed and one turn for high-speed. This baseline setting allows the engine to start. From there, fine-tune by warming the engine to operating temperature, then adjusting the low-speed needle for the fastest idle, followed by the high-speed needle for maximum power under load. The diagram will show you where each needle is located and which direction leans or enriches the mixture.

Conclusion

The Tillotson carb diagram is far more than a simple illustration; it is a roadmap to understanding one of the most reliable yet misunderstood carburetors in small engine history. By learning to read and interpret the diagram, you can confidently troubleshoot fuel delivery problems, execute a successful rebuild, and tune your engine for optimal performance. Whether you are restoring a vintage chainsaw, building a go-kart, or maintaining classic outdoor equipment, taking the time to study the Tillotson carb diagram will save you hours of frustration and ensure your engine runs as smoothly

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