

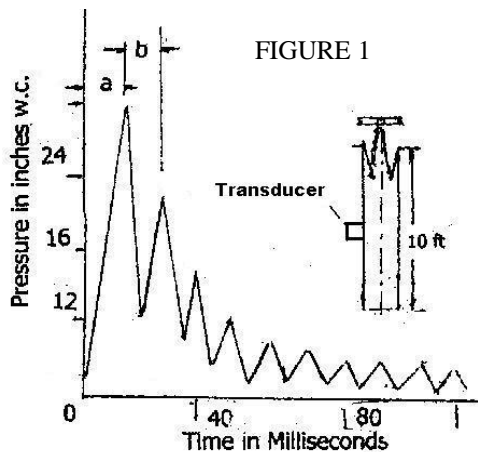
## Auto Booster - Duct Cleaner

### Pulse Jet Dust Collector Technology Applied to Simple Duct Cleaning Mechanism

The pulse jet collector uses a compressed air powered jet to draw air from a zero velocity source in the clean air plenum and accelerates this air to velocities of 12,000 to 15,000 feet per minute. This process cleans the bags individually

This pulse jet technology has been applied to accelerate the velocity in a ventilating duct to 8,000-10,000 feet per minute. This propels the dust accumulated in the duct toward the dust collector. Like in a pulse jet cleaning system, the velocity is increased for fractions of a second. Like the pulse jet cleaning system the impulse flow travels in the pipe or duct system at the speed of sound. With QAM's exclusive supersonic nozzles, the impulse is increased to twice the speed of sound. With a 0.10-0.15 second pulse, 250 feet of duct work can be cleaned.

First, we will describe jet action in a pulse jet dust collector. Referring to figure1, the collector has a bag 10 feet long and the cleaning pulse is 0.25 seconds. A pressure time plot taken from a transducer installed on the surface of a filter bag gives us a profile of the energy in the pulse.

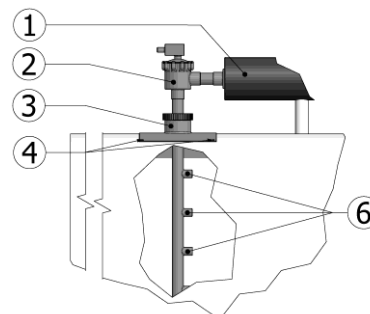


The pressure reaches a peak at "a" and the time from the beginning of the pulse is 10 feet divided by the speed of sound. The speed of sound is approximately 1000 ft/sec. This time to reach the peak is 0.010 seconds. The cleaning column of air in the jet breaks up and the jet reforms until it reaches another lower peak at "b". The distance from "a" to "b" is again 0.10 seconds. This action continues until the pulse is stopped.

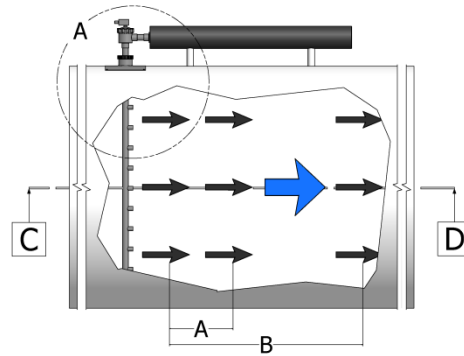
If the cylinder did not have a bottom the pulse would continue at the speed of sound until the compressed air pulse is stopped. The compressed air operated duct cleaner generates the pulse using the same design verified by over 300,000 dust collector installations world wide.

Below we have an outline of the booster-duct cleaner installed in a duct that is carrying dust from a hood to a dust collector.

Booster - Duct Cleaner	
1	header (for some models)
2	solenoid diaphragm valve
3	duct mounting plate
4	Self tapping screws
5	duct section
6	(optional) supersonic nozzles



## THE ACTION OF THE AUTO BOOSTER IS ILLUSTRATED BELOW:



**FIGURE 2**

Before the duct cleaner is actuated, the conditions in the duct and pressure conditions in the compressed air supply can be typical as listed below:

- Duct gas velocity 1000 to 3600 fpm
- Because this duct velocity may be intermittently or continually lower than the needed dust carrying velocities, the dust will drop out in the horizontal runs of ductwork.
- This dust accumulation adds weight to the hangers which support the duct and could cause serious structural failures. Combustible material can accumulate in the duct which poses a fire hazard. Some fire regulations for certain dusts (ex. NAFA 351) prohibit any dust accumulations in ductwork.

**Referring to figure 2 above, the action of the pneumatically operated duct cleaner will be illustrated.**

The duct booster will increase the air speed in the duct by 3000-5000 feet per minute (depending on the design parameters), similar to a fast acting booster fan with no internal moving parts. "C" is the entrance from the dust generating source. "D" is the exit of the duct to the dust collector. Let us assume we have a pulse duration of 0.250 seconds. This will pick up the dust lying on the bottom and push it along for 0.25 seconds. At 8600 FPM (143 FPS) the dust will move a distance marked "B" in figure 2. It can be calculated as  $143 \times 0.25 \text{ seconds} = 36 \text{ feet}$ . In subsequent pulses the dust will move along the duct up to a length calculated by the speed of sound multiplied by the pulse width. In this case the duct can be cleaned as shown by the calculation;  $0.25 \text{ seconds} \times 1000 \text{ ft per second} \times 0.5$  (accounting for inertia effects) = 125 feet. The air jets will also remove electrostatic charges on the duct surfaces which are a source of ignition. Because this is a closed system, noise is muffled.

### **Control of the duct cleaner**

If we use the output from one of the positions pulse sequencer, controlling the cleaning cycle of the bag cleaning system, the length of pulse would be typically 0.10 to 0.15 seconds. Which means a duct up to 100 to 150 feet long for a single duct cleaner could be used.

The duct cleaner can also be actuated by a manual push button. In this instance, there is a possibility the valve opening would deplete the pressure in the accumulator header and the pressure could not close the valve. To overcome this, a pressure switch is mounted on the accumulator header that disconnects the solenoid when the pressure in the valve manifold / accumulator drops to a pre-set level. When the pressure recovers the duct cleaner will resume operating.

When averaged over a day's operation, the cleaner need not be actuated except once in every one to four hours, and, the air consumption is negligible.

**Please call us immediately for this inexpensive valuable protection. Installation can be made by your maintenance crew during routine servicing of your dust collecting systems. Call your representative now and have a safe efficient system.**