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# THE GAMGRAM

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No. 1

PRESSURE DROP

JAN. 1975

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*This was the very first GamGram that we published for the aviation fuel handling industry. Since that time, almost 36 years ago, the vast majority of filter separators have direct reading differential pressure gauges, and the then popular (miserable) little 3-way valve that is described in this GamGram has finally disappeared from 99% of the installations.*

*We are under some pressure to simply stop printing this first GamGram, but we decided to continue to tell the ancient story because it teaches a lesson, a lesson that you must really know how every piece of your equipment works.*

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One of our good customers in a power generation station phoned us frantically with a report that his coalescer elements had burst, his separator elements had collapsed, and his final filter on a jet engine driving a generator had been plugged with dirt. The obvious first question, “How much pressure drop did you have across the filter separator?” Answer, “Well you know we never have been able to read anything much on the pressure gauge. Those filter elements of yours just seem to come apart in our fuel.”

This kind of report always makes a filter man get very, very cagy because he knows absolutely that there has to be a pressure drop across any filter or it isn't going to do any filtering. The way the Good Lord put our world together, if a fluid moves through a pipe, the pressure gets lower and lower as you get farther from the pump. There is a pressure loss across every valve, every meter, every foot of pipe and especially across a filter. The only difference in the filter is that its pressure loss gets greater and greater as the elements collect more dirt — because some of the passageways get clogged.

Several years ago, we wrote a paper that presented data from a field survey we made that showed 70% of all filter separator pressure readings at airports were made incorrectly. Today that figure is probably a bit lower but we do not think that our current estimate of 50% is very encouraging — it's just terrible!

When that man told me on the phone that his pressure gauge never seemed to tell him anything, I was 90% sure that he suffered from a miserable little valve that some of the filter separator manufacturers love to install. This is a 3 port brass plug valve under the pressure gauge with a copper tube running to the inlet side of the filter and another to the outlet side. All you need to do to read pressure drop is to turn the valve handle to 2 different positions so that the gauge will read the inlet pressure and then the outlet pressure. The difference is the pressure drop. Simple? Unfortunately, NO!

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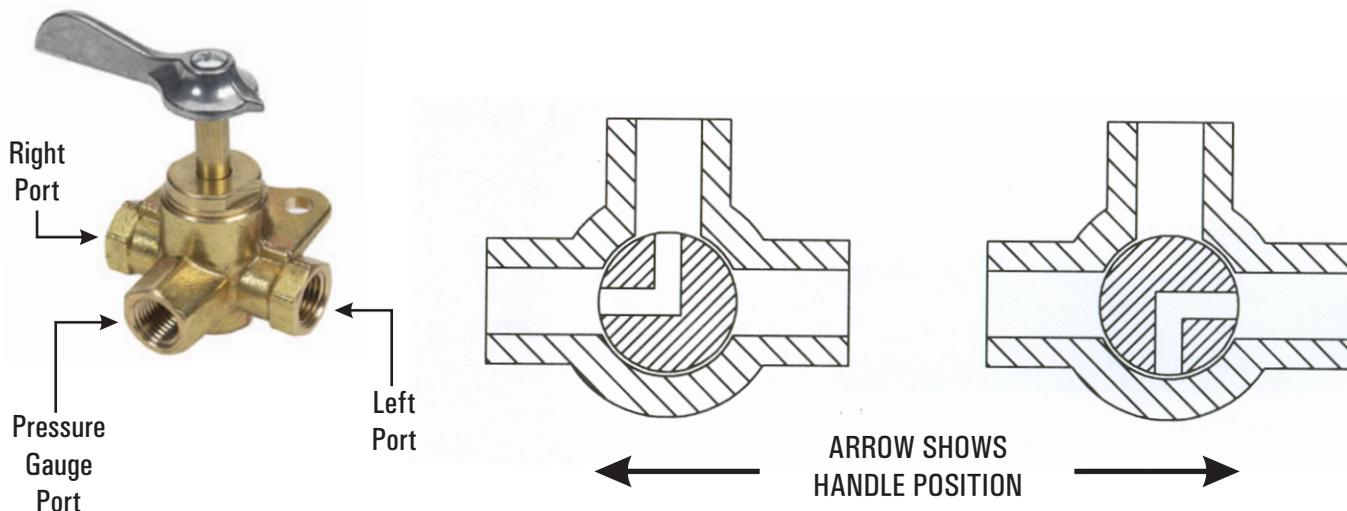
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I asked the customer how he read pressure drop and he confirmed that he had a 3-way valve. (Now I was 95% sure I knew the problem.) I then asked how he turned the valve handle. “You think I’m stupid or something,” he exploded. “All I did was turn the handle to point to the left side and then to the right side. Mostly I get the same reading.” Now I was 100% sure. He had never read pressure drop! The actual pressure drop had become so great that the coalescers could not hold together, so they burst.

Hundreds of you who have read this bulletin to this point already know the answer. Hundreds of you have the same valve problem and don’t know it. The photograph shows the valve we are discussing and the diagrams explain what happens. Normally, you would point the handle to the left side and get a reading on the gauge because the plug with its “L” shaped porting directs pressure from the left port to the gauge. If you now turn the handle to point to the right, the “L” turns upside down and no port is connected to the gauge. The pressure from the first reading remains trapped in the gauge and no pressure drop is observed.



Many of you will now conclude that all you have to do is remember to point the handle to the gauge when you want to read the right hand port. **WRONG!** You can only do this if you are absolutely sure that someone hasn’t had the handle off of the valve – you can put it on in any of 4 positions, believe it or not. Truthfully, do you know how your handles are installed? Oh, you say that all you do is keep turning the valve until you find the highest and the lowest readings? A lot of people use this primitive method but they forget to tell the night man. The new man or the relief man – and on top of that, he can’t subtract in his head!

The only perfect solution to this situation is to use a direct reading differential pressure gauge. No valves to turn; no shaky pointers and no need for snubbers; no subtraction. [See our Bulletin 25.](#)