

BREUER/TORNADO® CORP.  
7401 W. LAWRENCE AVENUE  
CHICAGO, IL 60656-3489  
(708) 867-5100 FAX (708) 867-6968



# TORNADO

## BI-SPEED FLOOR MACHINES



CATALOG NO.

98480

98473

98474

## *ILLUSTRATED PARTS*

L2136G FOR COMMERCIAL USE ONLY  
B/T 9-95

## NOTES

This illustrated parts book covers:

<b>CATALOG NO.</b>	98480	98473	98474
<b>SERIES</b>	F	F	F
<b>SIZE</b>	20"	17"	17"
<b>VOLTS</b>	115	115	250
<b>H.P.</b>	1 1/2	1 1/2	1 1/2
<b>U.L.</b>	*	*	

\*U.L. Listed CSA Certified

All specifications are subject to change without notice.

**TABLE OF CONTENTS:**

Safety Instructions	4
Grounding Methods	5
Exploded View	6
Parts List	7
Gear Unit Service Instructions	8 & 9
Exploded View-Gear Unit	10

## WARRANTY

Your Tornado® Machine has been thoroughly tested and inspected and is guaranteed to be free of defect in material and workmanship. Refer below for base warranty. This warranty does not cover normal wear items such as power cords, wheels and switches. Other items may apply or not apply based on your specific Tornado® machine. If such defects occur, this warranty is voided if service is attempted by non Authorized Tornado® Service Depot.

The Bi-Speed Floor Machines are warranted as follows:

- 1 years on motor and gear unit
- 1 year on all other components (See Above)
- 1 year on labor

## FOR COMMERCIAL USE IMPORTANT SAFETY INSTRUCTIONS

When using an electrical appliance, basic precautions should always be followed including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS APPLIANCE

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

Unplug machine when not in use. If handle switch lever is activated accidentally, high starting torque will cause machine to move and may cause damage or injury.

Unplug machine before:

- Leaving machine unattended
- Changing pads
- Attempting any maintenance or adjustment

This equipment is equipped with a three-conductor cable and three-prong grounding type plug to fit a grounding type receptacle. Do not break off or pull out the grounding prong on plug. Adapters are available for connecting three-prong grounding wire or terminal extending from the adapter must be connected to a permanent ground such as to a properly grounded electrical outlet box. If cord becomes frayed or damaged in any manner, replace. Otherwise possible electric shock may result.

Do not put hands under base - rotating parts could cause injury. Always keep hands feet and loose fitting clothing away from moving parts to prevent possible injuries. Use care to keep electrical supply cable from contacting moving parts, such as floor brushes or pads.

To avoid electrical shock, use indoors only. Do not use machine in areas where flammable and/or explosive vapors or dust are present.

Make sure voltage and frequency at the wall receptacle correspond with that indicated on name plate before plugging in machine. A 20 amp circuit is recommended. Right or left switch levers will independently operate the motor.

Never use a device to lock the switch lever in the "ON" position.

Use only a 12 Ga. three-wire extension cable which have 3-prong grounding type plugs and 3-prong receptacles that accept the machine's plug.

Always operate this machine with all of the cable removed from the handle. Failure to do so will upset the precision balance of the machine.

Do not add weight to this machine - this will upset the balance and may cause motor overload.

Pad holders and brushes must be properly maintained to insure maximum cleaning results.

- To avoid electrical shock do not expose to rain; store indoors.
- To avoid fire do not use with a flammable or combustible liquid to clean a floor.
- Risk of explosion. Floor sanding can result in explosive mixture of fine dust and air. Use this machine only in a well ventilated area, free from any flame or match.
- Do not add weight.
- Do not hop the brush or pad holder onto the machine.
- Disconnect before servicing.
- Do not store with brush, pad holder or pad on floor.
- Refer to this manual for additional instructions.

SAVE THESE INSTRUCTIONS

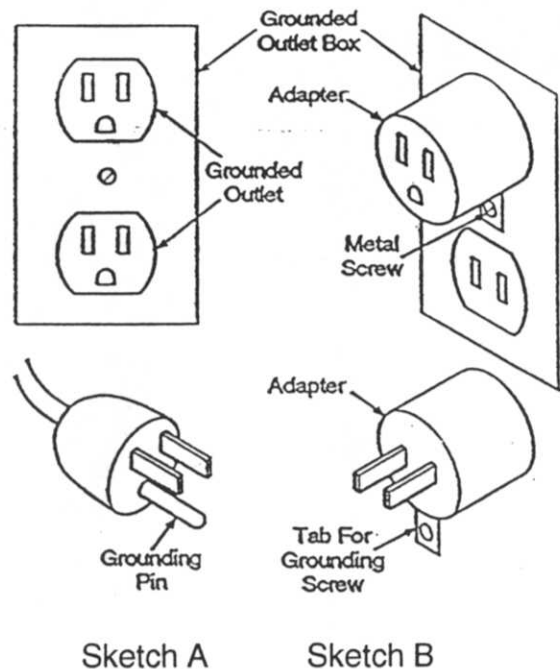
# GROUNDING METHODS

## GROUNDING INSTRUCTIONS

This appliance must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electrical current to reduce the risk of electric shock. This appliance is equipped with a cord having an equipment-grounding conductor and grounding plug. The plug must be plugged 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 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 temporary adapter that looks like the adapter illustrated in sketches B and C may be used to connect this plug to a 2-pole receptacle as shown in sketch B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet (sketch A) can be installed by a qualified electrician. The green-colored rigid ear, lug or the like, extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by a metal screw.

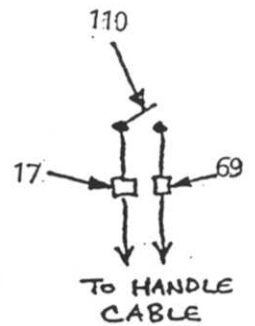
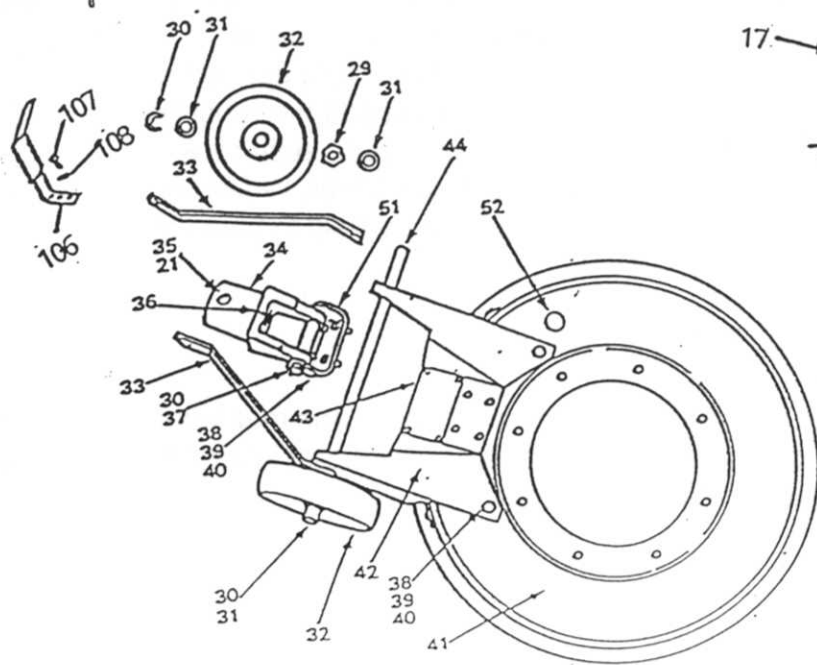
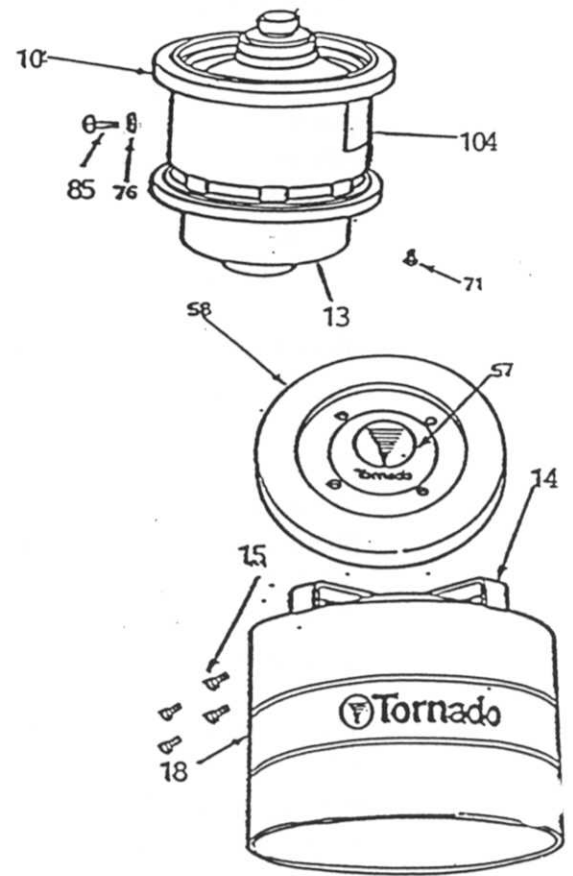
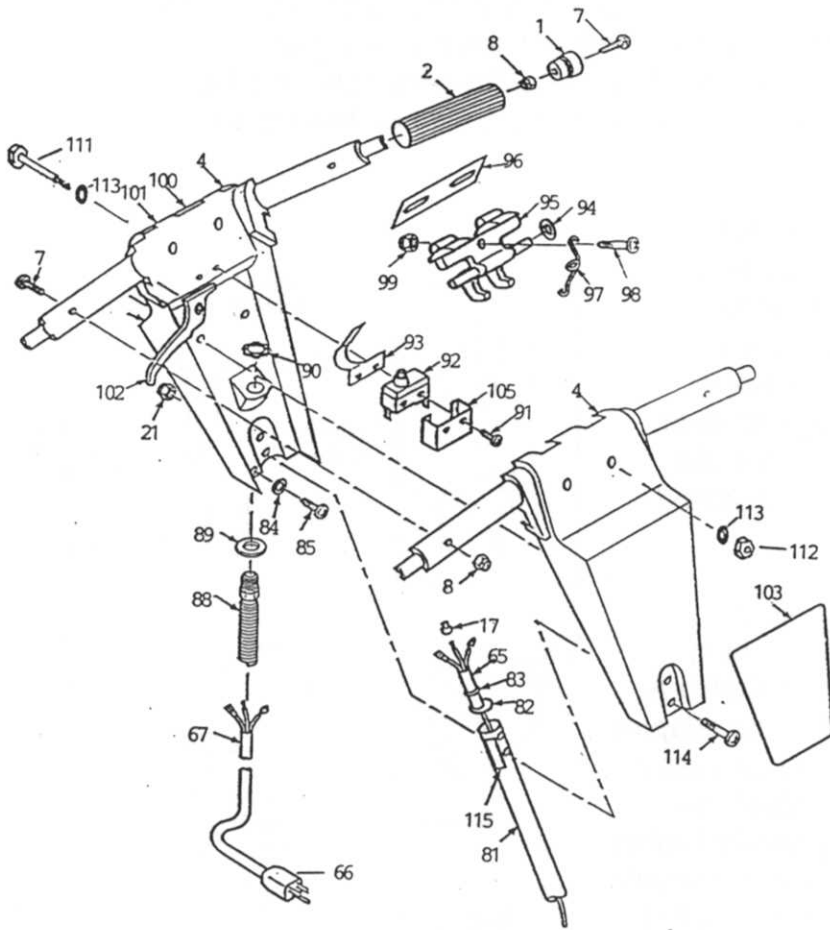


## EXTENSION CORDS

Use only three-wire extension cords that have three-prong grounding-type plug caps and three-pole receptacles that accept the appliance's plug. Replace or repair damaged cords.

# EXPLODED VIEW TORNADO

98473 BI-SPEED FLOOR MACHINE  
98480 BI-SPEED FLOOR MACHINE



## BI-SPEED FLOOR MACHINE PARTS LIST

ITEM NO.	QTY	PART NO.	DESCRIPTION	ITEM NO	QTY	PART NO	DESCRIPTION
1	2	17163	Handle Tip	83	1	01608	Hog Ring
2	2	17162	Handle Sleeve	84	2	01713	Lockwasher
4	1	18996	Handle Casting	85	2	10886	Screw
"	1	18997	Handle Casting	88	1	16168	Strain Reliever
7	4	07532	Screw	89	1	16159	Washer
8	4	07533	Locknut	90	1	16169	Locknut, Conduit
10	1	13000	Baffle	91	2	17167	Screw
13	1	18576	Gear Unit (See exploded view)	92	1	06685	Switch
14	1	14188	Cover Ring S/A-98480	93	1	17165	Switch-Spring
"	1	14497	Cover RingS/A-98473 & 98374	94	5	17245	Washer
15	4	01896	Screw	95	1	16154	Safety Lock
17	5	06824	Connector	96	1	17166	Escutcheon
18	1	12952	Decal	97	1	17157	Lock Spring
21	3	00067	Nut	98	1	03660	Screw
29	2	07723	Wave Washer	99	1	10894	Nut
30	4	03470	E-Ring	100	1	15228	Warning Label
31	6	03658	Washer	101	1	14413	Warning Label
32	2	14491	Wheel	102	2	18969	Lever
33	2	07517	Support Arm	103	1	16170	Nameplate, Handle
34	1	10019	Yoke Handle	104	1	18580	Motor-115v/60hz
35	1	04349	Screw	"	1	18592	Motor-250v/50hz
36	1	00058	Pin-Handle Tube Locator	105	1	17900	Switch Cover
37	1	07551	Shaft-Handle Yoke	106	1	10407	Cable Hook
38	10	02109	Screw	107	2	00685	Nut
39	10	01577	Lockwasher	108	2	01574	Lockwasher
40	10	07719	Nut	109	2	10398	Screw
41	1	11120	Base & Bumper Assy. 20"	110	1	19060	Speed Switch
"	1	18618	Base & Bumper Assy. 17"	111	2	18991	Screw-Shoulder
42	1	17620	Wheel Bracket-98480	112	2	19072	Nut-Hex
"	1	17621	Wheel Bracket-98473&98474	113	5	17245	1/4" Plain Washer
43	4	06374	Rivet	114	2	07536	5/16-18x2" Pan Hd Screw
44	1	13980	Wheel Shaft	115	1	16979	Decal-"Waring Risk of Exp....
51	1	07519	Handle Mounting Bracket	*	1	04145	Grommet
52	1	04054	Plug Button	*	1	12969	Sleeving
57	1	07648	Logo	*	1	13403	Strain Relief
58	1	12909	Top Cover	*	1	14471	Warning Decal
59	1	03868	Locknut	<b>MOTOR PARTS</b>			
60	1	07526	Clamp Band	*	4	23919	Carbon Brushes
61	1	07547	Eye Bolt	*	1	23934	Rectifier
62	1	01589	Nut, Hex Nylok	*	1	13138	Triac
63	1	03361	Screw	*	4	21007	Brush Spring
64	1	07883	Clamp, lever	*	1	13134	Bearing
65	1	18621	Cable, Handle	*	1	23923	Armature Assy. (w/fan)
66	1	08220	Plug, 115v	*	4	23924	Thru Bolt
"	1	02563	Plug, 230v	*	1	23935	Fan
67	1	04358	Cable & Plug, 115v	*	1	23936	End Bell Assy.
69	1	12966	Terminal	<b>PAD HOLDERS</b>			
71	4	17617	Screw 5/16-18x7/8 Hex Hd.	*	1	98548	20" High Speed Pad Holder
76	1	11077	Lockwasher	*	1	98533	17" High Speed Pad Holder
81	1	16171	Tube, Handle				
82	1	15226	Washer, Stain Relief				

\*\*NOT SHOWN

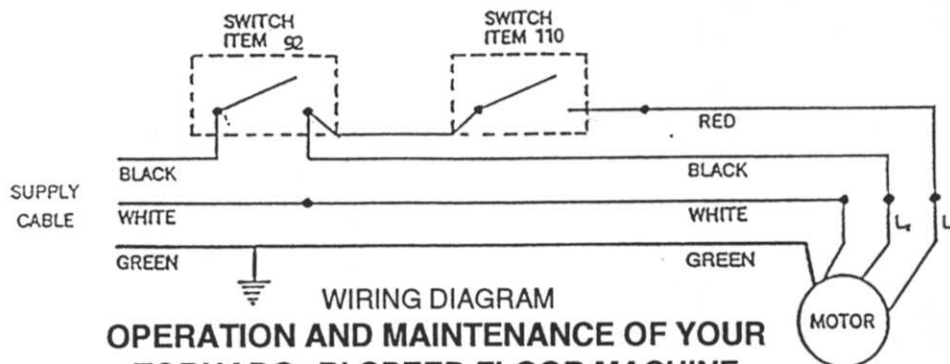
## GEAR UNIT SERVICE INSTRUCTIONS

### ASSEMBLY OF SMALL PARTS:

1. Press bearings (1) on pinion gear (13).
2. Press bearing (15) on cage.
3. Press bearings into cage. Insert planet gear (16) into cage and press spindle through cage into planet gear (16).
4. Press bearing into cover.
5. Be very careful when installing bearing not to damage bearings.
6. Check freedom of gears.

### ASSEMBLY OF UNIT:

1. Lightly press cage with planet gears in drive cover.
2. Fill drive cover with grease.
3. Install pinion with bearings into cage.
4. Assemble rotating cover on drive cover. Install six screws and tighten.
5. Assemble end shield (8) on top of rotating cover. Install spacer (3), and insert screw on with lockwashers (5) and tighten.



## OPERATION AND MAINTENANCE OF YOUR TORNADO® BI-SPEED FLOOR MACHINE

### OPERATION AND MAINTENANCE OF YOUR TORNADO BI-SPEED FLOOR MACHINE

This manual contains vital information for the safe use and efficient operation of this machine. Carefully read this operator's manual before starting the machine, and retain for future reference. Instruct all operators to read this manual. **FAILURE TO ADHERE TO THESE INSTRUCTIONS COULD RESULT IN SERIOUS BODILY INJURY OF PROPERTY DAMAGE. OPERATOR AND SAFETY INSTRUCTIONS**

1. You must be trained in the operation of this machine before use. Please read this manual carefully and obtain operation instructions from your safety director or your authorized Tornado distributor.
2. Your Tornado floor machine is ready for operation as soon as it is unpacked. Remove machine from pallet and discard bolts. No further disassembly or assembly is required.
3. To adjust handle to desired height, loosen clamp lever, adjust handle to desired height and tighten clamp lever.
4. Plug cable to wall receptacle making sure the voltage and cycles correspond with that indicated on nameplate. Never operate this machine unless plug is grounded, failure to ground could cause electrical shock.

This appliance is equipped with a three-conducted cable and three-prong grounding type plug to fit grounding type receptacle. Do not break off or pull out the grounding prong on plug. Adapters are available for connecting three-prong grounding type plugs to two-prong

receptacles. The grounding wire or terminal extending from the adapter must be connected to a permanent ground such as to a properly grounded electrical Outlet Box. If cable becomes frayed or damaged in any manner replace. Otherwise possible electric shock may result.

5. Movement of machine in operation is controlled by raising or lowering handles lightly. Raise handle to travel to the right. To make it travel to the left, lower the handle.
6. Do not run brush or pad into or over electrical power cable. The resulting reaction could cause a violent handle reaction to the operator or damage the cable.
7. Do not leave this machine plugged into the power source while unattended.
8. Do not expose to rain-Store indoors. Do not use machine in areas where flammable and or explosive vapors or dust are present.
9. Always unplug electrical cable from wall outlet before attempting repairs or maintenance by qualified personnel only.

### ATTACHING BRUSH OR PAD HOLDER

Be sure cable is not plugged into wall outlet. To attach on brush or pad holder raise handle to upright position and tighten. Tilt machine back on wheels until handle rests on floor. Rotate brush or pad holder against coupler until the three lugs drop into place and turn lightly counter-clockwise until locked. To remove, turn clockwise until lugs of coupler are free and then lift off. For long life and best results always use genuine Tornado parts.



**CAUTION - UNIT MUST BE UNPLUGGED BEFORE SERVICING**



**PAD PLACEMENT INSTRUCTIONS**

1. Remove center section of pad.
2. Place pad on floor.
3. Place pad holder on pad, bristle side down-making sure pad overlaps pad holder uniformly.
4. Turn over pad holder assembly by grasping pad and pad holder together (pad holder will not "grab" pad yet).
5. Firmly depress pad with thumbs to engage Center-Lok mechanism. (Note: Do not force pad below Center-Lok bristles.)
6. Repeat Step 5 while rotating assembly until the pad is uniformly secured.
7. Mount pad holder assembly on machine.

**OPERATION**

Low speed used for wet scrubbing and stripping. Apply cleaning or stripping solution directly to floor surface with a mop. Scrub surface with the proper brush or pad. Be sure the surface does not dry before recovery of solution. Recover solution with wet/dry vacuum.

Do not use Bi-Speed for rotary brush shampooing.

High speed used for polishing and spray buffing. Prior to either procedure clean the floor surface. Polishing or burnishing is a dry procedure. Use proper brushes or pads. Spray buffing with either an aerosol system or hand held trigger sprayer, the spray buff solution should be applied away from the machine. For best results the spray buff material should be buffed out within two to three passes.

**STORING**

Store Bi-Speed in a upright position. Do not store with brush, pad holder and/or mounted on the machine.

**MAINTENANCE**

Clean machine after each use with a damp cloth. If cleaning solution is required, prevent solution from getting into motor. Wrap cable around cable hook and handle by running the cable through a damp cloth. Check for cable damage and repair if necessary.

**MOTOR MAINTENANCE**

This machine is equipped with a permanent magnet motor. Check carbon brush wear every 500 hours of use. Check carbon brush wear every 500 hours of use. Replace when brushes are 3/8" long. (Carbon motor brushes should be replaced only by an authorized service representative.)

**TO INSPECT CARBON BRUSHES**

1. Unplug cable
2. Unscrew (4) screws at top of motor cover. Remove motor cover and cover ring. Brushes (4) are accessible inside large openings near top of motor.

**EXTENSION CABLE**

Use only three wire 12 or 14 gauge extension cables that have three prong grounding type plugs and three poly receptacles that accept the machines plug. Replace or repair all damaged cables.

**OPERATION OF MACHINE**

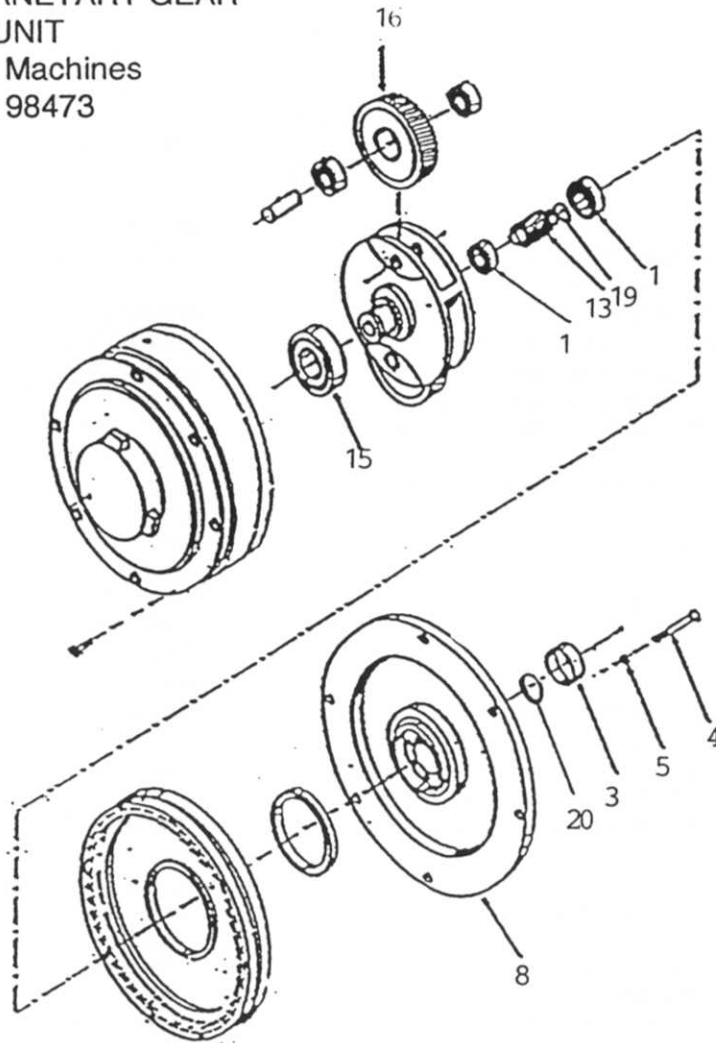
Your TORNADO Floor Machine is ready for operation as soon as it is unpacked. Remove machine from the pallet and discard bolts. No further assembly or disassembly is required. To adjust handle to desired height, loosen clamp lever, adjust handle to desired height and tighten clamp lever. Connect cable to wall receptacle making sure that voltage and hertz correspond with that indicated on name plate. Right or left switch levers will independently operate motor. THE LOCKOUT LEVER MUST BE PUSHES FORWARD FROM THE OPERATORS POSITION TO UNLOCK SWITCH LEVERS. Movement of machine in operation is controlled by raising or lowering handle lightly. Care should be taken to keep cable away from rotating brush.

**TROUBLE SHOOTING HIGH SPEED WOBBLE**

Your Tornado Bi-Speed has been tested and found to be wobble free with the dynamically balanced pad holder supplied with this machine. If you encounter excessive wobbling not the following:

1. Check the pad - you will encounter wobbling if:
  - A) The pad is thicker on one side then the other
  - B) Using worn or damaged pads
  - C) Pad is not centered properly on pad holders
  - D) Using non-approved pad holders
  - E) Storing pad and/or pad holder on the machine
  - F) Not storing pad holder and pads properly
2. New Pad Break In  
Most new pads need a break in time from 5 to 10 minutes in low speed. This levels and smoothes the pad out. You are now ready to use the high speed.  
CAUTION: If the machine is left unattended, resting on the pad for any period of time you may encounter wobbling. Repeat the above procedure to smooth out pad.
3. Pad Holder Adjustment
  - A) Due to variations, in rubber, the pad holder may initially cause some machine wobble. Heeling machine from side to side will correct this situation.
  - B) If the wobbling persists with the above precautions and procedures, rotate the pad holder to another lug position. Mark this position with a marker for future placement.

Exploded View of PLANETARY GEAR  
REDUCTION UNIT  
For TORNADO Floor Machines  
Code 98480 & 98473



**PLANETARY GEAR  
REDUCTION UNIT  
18576**

NOTE: (1) Refill gear unit with 8 1/2oz of SHELL DARINA EP2 Grease

INDEX NO.	PART NO.	DESCRIPTION	QTY. REG.
1	04179	Bearing	2
3	11732	Spacer Sleeve	1
4	11733	Cap Screw	6
5	11007	Lockwasher	6
8	23925	End Shield	1
13	11742	Pinion Shaft	1
15	05715	Needle Bearing	1
16	11743	Idler Gear	3
*	11745	Grease (8.5oz)	1
19	05702	Coupler	1
20	23937	Retainer Ring	1

\*NOT SHOWN