A Schrader valve and valve core.

Valve Cores in Aviation Applications

Correct use and installation

CAROL CARPENTER & BRIAN CARPENTER

WHAT PART ON YOUR aircraft hasn't changed its design in more than 100 years? The answer: the Schrader valve. Whether your tires have tubes or are tubeless there's a tire valve on every wheel, a design patented in 1898.

Valve cores are on many different components of your aircraft; the most common places are on the tires and tubes and shock struts. However, the valve cores are used in many other aviation and industrial applications, such as hydraulic systems, pneumatic systems, air conditioning systems, and fuel systems. If you look, you'll even see them on the top of your fire extinguisher. These valve cores are often referred to as Schrader valves, named after its inventor, George Schrader. Schrader International is the manufacturer that sells most of the valve cores used today.

This valve consists of an externally threaded hollow cylindrical metal tube. In the center is a metal pin running along the axis of the outer cylinder attaching to the cup seal on the pressure end of the valve. This valve is nothing more than another version of a check valve. The body of the valve core is normally brass, stainless steel, or nickel-plated steel. Many different types of valve cores are used throughout the industry, and we often find them, intended for other applications, installed in aircraft struts or even aircraft tires.

AIRCRAFT USE

A common error is often made when a valve core intended for a tire is used on a landing gear strut. Even on small aircraft, the pressures that exist inside of a landing gear strut, especially on landing, are quite high compared to that of a typical tire. The typical Schrader valve found in aviation tire applications is usually part number 6035, which has a standard operating pressure from 0 to 400 psi and normal operating pressures of usually more than 70 psi. However, the typical Schrader valve for an aviation shock strut or hydraulic

PHOTOGRAPHY BY **BRADY LANE**

VALVE CORE INSTALLATION TIPS

The specific torque called out for the installation of a valve core is between 2 to 5 inch-pounds. As you can see, it doesn't take much to torque. Make sure that you don't strip out the threads while installing a new valve core, and don't overtighten the valve stem core when installing the new one. When the top portion of the Schrader breaks off in the service port, the section that's left behind resembles a hollow barrel. It is difficult to remove because there is nothing to grab ahold of. Rather than scrap the part, a T15 Torx driver can be used to extract the barrel. With a light tap, the teeth on the driver bite in to grip the soft brass of the broken Schrader valve.

And finally, any time that a valve core is removed from the valve body, it is standard practice to install a new valve core and discard the old one. This is also consistent with the manufacturer's recommendations.

accumulator should be Schrader part number 2300TV. This valve has an operating pressure from 0 to 2000 psi.

If you're unfamiliar with these types of valve cores, there are a couple of items that can help you identify proper application. On high-pressure valve cores it is common to see the letter H stamped on the stem, into the head of the valve pin. This is not easy to see with the naked eye but is revealed with a magnifying glass. In addition, the plug-sealing material is made from a black molded nitrile rubber and the plunger-sealing material is typically a black nitrite material. On the other hand, a valve core used in an aviation tire application typically has a white silicone plunger-sealing material around the outside with a natural Teflon plug-sealing material.

Many homebuilt, light-sport, and ultralight aircraft use valve cores made for general purpose and commercial applications. These valve cores can have a white silicone or a black nitrite plunger-sealing material with a red or green Teflon plug-sealing material. These are adequate for many of these applications; however, they are designed for operating pressures from 0 up to 200 psi.

One of the most common reasons for a valve core to start leaking is due to contamination entering into the valve stem. This is the primary reason for using a valve cap on your tires and on the top of the Schrader valve located on your landing gear strut. Even a minute amount of dirt can get underneath the sealing surfaces of the valve, causing a leak. In the case of a tire or strut, it may take several days, or as little as a few minutes, to leak down.

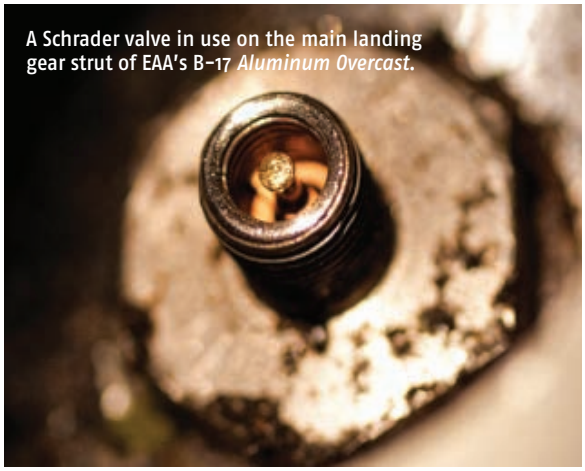
It is important to recognize that both the plug-sealing material and the plunger-sealing material are made of components such as Teflon, silicone, nitrite rubber, and nitrile rubber. All of these materials are life-limited and will deteriorate with age, heat, and exposure to oxygen (this is one of the reasons that we use nitrogen to service tires

and struts). If you find that you are having a slow leak on a landing gear strut, one of the easiest troubleshooting tools you have is to simply replace the valve core and see what kind of results you get. If you keep your landing gear valve stems on your tubes covered with a valve cap, it is likely that your valve core will outlast the rubber on the tube. However, on tubeless tires we often see the valve core remaining with the rim for thousands of hours, and in this case, eventually you will see deterioration of the valve core.

Generally, all Schrader valves used on tires have threads and bodies of a single standard size at the exterior end, so caps and tools generally are universal for the valves on all common applications. Removing, installing, or replacing a valve core is inexpensive and easy to do. You will just need the replacement valve core and a valve core tool. These are readily available from any auto parts store. EAA

Carol and Brian Carpenter, owners of Rainbow Aviation Services, teach Light Sport Repairman maintenance and Inspection Courses. Brian, EAA 299858, is an A&P with an inspection authroization rating, and DAR. Carol, EAA 678959, is a sport pilot instructor and an FAA Safety Team representative. For more information on their repairman courses, visit *www.RainbowAviation.com*.

Without August Schrader and his son, George, there wouldn't have been an easy way to put air into your tires and keep it there. The Schrader valve has been an American standard for more than 100 years and quickly became a world standard as well. George Schrader is credited with the pioneering effort and experimental work that resulted in patents issued for the current housing design with its removable and interchangeable core and cap.



A Schrader valve in use on the main landing gear strut of EAA's B-17 *Aluminum Overcast*.

PHOTOGRAPHY BY **BRADY LANE**