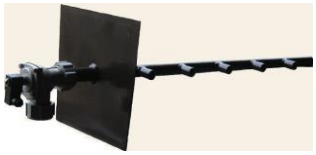
Auto-Booster / Duct Cleaner in 64 inch Duct



Booster Hardware

Auto Booster Duct Cleaner

The Low Cost, Ridiculously Simple Solution, Prevents Dust Drop Out in Ducts Due to Low Air Flow Conditions

Advanced Pulse Jet Technology Applied to Flow Enhancement

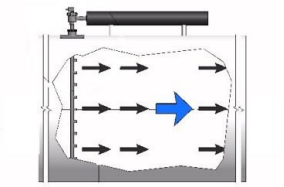
Available in All Duct Sizes

Unique Features

- **To clean dust dropout** in ductwork, preventing structural damage from the added weight.
- **Boost low flow conditions** in ducts which causes dust dropout. Note flow velocity is much lower at the walls than in the center of the duct.
- **Reduce risk of fire and explosions** which occurs when the dust deposited in the duct is between the upper and lower explosive limits and a spark/ember ignites the dust. Check out the Quencher spark arrestor at www.qamanage.com.
- **Prevent blockages** in pneumatic conveying systems.

Clean out dust accumulations in spark arrestors and other devices in airstreams

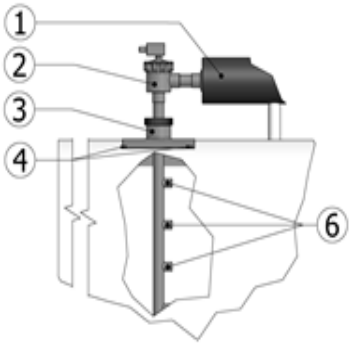
- ✓ Momentum pulsed duct cleaner, using advanced pulse jet technology
- ✓ Simple mechanism boosts air flow by 2-4 times
- ✓ Simply insert in the duct section
- ✓ Cleans 25 to 50 feet of duct, for very long duct runs multiple BOOSTERS are indicated.



BOOSTER cleans spark arrestor cell

Construction

The duct booster is a pneumatically propelled, jet generating system using the same jet pump design and components as are found in advanced technology pulse jet dust collectors. It is like having a booster fan in the duct system, with no moving parts.
It will increase air speed in ducts by 3000-5000 feet per minute for short bursts of time. This will pick up the dust lying on the bottom of the duct and push it along to the dust collector. The air jets also remove electrostatic charges on the duct surfaces which are a source of ignition.



BOOSTER - DUCT CLEANER	
ITEM	PART
1	**Header (for some models)**
2	Solenoid Diaphragm Valve
3	4 inch Insert with Duct Mounting Plate
4	Self Tapping Screws
5	Duct
6	Converging Diverging Nozzles **(Optional)**

When averaged over a day's operation the BOOSTER need not be actuated except once in every one to four hours, and therefore air consumption is negligible. The BOOSTER is usually powered by shop air at 85 PSI.
Optional supersonic nozzles can be added to the blow pipes for more efficient pressure-to-velocity conversion.
The BOOSTER can be actuated by a manual push button or using the output from one of the positions on a pulse sequencer controlling the cleaning cycle of a dust collector.
It can also be designed for various low air pressures from 7-20 PSI, thereby allowing operation where shop air is not readily available.

Manufactured by; QAM, 11312 US 15-501 North, Suite 107-182, Chapel Hill, NC, 27517
Phone 1-800-267-5585 toll-free; WWW.QAMANAGE.COM

Engineering Bulletin

Auto Booster – Duct Cleaner

QUALITY AIR MANAGEMENT
(800) 267-5585
www.qamanage.com

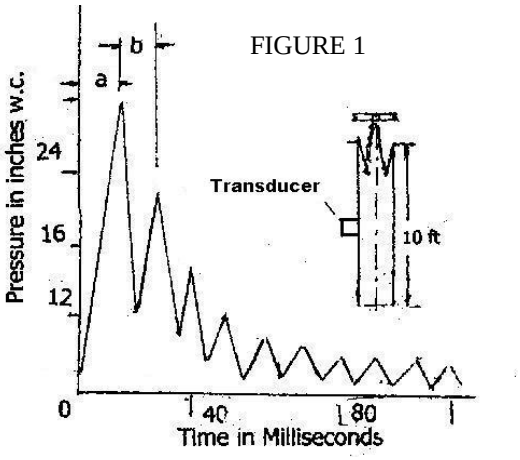
Pulse Jet Dust Collector Technology Applied to Simple Duct Cleaning Mechanism

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.

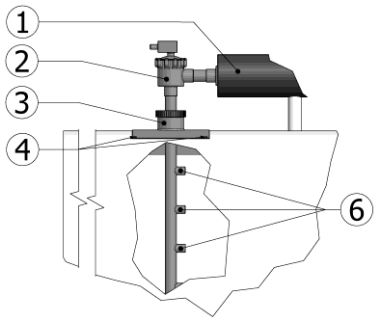
FIGURE 1



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

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:

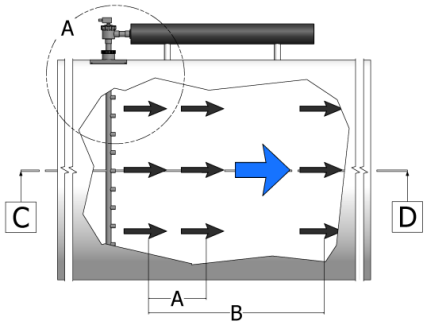


FIGURE 2

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 x 0.25 seconds = 36 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 seconds x 1000 ft per second x 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 to150 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.

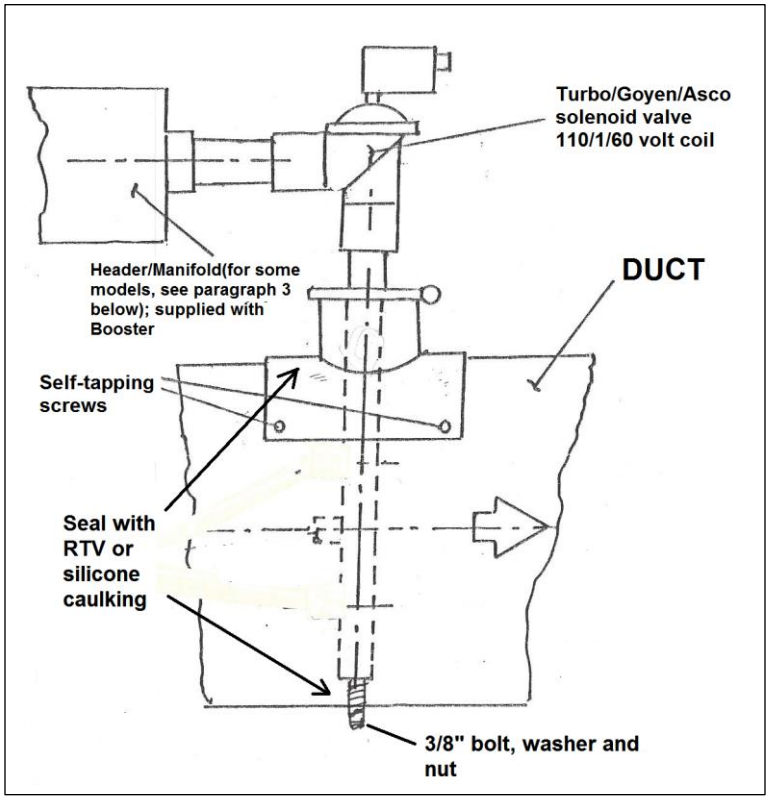
Engineering Bulletin

SET-UP; AUTO BOOSTER

QUALITY AIR MANAGEMENT
(800) 267-5585
www.qamanage.com

1. The nomenclature to identify your model is DB*(duct booster)*-10*(model #)*-xxx*(duct OD in inches)*. Example; DB-10-006 means Duct Booster, model 10, for 6 inch OD duct.

2. Drill two diagonally opposite holes in the duct, to insert the booster pipe (as per the table below) and bolt (7/16" hole). A solenoid valve will be mounted on the assembly. The assembly will be mounted on the existing duct with self tapping screws provided by the purchaser. The sketch, below, illustrates the installation. A schedule 40 pipe at least 10 ft long, provided with some models as part of the kit, is connected to the solenoid valve and a compressed air supply line. The unit is directional so the orifices must be pointed in direction of flow. The valve is normally operated by 110 volt single phase power, other voltages available upon request.



Model	Hole Size (for pulse pipe at the top)
DB-08 (4-8" duct), DB-12 (9-12" duct)	1 1/8 inch
DB-18 (13-18" duct)	1 3/8 inch
DB-24 (19-24" duct), DB-30 (25-30" duct)	2 inch
DB-40 (31-40" duct)	2 inch, 2 sets of holes, 90^{o} from each other & one set 3 inches down the duct from the first set of holes
DB-50 (41-50" duct), DB-60 (51-60" duct)	2 1/2 inch, 2 sets of holes 90^{o} from each other & one set 3 inches down the duct from the first set of holes

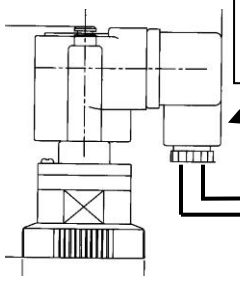
3. Connect a compressed air line (**85 PSI pressure**) to the diaphragm valve or manifold connection**.**

Model	**Connection Size** (NPT Coupling, female supplied)	**Air Consumption** (SCF/Pulse)
DB-08, DB-12	3/4 inch directly to the valve, no manifold	0.185 - 0.735
DB-18	1 inch directly to the valve, no manifold	1.152 - 2.592
DB-24, DB-30	1 1/2 inch directly to the valve, no manifold	4.155
DB-40	1 1/2 inch on end of the manifold/header	6.637
DB-50 to DB-60	1 1/2 inch on end of the manifold/header	10.365 - 11.355

QAM reserves the right to make improvements and /or changes without notice.

4. Two electrical activation methods are recommended, timer or automatic sequencing.

Activation by localized timer: Activate the cell cleaner by connecting a power source to the timer on the solenoid of the diaphragm valve**.**



SOLENOID ON VALVE(S)

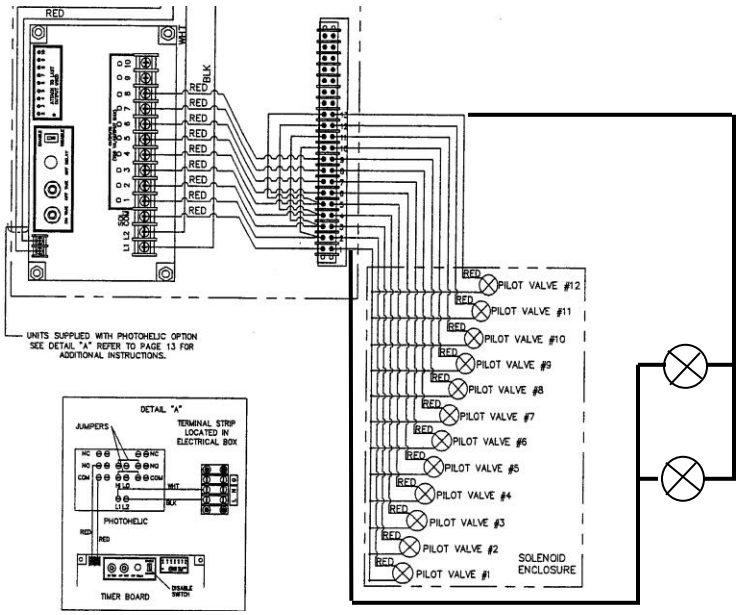
Electronic Timer on the solenoid; Set ON time to 120-150 milliseconds and the OFF time to pulse every 5 minutes or so. See instructions included with this manual.
The timer module can be ordered from QAM, ask for part # CONTEMP/{specify the voltage of the power source}

To Power source
Voltage: 230-110 - 24 VAC / 50-60Hz
24VDC
(110 / 60hz VAC is supplied by default)

For two valve models, wire both in parallel so both valves fire simultaneously.

Activation by pulse sequencer at the dust collector: Activate the cleaner by using one of the existing dust collector sequencer outputs. Ensure that the "ON-TIME" setting is **maximum 150 milliseconds or the valve may not shut.**

Typical Pulse-Jet Sequencer



Connect to controller board output. If using a separate output, ensure that the output port is activated on the board.
Voltage: 230-110 - 24 VAC / 50-60Hz
24VDC
(110 / 60hz VAC is supplied by default)

1 booster valve

2 booster valve, where applicable