RETHINKING YOUR CHECK VALVE And BOOM STRAINER

BY DAVID EBY

Some believe that the agricultural aviation industry will self-destruct within the next few years due to the perceived irresponsibility toward people, personal property, and the environment. In at least one state there has already been a citizen's movement to eliminate aerial applications simply because the people are weary of being exposed to drift, their personal property contaminated from leaking check valves, and the apparent lack of concern by aerial applicators. If this is true then one of agriculture's most efficient methods of application that was invented in this century will be lost. However, there can be another scenario. Through education, striving toward impeccable personal integrity, along with new products, aerial application could once again be the application method of choice. Thus, the goal of this article is to increase the aerial applicator's knowledge of two extremely important new products.

It has happened to every applicator. One of your best customers asks you to help him out in an emergency and spray a very toxic herbicide. Reluctantly, the plane is loaded hoping the ideal weather conditions will prevail. Arriving at the field you notice a neighbor's adjacent crop that is extremely susceptible to injury from the pesticide that is to be sprayed, and you were not informed of its proximity. Checking the wind it luckily appears calm but you have to pull up over the neighbor's field. Ten minutes later with the application almost completed, you methodically check the left wing while exiting over the neighbor's field and observe in *horror* as a check valve is streaming pesticide. Questions immediately go through your mind; how long was it leaking? Did it leak enough to do any damage? What is this one going to cost? Will you lose your license or your best customer?

The check valves currently used on most agricultural aircraft are technically called hydraulic diaphragm check valves. Designed at least 40 years ago, they were later adapted to agricultural uses. The parts of a check valve the operator needs to be familiar with are the valve seat, the diaphragm, and the cap (Please refer to figure. 1). As the spray valve is opened the pesticide solution pressurizes the outer ring causing the spring in the cap to compress; usually occurring at 15 psi., allowing the pesticide solution to flow through the valve seat and out the spray tip.

So what causes the check valve to leak? It is really quite simple. As every operator knows, when a check valve is leaking and he removes the cap, there is a particle of debris caught between the valve seat and diaphragm. By removing the particles the check valve quits leaking. Therefore, to work properly *any diaphragm check valve must have a clean sealing surface between the valve seat and the diaphragm in order not to leak.*

Some applicators have discovered this and have been screening spray solutions as they are being pumped into the aircraft. Experience has shown this helps to alleviate the problem, but it is not the complete solution. There is still debris that appears after straining due to hose deterioration, particles that escape past the loading screen, or pesticide reactions. For a complete solution to leaking and dripping check valves a final screen needs to be located just prior to the diaphragm area. (See figure 2.)

The answer is the AFS check valve, which was designed specifically for agricultural aircraft. Benefits include a large 20 mesh self-cleaning conical screen just prior to the diaphragm, ability to handle high and low volumes, optional on-off valve, aerodynamic shape, with the spray tip placed 4 inches below the spray boom right where it should be--*all* in one product! With this final screen being 20 mesh, its holes are twice as large as the boom strainer screen allowing for almost no maintenance all season; yet, it is small enough to keep the check valve from leaking.

It would be self-defeating to introduce a screen in the check valve just to create another problem of possibly plugging the check valve screens. So, to complete this system, consider the boom strainer. The most common strainers on agricultural aircraft are either Transland or Agrinautics and until recently, were manufactured mostly in cast aluminum. Upon close inspection the most common problems associated with the strainers are gaps between the screen and strainer body because the screen length was incorrect (even on new assemblies), and using wire mesh screens that distort and create gaps which allow unfiltered spray solutions into the spray boom. In addition casting part lines remained on the strainer body not allowing the front of the screen to seal positively against the strainer body.