Steel Hoses For Your Engine

by BARRY SCHIFF / AOPA 110803

■■ Modern man has been made aware of the need to keep fit. Millions of people spend a part of each day jogging or involving themselves in some sport to keep their blood vessels in good condition.

Aircraft engines also have circulatory systems that require attention. These usually consist of the rubber hoses that provide for the life-supporting flow of fuel and oil. Unfortunately, these hoses often do not receive adequate attention. They are allowed to stiffen and become brittle, a "hardening of the arteries" that can lead to eventual rupture. Or their cores may deteriorate, a condition that can restrict the flow of vital fluid to the engine the way arteriosclerosis impedes the flow of blood to the heart.

The enemy of every circulatory system, be it physiological or mechanical, is old age, or time. In the case of rubber hoses, many experts acknowledge that these should not be installed after the rubber has aged three years beyond its cure date and, once installed, should be replaced after three years of service. (The Department of Defense insists that the rubber or teflon hoses of all military aircraft be replaced according to this schedule.)

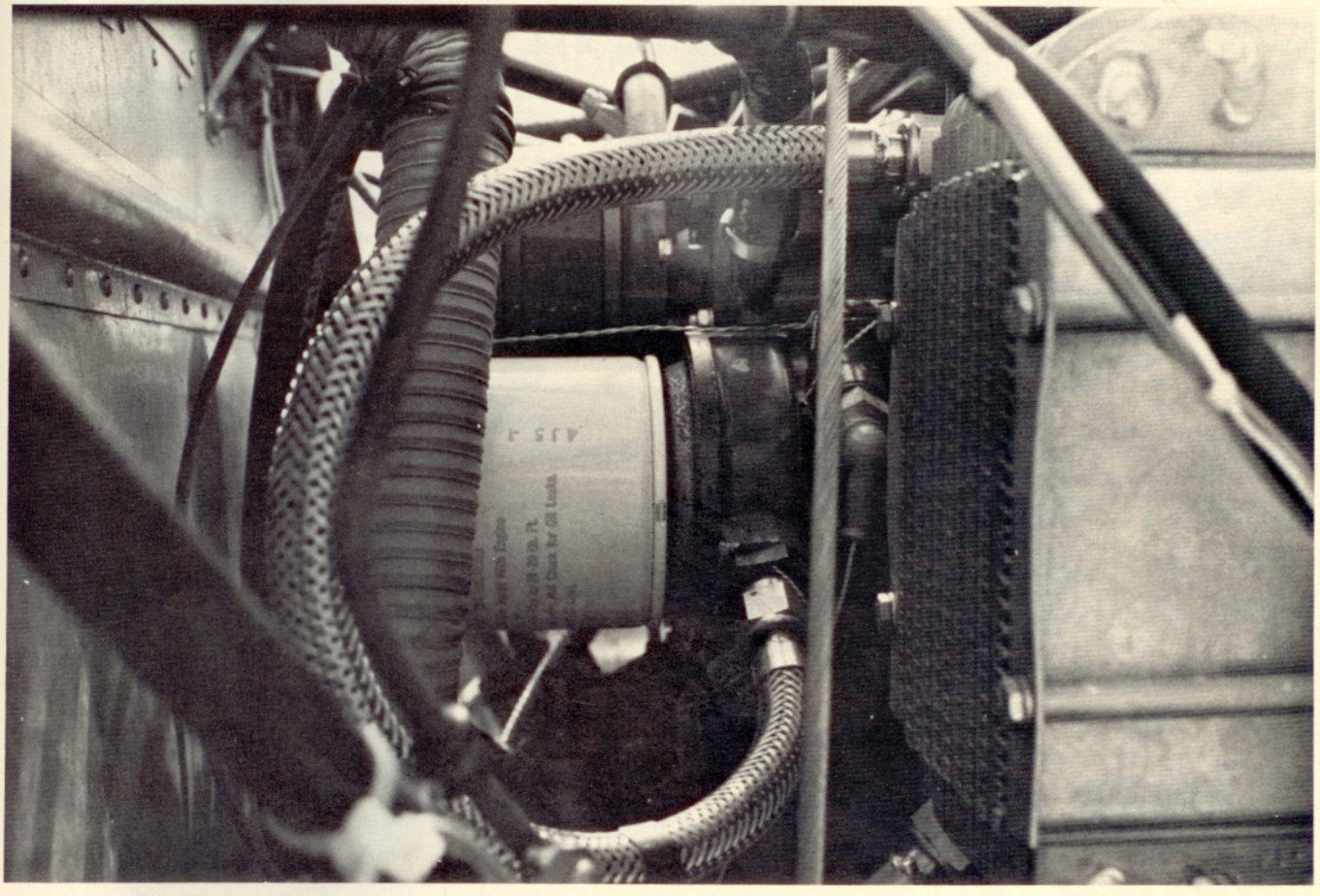
Beyond three years, the corrosive and deteriorating effects of heat, pressure, and air pollution can lead to hose failure and possible engine failure or fire. Anyone who has had a broken automotive radiator hose should be more than familiar with these corrosive effects.

During a random inspection of powerplant hoses on 17 aircraft based at Santa Monica, Calif., it was found that all but three were being flown with rubber oil and fuel lines that were supplied originally with the aircraft. (These aircraft ranged from 6 to 16 years of age.) Based on this survey and the opinions of experts in this field, it might be concluded that a large percentage of general aviation aircraft could have ailing "circulatory systems." (Hose failures, by the way, are responsible for a considerable number of accidents and forced landings.)

The precise cure date of any rubber hose is easy to determine. All aircraft certificated since 1961 are required to be equipped with TSO'd fuel and oil lines. And each of these lines must be tagged individually with the cure date of the material from which they were manufactured. It would be worthwhile to check the ages of these critical arteries during a forthcoming preflight inspection. And while you're at it, check the hydraulic lines, too.

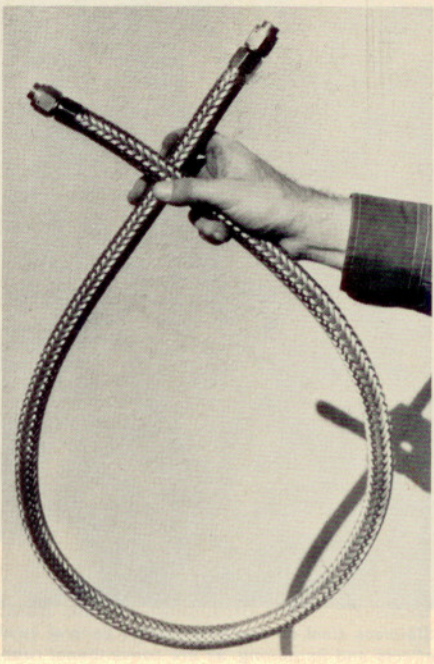
If you opt to retain a hose more than

Flexible, all-metal oil and fuel lines offer fewer problems, longer life



Stainless steel oil line hose on this general aviation airplane is not subject to corrosive effects and hardening, as are conventional rubber and teflon hoses.

three years old, then at least hand test it for resiliency and visible cracking. One positive resiliency test is to remove the hose and place it on the ground. If the hose retains a permanent set and does not return to its original straight configuration, the hose is considered unserviceable. If the



Rubber hoses (above) get brittle with age and deteriorate internally, requiring periodic replacement, but flexible 100% stainless steel hoses (below) will not stiffen—and can last for the life of the airplane.

hose appears stiff, consider replacing it. But even if the hose seems sufficiently flexible, this is not a guarantee that the line may not be corroding internally.

When a rubber hose is replaced, be certain that the new line is an STC'd or TSO'd part manufactured to replace the defective line. It is a habit of many A&P mechanics to cut a length of hose from a roll of material, add a fitting to each end, and install it on the engine. This is *illegal* for aircraft certificated since 1961 because A&Ps do not have the authority to "manufacture" TSO'd parts.

The new oil or fuel line must be properly tagged with both rubber cure date and hose/connector assembly date by a manufacturing agency authorized to do so. Otherwise, there is no guarantee that the line meets required specifications or that it has been pressure tested. Nor can the cure date of the hose be determined. Some rubber hoses have been lying about for so many years that the product is "defective" before it is installed (even though it may *appear* otherwise).

One way to permanently prevent arteriosclerosis of the engine would be to install a set of flexible, stainless steel hoses such as those manufactured by Aircraft Metal Products of Venice, Calif. This is the only firm that produces oil and fuel lines made from 100% stainless steel for general aviation; they contain no inner cores of rubber or teflon. As a result, the company guarantees its hoses for the life of the aircraft. Although these lines are more expensive initially than conventional rubber hoses, their long life can make them less expensive in the long run.

Peter Friedman, company president, received his education and expertise in this highly specialized field as a manufacturer and supplier of stainless steel fuel and oil lines for various military aircraft.

When he discovered that the majority of general aviation aircraft engines—including the one in his own Piper Cherokee—were fitted with either fabric-covered rubber hoses or teflon hoses protected by a braided, stainless-steel mesh, Friedman embarked on a crusade to offer an alternative to conventional fuel and oil lines in general aviation aircraft. His products are described technically as stainless-steel, flexible (they can be tied in a knot), corrugated hoses protected by an armor of stainless steel wire braid. To these are welded stainless steel fittings which have a much higher melting point than standard aluminum fittings (2,500°F vs. 1,800°F). Each hose is hydrostatically tested in excess of 4,000 psi (and none have ever failed).

Rubber hoses usually are wrapped in asbestos to protect them from fire. But this, according to Friedman, is another disadvantage of rubber hoses. The asbestos acts as an insulator and keeps the oil hot while flowing through the line. Stainless steel, on the other hand, is a good conductor and allows heat to dissipate which, he claims, can reduce oil temperature by 20°F or more.

Similarily, when replacing rubber or teflon fuel hoses, stainless steel lines can help reduce fuel temperature and eliminate vapor lock and hot-start problems associated with fuel-injected engines.

Friedman's hoses are more flexible and weigh less than rubber hoses and they're FAA approved as the only such product for replacement use in modern (post-1961 certification) general aviation aircraft. □