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**Operations & Maintenance Manual
For Commercial Use Only**



**ECO 500AW / ECO500 PLUS AW RECYCLING EXTRACTOR
MODEL NO: 98825, 98827, 98829, 98831 / 98838, 98842, 98846, 98848**



Long -Term Buyer Protection Limited Warranty

Tornado Industries, LLC. warrants to the end user/ customer that the Tornado product(s) will be free from defects in material and workmanship for the duration(s) described below. This limited warranty DOES NOT cover machines and/or components subject to normal wear and tear, damage that occurs in shipping, failures resulting from modification, accident, unsuitable operating environment, misuse, abuse, **neglect, or improper maintenance**. For full details, contact your Authorized Tornado Distributor, Service Center, or the Tornado Technical Service Department. Tornado sales and service representatives are not authorized to waive or alter the terms of this warranty, or to increase the obligations of Tornado under the warranty.

10 Years*

Plastic water tanks and Rotationally-molded bodies

2 Years*

Parts on all Tornado cleaning equipment

1 Year*

Labor on all Tornado cleaning equipment

1 Year*

Warranty on batteries, one year prorated

All battery warranties are handled directly by the battery manufacturer, on a one year prorated basis

Terms subject to change without notice

1. All Windshear™ Blowers, Storm, TV2SS, Side and Dowlndraft, Insulation Blowers, CV 30, CV 38, CK14/1 PRO, CK 14/1 BSE, CK14/2 PRO, SWM 31/9, CK LW13/1, CK LW 13/1 ROAM, CV 38/48 Dual, PV6, PV10, PV6 ROAM, Wall Mount Vacuum and all chargers are warranted for 1 (one) year for both parts and labor.
2. All non-wear item parts purchased after warranty expiration are warranted for 90 days.
3. Warranty starts from either: The date of sale to the consumer, or 6 months after the dealer purchased the unit from Tornado (at Tornado's discretion), whichever comes first.
4. The EB 30 is warranted for a period of 90 days for both parts and labor.
5. Propane-powered equipment engines are limited to the engine manufacturer's warranty.
6. Ride-on Scrubbers are warranted for 24 months parts, and 6 months labor, or 1,000 hours, whichever occurs first.

Note: Tornado, The Latest Dirt, Floorkeeper, Carpet-keeper, Carpetrinser, Carpetrinser/Dryer, Headmaster, Taskforce, PAC-VAC, T-Lite, Glazer, Windshear, Max-Vac and Trot-Mop are trademarks of Tornado Industries

Website: www.tornadovac.com

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Fort Worth, TX 76140

1-800-VACUUMS

Over 91 Years of Cleaning Innovation

A Tacony Company

ECO 500AW Technical Specifications

Model	98825	98827	98838	98842
Tank Size	10 Gallon	10 Gallon	10 Gallon	10 Gallon
Heater	No	No	No	Yes
Tools	No	No	No	No
Power	220V/15A	220V/15A	120V/15A	120V/15A
Power Cords	(1) 25' Detachable	(1) 25' Detachable	(1) 25' Detachable	(2) 25' Detachable
Vacuum Motor	Single 6.6 Dia AW	Single 6.6 Dia AW	Single 6.6 Dia AW	Single 6.6 Dia AW
CFM	141	141	141	141
Peak Airwatts	673	673	673	673
Solution Pump	100-500 P.S.I.	100-500 P.S.I.	100-500 P.S.I.	100-500 P.S.I.
Interim Cleaning Productivity	120 Sq ft/hour	120 Sq ft/hour	120 Sq ft/hour	120 Sq ft/hour
Restorative Cleaning Productivity	60 sq ft/hour	60 sq ft/hour	60 sq ft/hour	60 sq ft/hour
Body Construction	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank
Front Wheels	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters
Rear Wheels	2-10" Dia	2-10" Dia	2-10" Dia	2-10" Dia
Weight	104 lbs.	104 lbs.	86 lbs.	96 lbs.
Dimensions	29" x 20' x 35"	29" x 20' x 35"	29" x 20' x 35"	29" x 20' x 35"

*Available Tools include - 11" Rapid Recovery Wand (Type R, 2 Jet) (77000), 3" Combination Tool (77001), and 33' Flexible Hose (77220).

ECO500 PLUS AW Technical Specifications

Model	98829	98831	98846	98848
Tank Size	15 Gallon	15 Gallon	15 Gallon	15 Gallon
Heater	Yes	Yes	Yes	No
Tools	No	No	No	No
Power	220V/15A	220V/15A	120V/15A	120V/15A
Power Cords	(2) 25' Detachable	(2) 25' Detachable	(2) 25' Detachable	(1) 25' Detachable
Vacuum Motor	Single 6.6 Dia AW	Single 6.6 Dia AW	Single 6.6 Dia AW	Single 6.6 Dia AW
CFM	141	141	141	141
Peak Airwatts	673	673	673	673
Solution Pump	100-500 P.S.I.	100-500 P.S.I.	100-500 P.S.I.	100-500 P.S.I.
Interim Cleaning Productivity	180 Sq ft/hour	180 Sq ft/hour	180 Sq ft/hour	180 Sq ft/hour
Restorative Cleaning Productivity	90 sq ft/hour	90 sq ft/hour	90 sq ft/hour	90 sq ft/hour
Body Construction	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank	Powder-coated aluminum chassis and rotationally-molded polyethylene tank
Front Wheels	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters	2-4" Dia Swivel Casters
Rear Wheels	2-10" Dia	2-10" Dia	2-10" Dia	2-10" Dia
Weight	104 lbs.	104 lbs.	98 lbs.	88 lbs.
Dimensions	29" x 20' x 40"	29" x 20' x 40"	29" x 20' x 40"	29" x 20' x 40"

*Available Tools include - 11" Rapid Recovery Wand (Type R, 2 Jet) (77000), 3" Combination Tool (77001), and 33' Flexible Hose (77220).

Your new Tornado ECO 500 AW Series of recycling carpet extractors is a high quality, precision-made product. All parts used in the manufacturing of this unit have passed rigid quality control standards prior to assembly. Please safeguard the original receipt / invoice. If you experience any problems with your unit during the warranty period, the original receipt / invoice will act as proof of purchase. Contact Tornado for any warranty inquiries.

IMPORTANT SAFETY INSTRUCTIONS

READ AND UNDERSTAND ALL INSTRUCTIONS BEFORE USING THIS UNIT

Read and understand this owner's manual and all labels on the unit before operating. Safety is a combination of common sense, staying alert and knowing how your unit works. Use this unit only as described in this manual. Use only manufacturer's recommended attachments. To reduce the risk of personal injury or damage to your unit use only Tornado recommended accessories.

If service is required, it must be performed by an authorized repair center. Contact your local dealer or call 1.800.533.2557 for the location of a repair center.

SERIAL NUMBER

The serial number of the machine is located on the label, located on the backside of the base. This information is needed when ordering parts or scheduling repairs. Fill in the information below for future reference:

Serial Number _____

Part Number _____

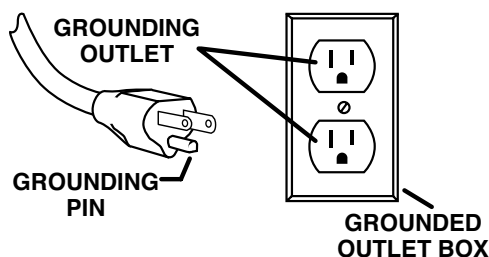
Purchase Date _____

GROUNDING INSTRUCTIONS

This appliance must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk electric shock. This machine is equipped with a cord having an equipment -grounding conductor and grounding plug. The plug must be inserted into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

WARNING: Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or service person if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with the appliance - if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

This appliance is for use on a nominal 120-volt circuit, and has a grounding plug that looks like the plug illustrated in sketch A.



A

UNPACKING INSTRUCTIONS

Your ECO 500 AW Series was thoroughly inspected, tested, and packaged to deliver the equipment in good operating condition. The freight carrier received and signed for the equipment in good condition. Damage can occur during shipping and to protect your interest, all cartons must be inspected for damage (including any concealed damage) that might have occurred during shipment. Any damage is the responsibility of the freight carrier and should be reported immediately to the carrier. It is your responsibility to issue a claim and to receive compensation from the freight carrier for any damage done in transit. Shipping damage is not warranted.

CAUTION

Read All Instructions, Warnings and Cautions before Using

These guidelines are provided for your protection and convenience. Please read them carefully. If you have any questions regarding the use of your equipment call Technical Service at 800.533.2557. Failure to adhere to instructions provided can potentially void any warranties. Precautions and safety warnings are provided for your protection.



Failure to observe these warnings could result in personal injury and damage to the equipment. When using an electrical appliance, basic safety precautions should always be followed.

WARNING!

To avoid fire, do not use with a flammable or combustible liquid to clean floor.

IMPORTANT SAFETY INSTRUCTIONS

The ECO 500 AW Series of recycling carpet extractors are intended for use only as described in this manual. Using the equipment in any manner not described in this manual can void the warranty. Use only manufacturer's recommended accessories.

READ ALL INSTRUCTIONS BEFORE USING

THIS PRODUCT IS INTENDED FOR COMMERCIAL USE ONLY

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

1. Operators must read and understand this manual completely before operating the equipment.
2. Make sure all caution, warning, and instructional decals are in place and legible. Replace damaged or missing labels.
3. Do not leave unit unattended while plugged in. Unplug from outlet when not in use and before servicing.
4. Connect to a proper grounded outlet only. (See Grounding Instructions.)
5. Do not use with damaged cord or plug.
6. Do not handle plug or unit with wet hands.
7. Do not pull or carry by cord, use cord as a handle, close a door on cord, or pull cord around sharp edges or corners. Do not run appliance over cord. Keep cord away from heated surfaces.
8. Turn off all controls before unplugging.
9. Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord and remove from outlet.
10. Do not put any object into openings. Do not use with any opening blocked; keep free of dust, lint, hair, and anything that may reduce air flow.
11. Do not pick up anything that is burning or smoking, such as cigarettes, matches, or hot ashes.
12. Do not use without filters in place.
13. Use extra care when cleaning stairs.
14. Do not use to pick up flammable or combustible liquids such as gasoline or use in areas where they may be present.
15. Do not expose to rain. Store indoors.
16. If unit is not working as it should, has been dropped, damaged, left outdoors, or dropped into water, take it to a local service center.



When using an electrical piece of equipment basic precautions should be followed, including the following:

SET UP INSTRUCTIONS

Filter Installation

There are three filters in the ECO-500 AW Series system: gross debris filter, disposable inlet filter and in-tank filter. It is imperative to the efficient operation of the ECO-500 AW Series that the filters are installed properly.

Disposable Inlet Filter

Place the disposable filter in recovery inlet area. Be sure that wire container is in place before fitting the disposable filter in place.



Gross Debris Filter

Position the gross debris filter over the disposable filter and attach recovery inlet using the two swivel clamps.

In-Tank Filter

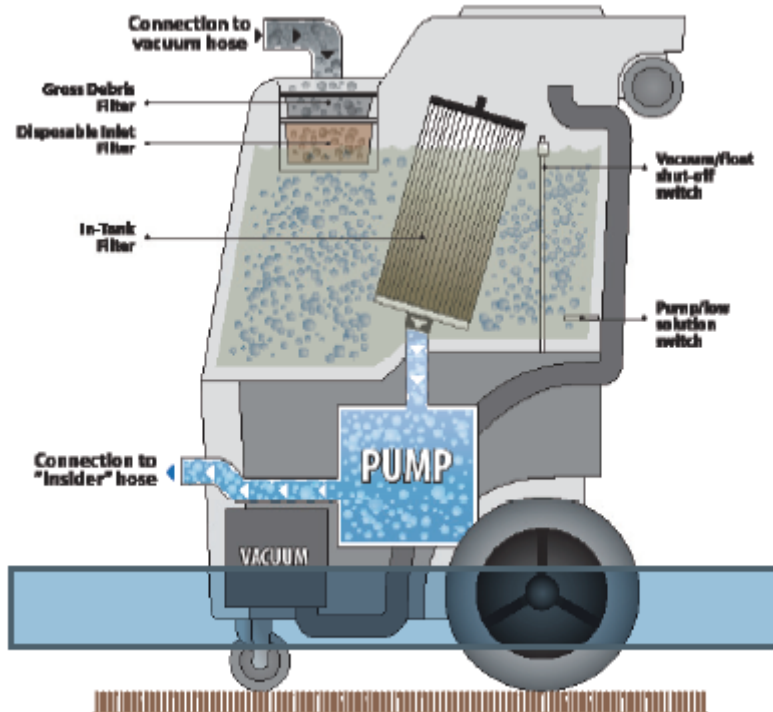
Soak in-tank filter inside and out in water before installing inside recovery tank. Make sure water is coming through the filter wall when you fill with water while holding the canister upside down. To install, simply screw canister filter into place.



OPERATING INSTRUCTIONS

1. Remove lid and composite filter.
2. Check the in-tank filter. Make sure the in-take filter is installed snugly.
3. Fill tank with water to a desired level or 1" below the vacuum float switch. Warm water will be more efficiently heated to desired temperature than cold water.
4. Add in-tank cleaner chemical for this extractor per chemical label use instructions. In addition, pre-spraying is often desirable and will assist in producing the fastest and best cleaning results. See chemical product labels for more information. *Note:* Use caution when moving machine (especially on inclines) with fluid in the tank to prevent fluid from entering vacuum intake at back of machine tank and flooding the vacuum. Chemicals for use in these extractors have been specially formulated to work with this machine.
5. If using the ECO 500 AWH Series, plug the receptacle cords into separate circuits. Green light will turn on when properly connected. 115V model only.
6. Prime pump by re-circulating fluid through priming hose, included, for 15/30 seconds. Attach priming hose to quick connect and turn pump on while placing opposite end of hose directly back into tank. Once a steady stream of solution flows, you may turn off pump and remove priming hose. The machine is now primed. Re-circulating the fluid primes the pump and expels trapped air from the system.

7. Replace inlet filter and lid
8. Lock the rectangular lid into position
9. Attach hose assembly to machine, connect fluid hose to the quick-disconnect found on the front of machine and connect vacuum hose cuff to recovery inlet fitting.
10. Attach the desired tool to the valve end of the hose assembly.
11. Turn on vacuum and pump switches.
12. Turn on heater switch if desired. Heater only available with the ECO 500 AWH Series units.
13. Clean surface with tool attached to hose assembly.
14. During the cleaning process, for any reason, the fluid level is heightened, the high level float switch will shut off the vacuum motors. Should such case happen, drain the tank so the fluid level is much below the high float switch.



CAUTION! When cleaning, monitor foam in the machine's tank. Areas cleaned with other cleaning equipment or chemicals may cause excessive foam to collect in the tank.

WARNING! EXCESSIVE FOAM IN THE TANK MAY CAUSE VACUUM MOTOR FLOODING AND MACHINE DAMAGE.

Pour one to two ounces of Defoam for use with these extractors directly into the tank or into the vacuum hose while the vacuum is running. Defoamer for use with these extractors has been specially formulated to work with this machine.

When finished cleaning, perform the daily maintenance procedure. Be sure that all filters are cleaned thoroughly and replaced in machine. Leave lid off for drying.

MAINTENANCE

Daily Maintenance

To maintain optimum performance of the equipment, tools and filters should be cleaned after each use. Replace any filters that cannot be cleaned or are damaged. Nozzles that cannot be cleared should be discarded. Wipe down the equipment with a damp cloth to keep clean and preserve the appearance.

1. Wands and Tools

Rinse opening of tool with water to eliminate any debris.

Wand only - open and clean in-line strainer.

A. Disconnect the In-line Strainer by using the quick disconnect coupler.

B. Remove the filter and rinse with water.

C. Remove any debris from the strainer.

D. Keep o-ring and threads of the plug lubricated.

DEFOAM for use in this extractor is a good lubricant or use a non-petroleum based lubricant. This will ensure a tighter seal.

E. Wipe tool with damp cloth and store with head up to prevent clogging of nozzle.

2. Filters

A. In-Line Strainer Filter - Disconnect the In-line Strainer Filter on the wand by using the quick disconnect coupler. Remove the filter and rinse with water. Remove any debris from the strainer. Keep o-ring and threads of the plug lubricated. DeFoam for use in this extractor is a good lubricant or use a nonpetroleum based lubricant. This will ensure a tighter seal.

B. Gross Debris Filter - Remove the gross debris filter. Dump and clean debris at the end of each cleaning job.

C. Disposable Inlet Filter - Remove the filter and rinse out and clean thoroughly or replace with part# 72776B.

D. In-Tank Filter - Unscrew this filter and rise thoroughly with water. Be sure to rinse both inner and outer filter media. When finished screw cartridge filter back in place.

Periodic Maintenance

1. Check power cord for any breaks, separations, or cuts. Make sure the ground pin on the connector is intact or the machine will be unsafe. Make sure the ground pin on all three prongs on the twist lock connector are intact.

2. Check for plugged nozzles when using tools. If streaking occurs during cleaning, a plugged nozzle may be the cause. A plugged or partially plugged nozzle can be identified by holding the tool 5-7" above the surface and checking for an even spray pattern. To clean a plugged nozzle, remove the nozzle and direct pressurized air backwards through the nozzle or backwash the nozzle with water. A convenient method is to insert the nozzle into a garden hose ball valve, tighten the ball valve to a faucet, and turn on the water. (Ball valves are available, part #7AX020). Inspect nozzle and repeat cleaning procedure, if necessary. Discard nozzles that cannot be cleared. Tool nozzles wear and must be replaced after 200-250 hours of use.

3. Occasionally open the base and inspect hose and other connections for leaks. Repair or replace any leaking parts. Always disconnect power cord, before removing side panels. Circuit Breakers: Overload circuit breakers are placed in both the pump and vacuum circuits to protect against unusually heavy current (ampere) loads. If either breaker trips, the pump motor or vacuum motor is overloaded.

4. It is very important to monitor machine operating hours for proper maintenance of the motors and pumps. After 700 hours of operation, the vacuum motor brushes should be inspected by an authorized repair station and replaced if worn (length is .5 inches or less).

5. Check vacuum motor performance using a vacuum gauge. Place this gauge on the tank inlet fitting with the vacuum turned on. Water lift should be between 190 and 210 inches. If the reading is lower, check for air leaks in the tank, cover gasket, and drain hose.

6. Check pump performance occasionally against built-in pressure gauge. Maximum pump running pressure on the ECO-500 AW Series should be 500 ± 10 p.s.i. If the pumping pressure is outside of this range, call your dealer or authorized station. After 400 hours, the pump valves should be replaced. After 700 hours of operation the pump cam bearing and plunger should be replaced. The pressure regulator should be rebuilt after 400 hours of operation.

TROUBLESHOOTING

Problem	Possible Cause	Solution
Vacuum or pump will not run	Defective Cord(s). Tripped building circuit breaker.	Inspect cord(s). Replace if defective. Reset circuitbreaker.*
Trips building circuit breaker	Circuit is overloaded.	Move cord to a different wall outlet.* Check plug end and cord for damage.
Vacuum won't run.	Vacuum switch not in the ON position. Water level too high.	Move Vacuum switch to the ON position. Drain some water out of the tank.**
Pump won't run	Pump switch not in the ON position. 5 Amp circuit breaker is tripped. Water level too low. Low voltage (the pump will not work if volage is less than 105VAC).	Move Vacuum switch to the ON position. Reset breaker. Add water to tank.** Check wall outlet for proper voltage.
Pump tries to run and then blows circuit breaker		
Pump starts and stops	Sticking pump float. Water level too low.	Ensure float moves smoothly on float rod. Add water to tank.**
Pump starts and sprays reduced amount of fluid	Dirty cartridge filter. Foam in tank	Remove and clean cartridge filter. Add defoamer designed for use these extractors.
Low or no suction	Clogged or broken hose. Loose connections.	Leave vacuum running for 1 minute when finished cleaning to clear hose. Check hose for breaks or tears. Make sure the in-line strainer is properly tightened and fluid hose connectors are fully seated.

*Check machine for dual circuit indicator light. If the light is not green, then you must move one cord to a different outlet on another circuit.

**The tank must have at least 5gallons of water for unit to operate.

If using an extension cord, make sure it is in good condition, less than 70 feet long and AWG 12 gauge or heavier.

Problem	Possible Cause	Solution
Carpet too wet	<p>Check tool positioning</p> <p>Obstruction in tool or hose.</p> <p>Lid cover not sealing.</p> <p>Lid cover cracked.</p> <p>Hose cracked or torn.</p> <p>Hose not seated firmly on tank fitting.</p> <p>Water dripping from bac of unit.</p> <p>Carpet installation.</p>	<p>Head must be completely "seated" on carpet to provide maximum water recovery.</p> <p>Check tool and hose for any obstructions.</p> <p>Check lid cover sealing properly - is basket filter gasket properly seated in tank? Is basket filter gasket in good shape with no cuts, cracks, or worn/compressed areas</p> <p>Check for cracks in lid cover.</p> <p>Check drain hose and fittings for cracks and tears.</p> <p>Check hose cuffs - must seat firmly on tank fitting and tool.</p> <p>Check water dripping from bottom of machine exhaust. If present, check machine for excess foaming.</p> <p>Some carpets are installed on uneven surfaces with ridges and bumps. It is difficult to get good drying times with this type of installation.</p>
Streaks on carpet	<p>Obstruction in tool or hose.</p> <p>Dirty in-line filter.</p> <p>Cloged nozzles.</p> <p>Strokes not overlapped.</p> <p>Improper Chemical useage.</p>	<p>Check tool and hose for any obstructions.</p> <p>Check and clean in-line strainer filter and in tank filters.</p> <p>Clean or replace nozzles.</p> <p>Make sure strokes overlap a minimum of 3 inches.</p> <p>Check chemical usage instructions for proper application.</p>
Excessive pressure drop when cleaning. (exceeds 100 p.s.i.)	<p>Low pressure.</p> <p>Dirty in tank filters.</p> <p>Worn or loose nozzles.</p> <p>Air in system.</p>	<p>Adjust static pressure to 500 p.s.i. when not cleaning.</p> <p>Check and clean in tank filters.</p> <p>Check and replace worn spray nozzles and loose or leaking fittings on hose.</p> <p>Purge excess air from pumping system using priming hose or hose with no nozzle.</p>

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TORNADO[®]

Warranty Registration Form

Please Print Clearly

Company/Institution	
Contact Name	Title
Address	City/State/Zip Code
Phone	Fax
Date of Purchase	Email
Selling Dealer:(Required)	

See white metal plate or sticker on unit for this information.

MACHINE TYPE/MODEL NUMBER:	MACHINE SERIAL NUMBER:
1.	1.
2.	2.
3.	3.
4.	4.

Facility Description (please circle all that apply)			
1. School	6. Manufacturing	11. Airport	16. Other Govt.
2. Retail Store	7. College/University	12. Warehouse	17. Auto Service
3. Restaurant	8. Hospital	13. Apartment/Condo	18. Non-Profit
4. Office Building	9. Nursing Home	14. Supermarket	19. Other (specify)
5. Contract Cleaning	10. Religious Institution	15. U.S. Govt	

<p>How did you first learn about Tornado cleaning and maintenance equipment?</p> <ul style="list-style-type: none"> <input type="radio"/> Contacted by local dealer <input type="radio"/> Previous experience with Tornado products <input type="radio"/> Reputation/Recommendation <input type="radio"/> Advertising <input type="radio"/> Direct mail <input type="radio"/> Website: _____ <input type="radio"/> Blog: _____ <input type="radio"/> Other 	<p>You can complete this form online at www.tornadovac.com/services/warranty-registration-form.aspx</p> <p>This form may also be returned to :</p> <p>Tornado Industries 3101 Wichita Court Fort Worth, TX 76140 Fax: 817-551-0719</p>
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Damage or defect arising from abuse, neglect or other misuse is excluded from this warranty. Other items may or may not apply based on your specific machine. If any defect occurs, and service is attempted by non-Authorized Tornado Service Centers, the warranty will be void.