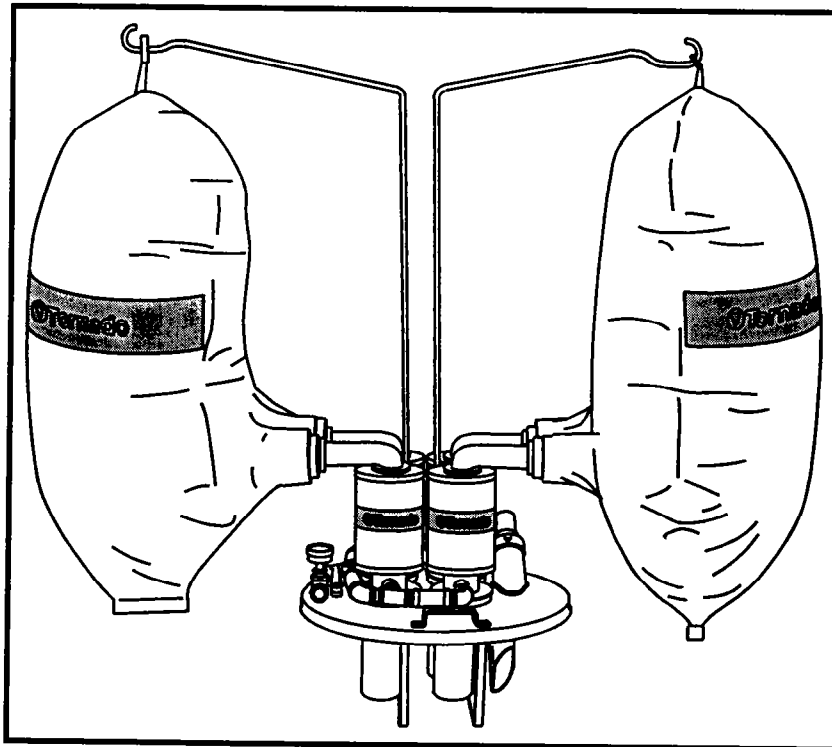


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## Operation & Maintenance Manual

For Commercial Use Only

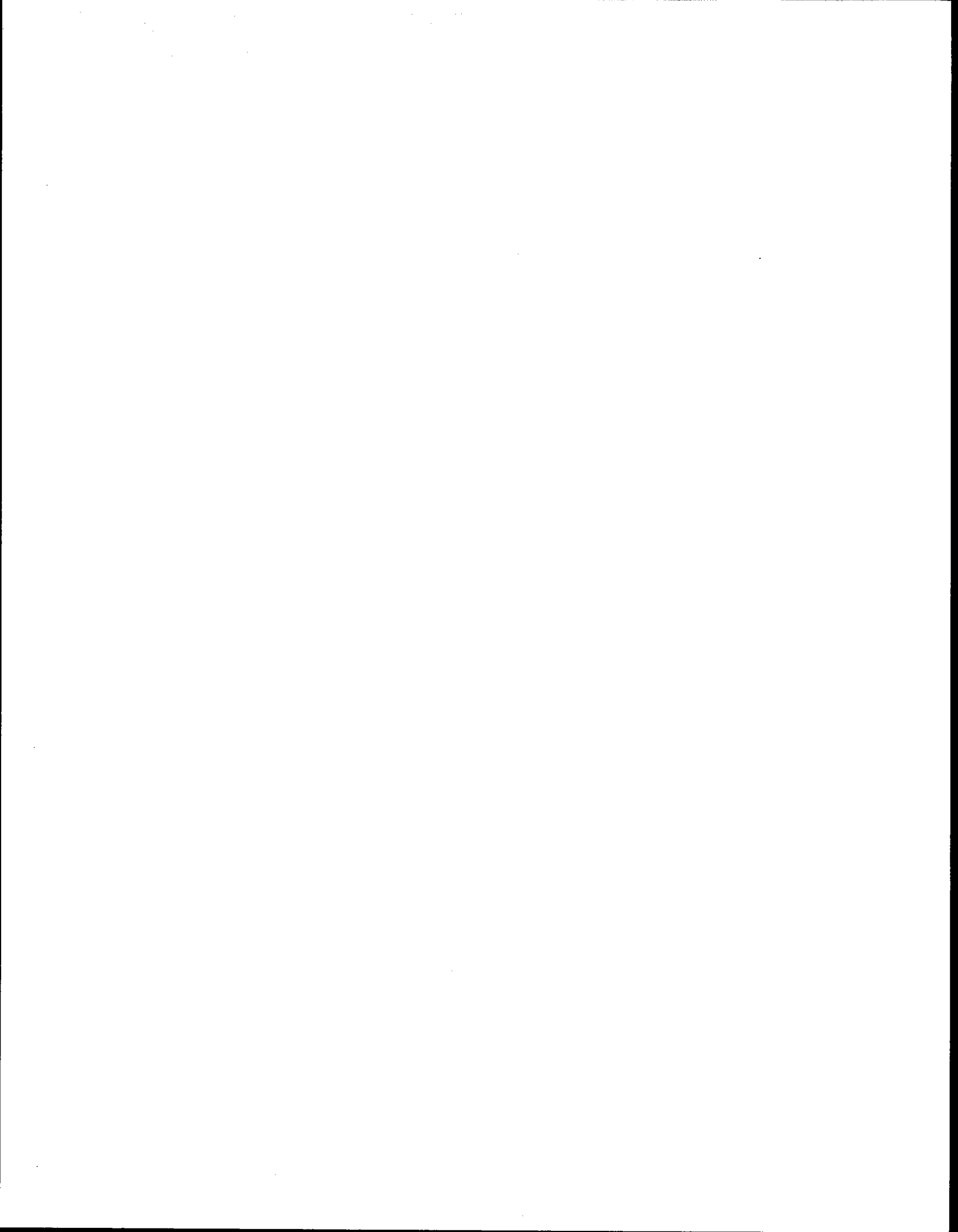


**MODEL**  
**98451**

# QUAD EXTERNAL FILTER AIR HEAD ASSEMBLY

L2732A B/T 2/99 FOR COMMERCIAL USE ONLY

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# Tornado Quad External Filter Air Head Assembly

## Table of Contents

General Specifications.....	2
Unit Specifications	
Warranty.....	3
Safety Instructions.....	4
Warnings.....	5
Head Assembly Setup.....	6
Unit/Drum Assembly	
Operation.....	6
Start/Stop Machine	
Operating Rules	
Maintenance	
Troubleshooting.....	7
Things To Know.....	8
Facts	
Compressor Evaluation	
Spare Parts.....	9-10

## ***Features:***

- Capable of simultaneous wet/dry pickup when using external filter(s).
- 3/16" (5mm) jets installed. 7/32" (5.5mm) and 1/4" (6mm) jets are included for heavier debris.
- Ideal for materials from powder to oily metal chips, grindings and shavings.
- Recovers fluids from water to heavy weight oils.
- External filter(s) collect lighter particles and resist clogging.
- A heavy duty 55-gallon rolled top drum is required, and is available from Tornado.

## Tornado Quad External Filter Air Head Assembly

### General Specifications

The Quad External Head Assembly is a heavy duty wet/dry industrial vacuum. It will pick up wet or dry waste simultaneously without the need to change any filters. This compressed air vacuum has no moving parts and has tremendous suction for a portable unit. It is designed to fit onto a 55-gallon rolled top steel drum (Tornado # 95942) for volume pick-up with maximum efficiency. Virtually all dry and liquid recovered products go into the drum, therefore maintaining peak performance. It handles a wide variety of waste, ranging from fine powders to heavy-grade viscosity products. Designed to perform at maximum efficiency with 1.5" and 2" hoses and attachments.

### Unit Specifications

#### 98451 INCLUDES:

- Quad Head Jumbo Cover and Venturi Powerhead Assembly w/ Liquid Shut-off (External Filter)
- 90488 Large Poly External Filter (2)
- 95995 Support Rod for Large Filter (2)
- 90442 Deflector (attached to Jumbo Cover)
- 90332 2" Hose Adaptor (1)

EXTERNAL FILTER AREA	1874 sq. in. (Per Head)
HORIZONTAL RECOVERY (reach)	100 ft.
VERTICAL RECOVERY (lift)	50 ft.
REQUIRED COMPRESSOR	50 h.p.
AIR LINE AND COUPLINGS	1" required
HOSE ADAPTOR	2" Included
COLOR	Tornado Grey
WEIGHT	79 lbs.
3/16" JET (installed) w/1.5" HOSE	185 CFM/154" Static Waterlift
3/16" JET w/2" HOSE	250 CFM/154" Static Waterlift
COMPRESSOR CFM	94 @ 90 p.s.i.
7/32" JET (included) w/1.5" HOSE	210 CFM/170" Static Waterlift
7/32" JET w/2" HOSE	244 CFM/170" Static Waterlift
COMPRESSOR CFM	122 @ 90 p.s.i.
1/4" JET (included) w/1.5" HOSE	231 CFM/200" Static Waterlift
1/4" JET w/2" HOSE	238 CFM/200" Static Waterlift
COMPRESSOR CFM	152 @ 90 p.s.i.

## Tornado Quad External Filter Air Head Assembly

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### **Tornado® Standard Warranty Program\***

10 Years: All plastic tanks and rotationally-molded bodies

2 Years: Parts and Labor on all Tornado and Tornado/Karcher cleaning equipment \*\*

1 Year: Warranty on batteries, one full year, not pro-rated.

Warranties do not cover components subject to normal wear or abuse and misuse, and have other limitations not specified here. For full details, contact your Authorized Tornado Distributor, Service Center, or the Tornado Technical Service Department.

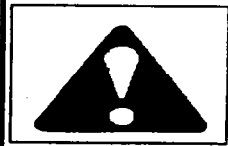
\* Effective January 1<sup>st</sup>, 2000. Terms subject to change without notice.

\*\* Windshear™ Blower-Dryer, Insulation Blowers, CW 50, CW 100, and Duo Upright Carpetkeepers™ are warranted for 1 (one) year for parts and labor.

## Tornado Quad External Filter Air Head Assembly

### Safety Instructions

When using this unit, basic precautions should always be followed. Read all instructions before using this unit.



**WARNING: To reduce the risk of fire, electric shock or injury:**

Do not leave machine unattended when running. Turn off when not in use.

Before attempting any maintenance or adjustment, disconnect air lines.

Do not expose to rain.

Do not allow to be used as a toy. Close attention is necessary when used by or near children.

Use only as described in this manual. Use only manufacturer's recommended attachments.

If machine is not working as it should, has been dropped, damaged, left outdoors, or dropped into water, return it to a service center.

Keep hair, loose clothing, fingers, and all parts of body away from openings and moving parts.

Turn off all controls before disconnecting air lines.

Do not put any object into openings. Do not use with any opening blocked. Keep openings free of dust, lint, hair, and anything that may reduce air flow.

Do not pick up anything that is burning or smoking, such as cigarettes, matches, or hot ashes.

Do not pick up flammable or combustible liquids, such as gasoline, or use machine where they may be present.

Do not use without filters in place.

Use extra care when cleaning on stairs.

Always replace worn or torn external filters immediately. This will prevent possible injury due to flying objects.

Never operate with intake unguarded. Strong suction will pull fingers and/or clothing into hose and other parts.

Always point exhaust port in safe direction. Air exits Venturi at very high velocity.

Always wear safety glasses when in vicinity of this unit.

Never operate above 100 p.s.i. (8 BAR) pressure.

Always turn off your air line supply at the drop before disconnecting the air line.

## Tornado Quad External Filter Air Head Assembly



**WARNING:** Failure to adhere to these instructions could result in serious bodily injury or property damage.

### BEFORE OPERATING MACHINE:

Read this manual completely before attempting to operate machine. This manual has important information for the use and safe operation of the machine. Keep this manual on file and handy. If additional information is needed, please contact your local distributor or write to:

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# Tornado Quad External Filter Air Head Assembly

## Head Assembly Setup and Operation

### ASSEMBLY OF HEAD UNIT AND DRUM

1. Remove all components from package.
2. The Venturi Powerhead(s) come already attached to the jumbo covers. To detach, remove quad unit air connector, then turn powerhead(s) counterclockwise and they will unlock from the Jumbo Cover. When attached, make sure the exhaust nozzle(s) are facing outward.
3. Install external filter support rod(s) by placing in access hole(s) located in Jumbo Cover.
4. Attach external filter(s) by attaching to filter support rod(s) and installing inlet collar(s) onto exhaust nozzle(s). Turn collar(s) clockwise to lock. Do not twist filter.
5. Install hose adaptor onto Jumbo housing. Lock in place by lining up adaptor indent with lock screw and tightening lock screw.
6. Place head unit onto drum (required accessory). The weight and suction power of the head unit will form a seal on the drum.

### STARTING/STOPPING MACHINE

1. Connect air supply line to head line connector.
2. Start vacuum by turning air valve located on line connector to its ON position.
3. Stop vacuum by turning air valve located on line connector to its OFF position.

### MAINTENANCE OF EXTERNAL FILTER

For maximum operating efficiency and to insure longer wear, remove filter(s) and empty by detaching the bottom clamp after every use.

Empty and clean vacuum, filter(s), and attachments after each days use for maximum performance.

### OPERATING RULES

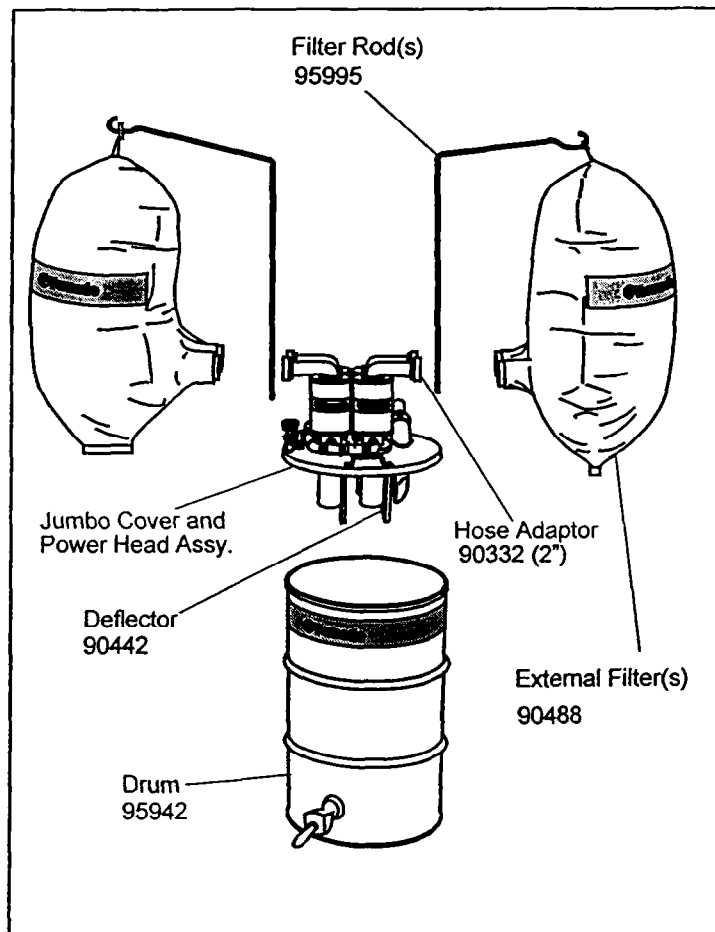
Use 1.5" to 2" I.D. hoses and attachments.

Use 1" air line hose and flow-thru quick connects (do not use ball style fittings).

90 p.s.i. (7 BAR) at gauge (valve open) for maximum pickup power, 60 p.s.i. (5 BAR) at gauge (valve open) for lighter debris recovery.

Use to recover water, heavy oils, powders, grindings, and metal shavings.

Use Tornado #94655 Add-A-Tank system when recovering fine dry powders. Grounding and static discharge are required when recovering powders. Use TORNADO brand static conductive hoses (urethane or neoprene), and ground vacuum head and tank assembly to an earth ground.





## Tornado Quad External Filter Air Head Assembly

### Troubleshooting Guidelines

<u><i>Problem</i></u>	<u><i>Remedy</i></u>
1. Machine does not operate	<p>Make sure air line valve is in ON position.</p> <p>Inspect air regulators for interference of air flow.</p> <p>Inspect air compressor for adequate size, and verify that proper air pressure is available ( 90 p.s.i.)</p> <p>Inspect air line for proper size and/or damage.</p> <p>Always use flow thru connectors.</p>
2. Machine stops running	<p>Inspect drum level.</p> <p>Inspect air line for damage.</p> <p>Inspect air pressure.</p>
3. Machine has no suction	<p>Inspect for clogged hose, collapsed hose, defective drum, material too heavy for unit.</p>
4. Air pressure drops at gauge	<p>Inspect air compressor for proper free air consumption and resistance in air line size or connections.</p>
5. Machine has poor recovery	<p>Inspect for correct size hose and attachments, poor sealing, defective drum, material too heavy for unit.</p> <p>Inspect external filter(s). Empty and clean if necessary.</p> <p>Inspect for proper drum cover seal (gasket).</p> <p>Inspect for damage and/or wear to hose and accessories.</p> <p>Inspect locked position(s) of venturi powerhead(s) to Jumbo Cover.</p> <p>Inspect locked position(s) of external filter(s) to venturi powerhead(s).</p> <p>Inspect all seals for wear and/or damage.</p>

# Tornado Quad External Filter Air Head Assembly

## Things To Know

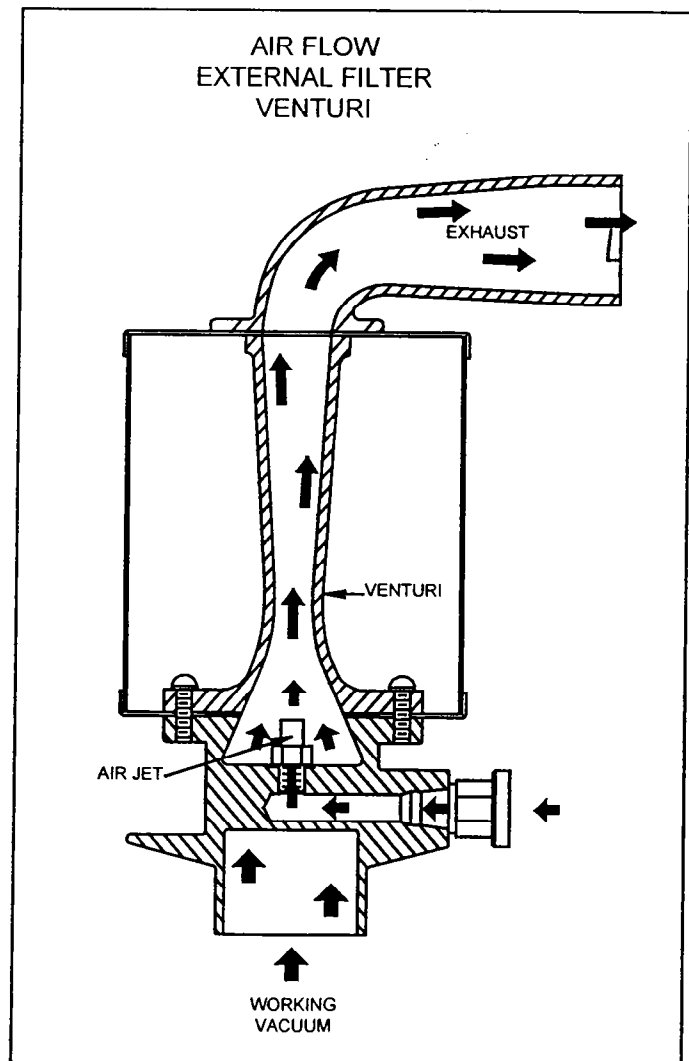
### COMPRESSED AIR VACUUM FACTS

1. Use the smallest air jet possible to do the job. The smaller the jet, the lower the compressed air C.F.M. required.
2. Use a single venturi unit where liquid recovery is the primary application. A single venturi will recover liquids as fast as a double venturi will, yet consumes only one half as much compressed air.
3. Use a double venturi or quad venturi unit where higher volume of vacuum air is required. Remember, compressor overload is more likely to occur with a quad than a double venturi.
4. Use the lowest air line pressure possible per the given jet size to do the job. The lower the line pressure, the lower the compressed air consumption.
5. Air line pressure **must** be maintained at the valve of the venturi unit. If pressure is not maintained at the unit, vacuum performance **will not** be reached. Be sure to use low line pressure for dry recovery, high line pressure for liquids, sludge, and other heavy debris.
6. The air line hose should be as short as possible, and of maximum inside diameter (single 1/2", double 3/4", quad 1" recommended). Line air losses that occur are related to hose length and diameter, thus reducing performance.
7. Any air line moisture (condensation) should be eliminated. Using a water trap in the air line to the venturi unit will help maintain peak performance.
8. Air line components can reduce performance. Quick disconnect couplings and line filters, for example, may reduce compressed air delivery.
9. Factors that affect compressed air supply are compressor horsepower rating, compressor C.F.M. rating, and system resistance of installed air lines.

### AIR COMPRESSOR EVALUATION

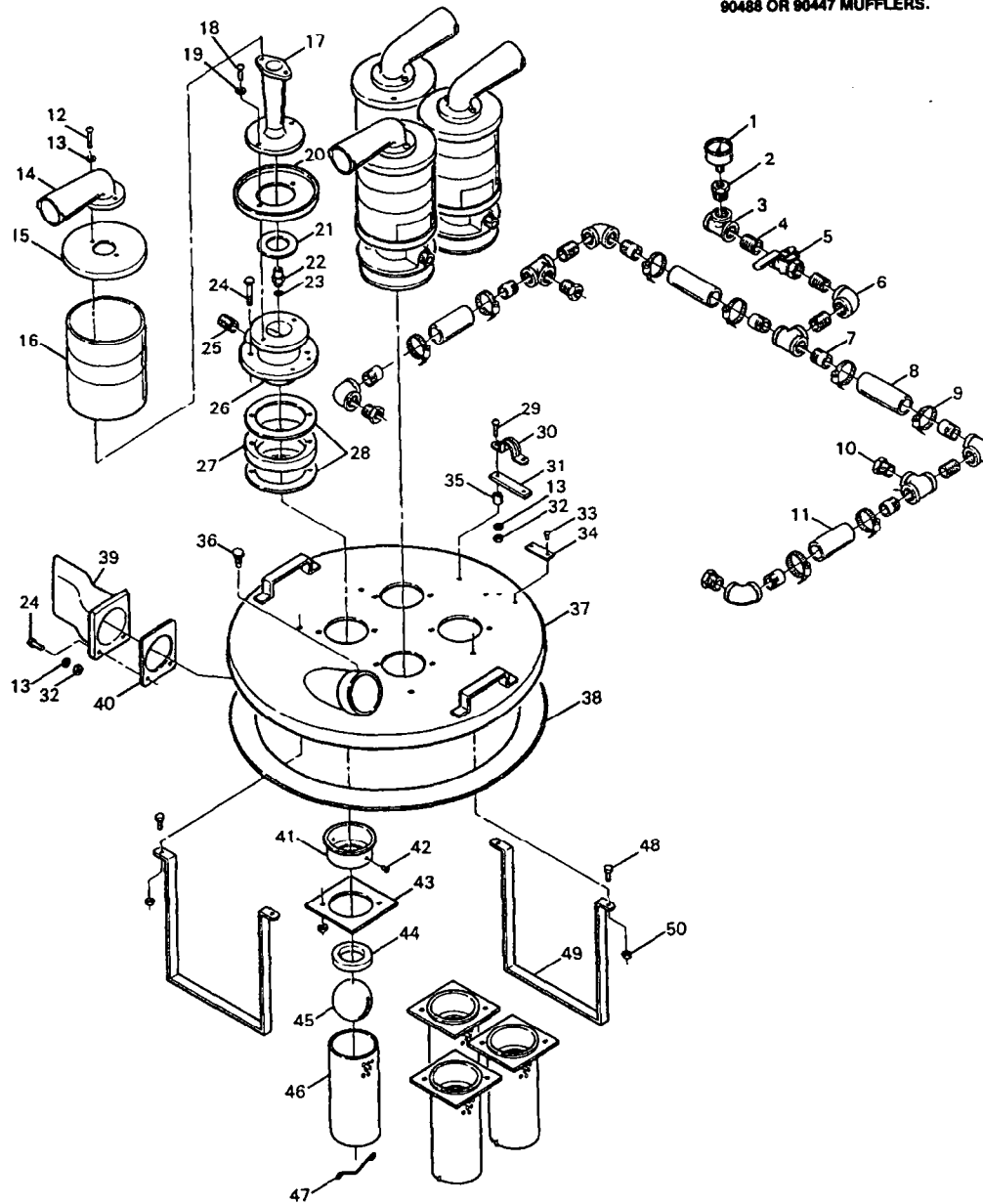
Independent of high horsepower or high compressor C.F.M. rating claims, the final evaluation in determining if a compressor is capable of supplying enough compressed air, is with a pressure gauge at the venturi unit. This will show the actual pressure being maintained while the unit is operating (refer to fact #5). This approach will also compensate for air line system resistance losses. If the compressor cannot maintain the free air consumption necessary, the line pressure will drop. Consequently, the compressed air C.F.M. will also drop, thus reducing the vacuum or suction performance.

**NOTE:** The compressed air C.F.M. is not the same as the vacuum air C.F.M.



# Tornado Quad External Filter Air Head Assembly

**WARNING**  
DO NOT OPERATE WITHOUT  
EXTERNAL FILTERS PART NO.  
90488 OR 90447 MUFFLERS.



(98451) EXTERNAL QUAD AIR VAC

Figure No. 3 Quad Jumbo Cover Assembly

## Tornado Quad External Filter Air Head Assembly

### (98451) EXTERNAL QUAD AIR VAC

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	05732	AIR PRESSURE GAUGE
2	1	11327	PIPE BUSHING
3	4	11323	3/4" PIPETEE
4	5	11325	3/4" NIPPLE
5	1	11326	3/4" VALVE
6	5	11324	3/4" ELBOW
7	8	11365	MALE ADAPTOR
8	2	80592	HOSE (5.63" LG)
9	8	05727	HOSE CLAMP
10	4	11322	REDUCING BUSHING
11	2	80592	HOSE (3.50" LG)
12	8	02038	SCREW
13	20	01574	LOCK WASHER
14	4	05734	ELBOW, CONNECTING
15	4	05735	MUFFLER COVER
16	4	05736	MUFFLER SHELL
17	4	05723	NOZZLE
18	8	02812	SCREW
19	8	01589	NUT
20	4	04927	MUFFLER BASE
21	4	05724	GASKET
22	4	04984	JET (1/4" DIA.)
23	4	02481	"O" RING
24	10	02038	SCREW
25	4	05730	1/2" NIPPLE
26	4	11317	BASE
27	4	14331	MOUNTING PLATE
28	8	11329	GASKET
29	2	01978	SCREW
30	1	11328	STRAP
31	1	14330	SUPPORT RISER
32	2	01497	NUT
33	2	02573	DRIVE SCREW
34	1	04924	NAMEPLATE
35	2	03144	SPACER
36	1	08057	THUMBSCREW
37	1	14329	TANK COVER S/A
38	1	4988	TANK COVER GASKET (6.5 FT.)
39	1	90442	DEFLECTOR
40	1	04908	GASKET
41	4	11331	FLANGE
42	8	05043	RIVET
43	4	14407	MOUNTING PLATE
44	4	02706	GASKET
45	4	03537	FLOAT
46	4	06428	CAGE
47	4	06430	WIRE
48	4	02047	SCREW
49	4	07533	LOCKNUT
50	2	04997	STAND

Recommended air line for quad external operation 1" I.D.