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NASA TECH BRIEF

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Sequential-Strip and Sequential-Disk Filters

The problem:

Current liquid and gas filters have limited life because of their finite contaminant capacities. As the filter unit reaches its maximum capacity, the pressure drop across it increases exponentially. At this point, a valve is actuated to bypass the filter, or the downstream pressure capability is severely limited. This condition is corrected by shutting the system down to clean the filter element or by replacing the element. Because of the wide variations in system fluid cleanliness, the operational time span of a filter can never be predicted. The end of the useful filter service normally is indicated by a popup differential pressure switch or by a differential pressure gauge, both of which require frequent monitoring that is difficult in remote inaccessible installations.

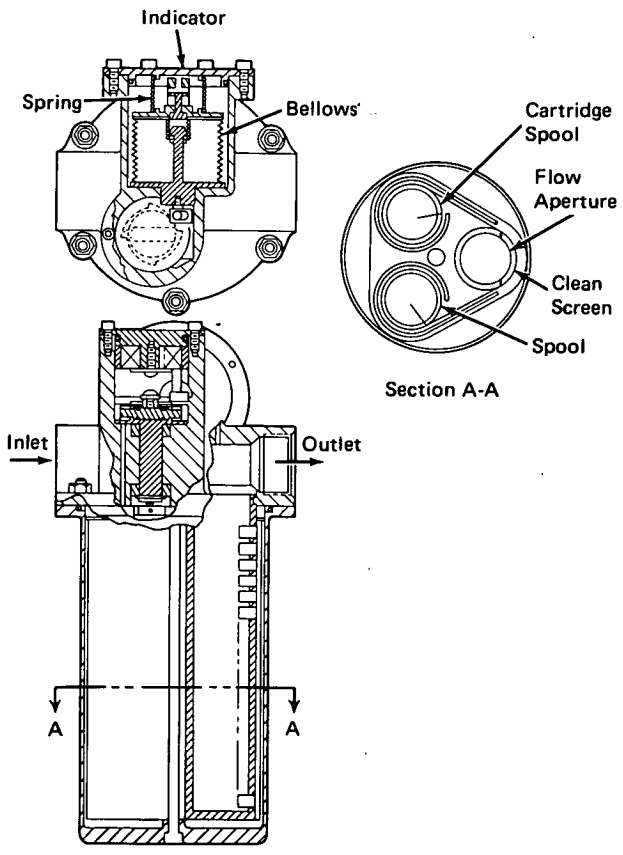

Figure 1. Sequential-Strip Filter

The solution:

Sequential-strip and sequential-disk filters do not require frequent monitoring.

How it's done:

The sequential-strip filter (see Figure 1) senses increasing pressure drop and uses this to compress a bellows. The compression of the bellows stores energy in a spring until a predetermined pressure-drop level is reached. At this point, the bellows and spring are released. The relaxation of the spring is used to move a clean area of screen into position across the fluid stream. In section A-A of Figure 1, the clean screen is shown in position across the flow aperture. The dirty screen is taken up on a windup spool, and the clean screen is stored on a cartridge spool. The number of screen frames used is shown on a mechanical indicator. This indication can be converted readily to an electrical signal, capable of remote readout.

The sequential-disk filter (see Figure 2) consists of a series of screen disks stacked on top of each other, with suitable seals between their mating surfaces. Each disk has a built-in spring-assisted burst diaphragm. Fluid flows into the filter at the top and from inside to outside on the first screen disk. As contamination builds up on the first disk, the pressure drop across the disk increases until the failure point of the burst diaphragm is reached. Failure of the diaphragm allows system fluid

(continued overleaf)

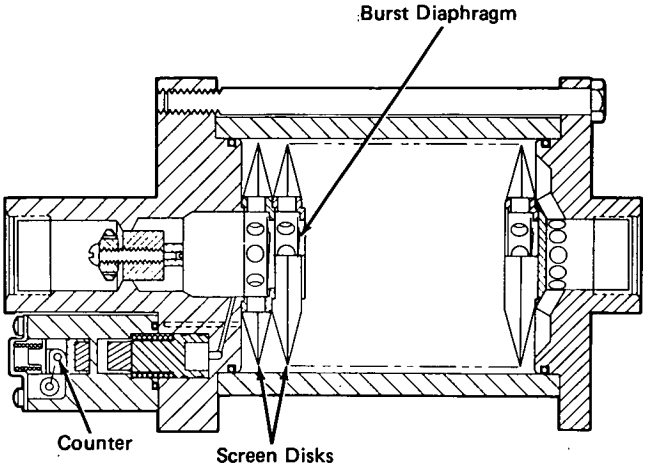

Figure 2. Sequential-Disk Filter

to flow into the second screen disk, and the process repeats itself. A piston-operated mechanical counter displays the number of the disk in use. This indication can also be converted to an electrical-signal remote readout.

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Technology Utilization Officer
Johnson Space Center
Code AM
Houston, Texas 77058

Source: J. P. Winzen of
Brunswick Corp.
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