

# OPERATION MANUAL

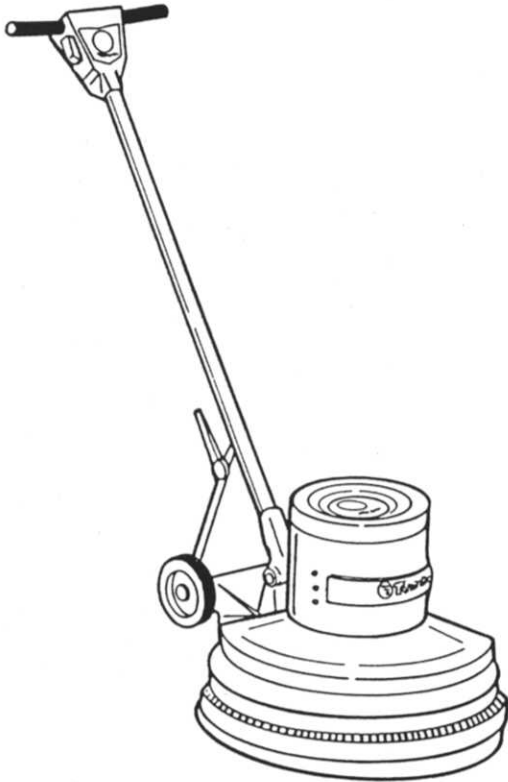


## BI-SPEED FLOOR MACHINE

CODE	8470C	8480C		
SPEED (RPM)	220/360	190/330		
SIZE	16"	20"		

NOTE: ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

UL LISTED  
C.S.A. CERTIFIED



### WARNING

TO AVOID ELECTRICAL  
SHOCK DO NOT EXPOSE  
TO RAIN, STORE INDOORS

### IMPORTANT

Before operating your Tornado<sup>®</sup> machine, make sure the current used is the same as indicated on the nameplate attached to the motor cover.

### WARRANTY

Your Tornado<sup>®</sup> Machine has been thoroughly tested and inspected and is warranted to be free of defects in material and workmanship for the **period specified in the Long Term Buyer Protection Plan**. This warranty does not cover normal wear items such as carbon brushes, belts, filters, power cords, squeegee blades, wheels, and switches. Other items may apply or not apply based on your specific Tornado<sup>®</sup> machine. If such defects occur, this warranty is voided if service is attempted by non Authorized Tornado<sup>®</sup> Service Depots.

PROTECT YOUR INVESTMENT  
BE SURE TO FILL OUT AND  
RETURN THE WARRANTY CARD.

**BREUER<sup>®</sup> ELECTRIC MFG. CO.**

7401 W. LAWRENCE AVENUE • CHICAGO, IL 60656-3489

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CCI 3/91 500

(708) 867-5100 • FAX (708) 867-6968

# 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

**Never operate this machine unless plug is grounded - failure to ground could cause electrical shock.**

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 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 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.

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 wall receptacle correspond with that indicated on nameplate before plugging in machine. 20 circuit recommended. Right or left switch amp levers will independently operate motor.

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

Use only 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 also will upset the balance and may cause motor overload.

If the pad holder needs to be replaced, be sure to specify genuine TORNADO® holder when ordering to assure precision balance of your machine.

**To avoid electrical shock** do not expose to rain or 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.

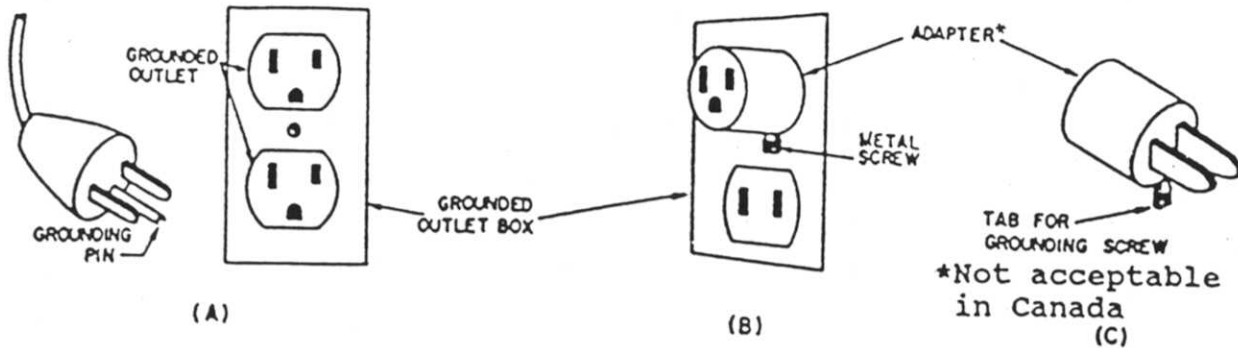
Disconnect before servicing.

Do not store with pad on the 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 electric 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.

**DANGER:** 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 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 which have three-prong grounding-type plug caps and three-pole receptacles that accept the appliance's plug. Extension cords should be the equivalent or a size heavier than the input cord. Replace or repair damaged cords.

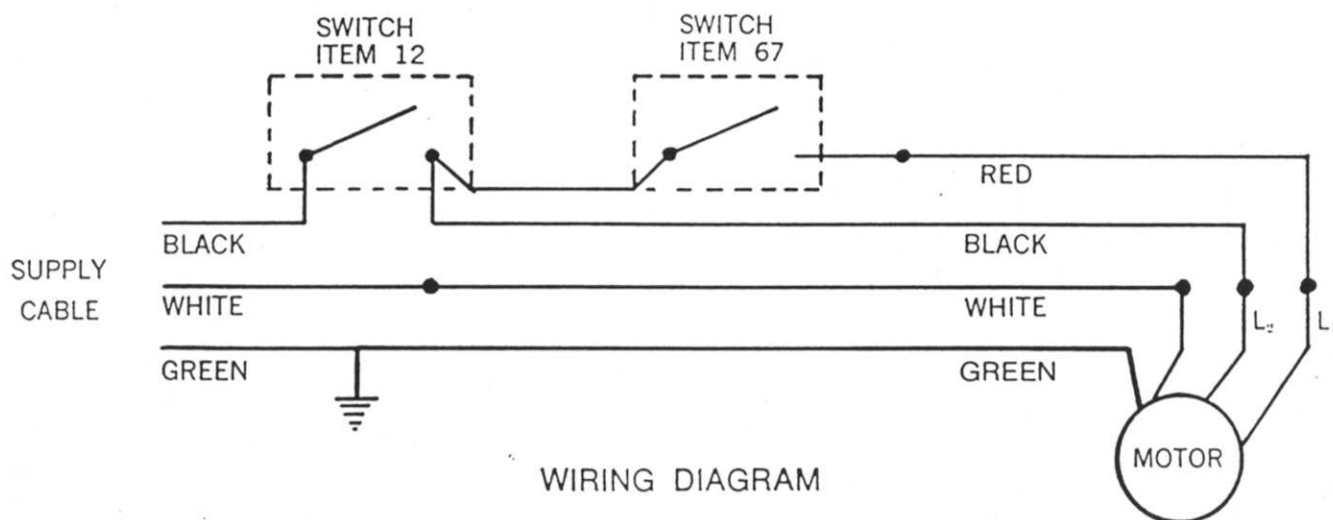
## GEAR UNIT SERVICE INSTRUCTIONS

### ASSEMBLY OF SMALL PARTS:

1. Press bearings (1) on pinion gear (13).
2. Press bearing (15) on cage (12).
3. Press bearings (17) into cage (12). Insert planet gear (16) into cage (12) and press spindle (18) through cage into planet gear (16).
4. Press bearing (7) into cover (9).
5. Be very careful when installing bearing not to damage bearings.
6. Check freedom of gears.

### ASSEMBLY OF UNIT:

1. Lightly press cage (12) with planet gears in drive cover (10).
2. Fill drive cover (10) with grease (19).
3. Install pinion with bearings into cage.
4. Assemble rotating cover (9) on drive cover (10). Install six screws (11) and tighten.
5. Assemble end shield (8) on top of rotating cover (9). Install spacer (3), and insert screws 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 OR 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 the 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 grounded, failure to ground could cause electric shock.

This appliance is equipped with a three-conductor 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 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 1

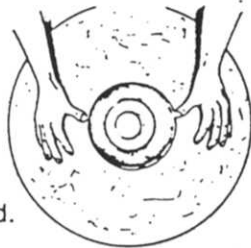
travel to the right. To make it travel to the left, lower the handle.

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.
10. Service repairs or maintenance by qualified personnel only.

### ATTACHING BRUSH OR PAD HOLDER

Be sure cable is not plugged into wall outlet. To attach a 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 slightly 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 a wet/dry vacuum.

Do not use Bi-Speed for rotary brush shampooing.

High speed used for polishing and spray buffing. Prior to other 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. Do not spray solution onto or into 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 pad 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. 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 14 or 12 gauge extension cables that have three prong grounding type plugs and three-pole 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 PUSHED 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 note the following.

1. **Check the pad** - you will encounter wobbling if
  - A) The pad is thicker on one side than the other
  - B) Using worn or damaged pads
  - C) Pad is not centered properly on pad holder
  - D) Using non-approved pad holder
  - 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**

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 Tornado

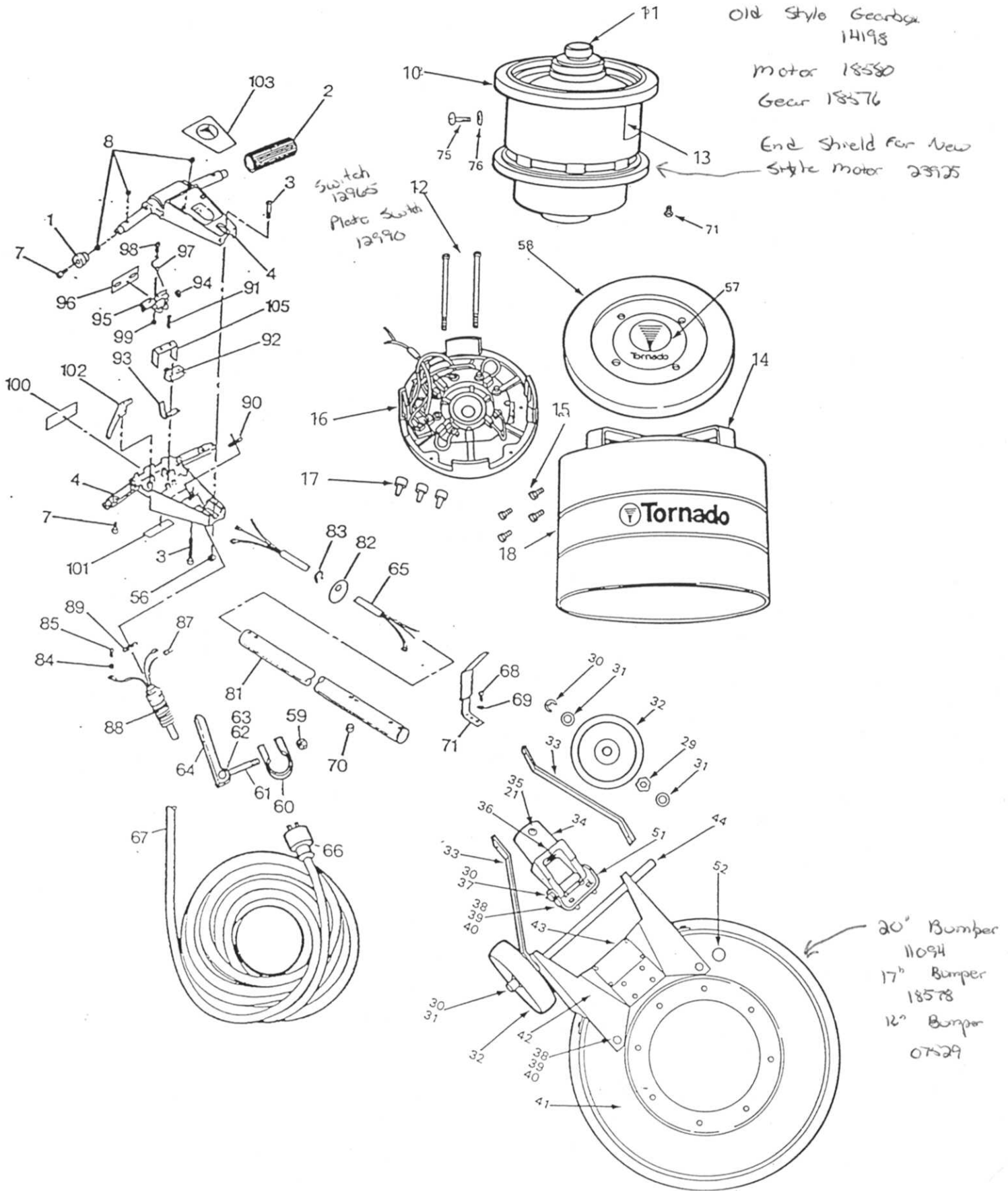
# 8470 BI-SPEED FLOOR MACHINE 8480 BI-SPEED FLOOR MACHINE

250 Bi-Speed motor  
18592

Old Style Gearbox  
14198

Motor 18580  
Gear 18576

End Shield for New  
Style motor 23525



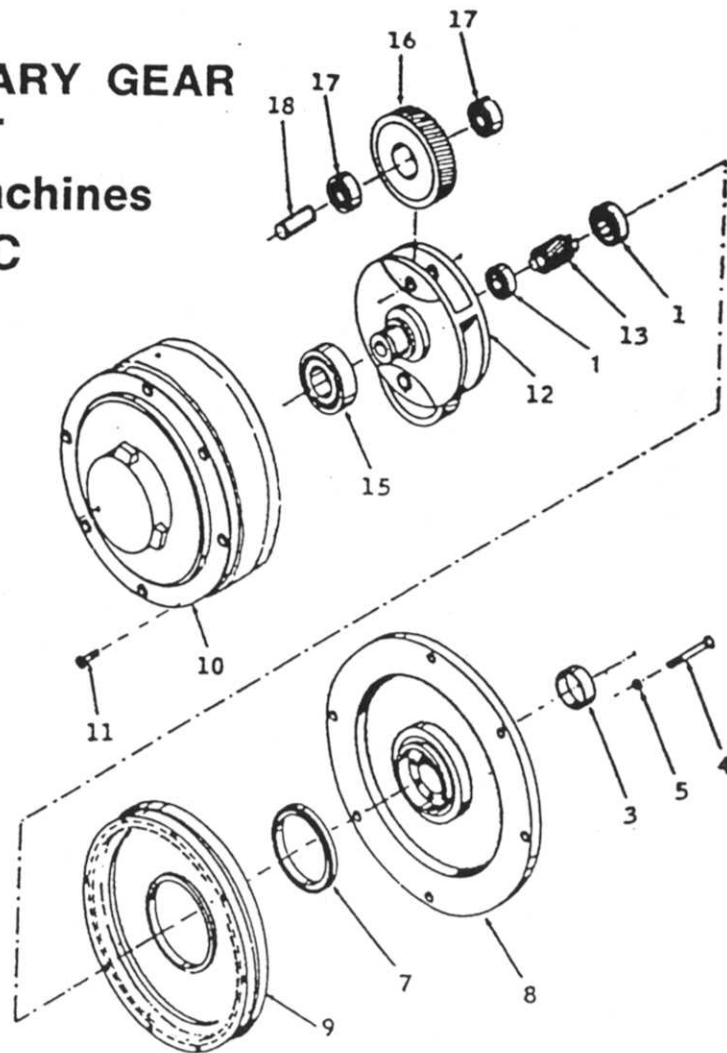
Item No.	Qty.	Part No.	Description
1	2	17163	Handle Tip
2	2	17162	Handle Sleeve
3	4	16156	Screw
4	1	17170	Handle Casting
	1	17164	Handle Casting
7	6	7532	Screw
8	6	7533	Locknut
10	1	13000	Baffle
11	1	20998	Armature (complete)
12	1	20997	Bolt Hex Hd. 1/4-28 X 6"
13	1	14194	Motor & Gear Unit Assy. 115v 60Hz
14	1	14188	Cover Ring S/A - 8480
	1	14467	Cover Ring S/A - 8470
15	1	1896	Screw
16	1	14099	End Bell S/A
17	4	6824	Connector
21	3	67	Nut
29	2	7723	Wave Washer
30	4	3470	E-Ring
31	6	3658	Washer
32	2	14491	Wheel
33	2	7517	Support Arm
34	1	10019	Yoke Handle
35	1	4349	Screw
36	1	58	Pin-Handle Tube Locator
37	1	7551	Shaft-Handle Yoke
38	6	2109	Screw
39	6	1577	Lockwasher
40	6	7719	Nut
41	1	11120	Brush Skirt/Bumper S/A-8480
	1	7903	Brush Skirt/Bumper S/A-8470
42	1	17620	Wheel Bracket-8480
	1	17621	Wheel Bracket-8470
43	4	6374	Rivet
44	1	13980	Wheel Shaft
51	1	7519	Handle Mounting Bracket
52	1	4054	Plug Button
56	3	67	Nut
57	1	7648	Logo
58	1	12909	Top Cover
59	1	3868	Locknut
60	1	7526	Clamp Band
61	1	7547	Eye Bolt
62	1	1589	Nut, Hex Nylok
63	1	3361	Screw
64	1	7883	Clamp, Lever
65	1	15486	Cable, Handle
66	1	8220	Plug, 115v
	1	2563	Plug, 230v
67	1	4358	Cable & Plug, 115v
	1	4359	Cable & Plug, 230v
68	1	14468	Handle Half-8470
69	1	12966	Terminal
71	4	17617	Screw 5/16-18 X 7/8 Hex Hd.
75	1	3261	Screw
76	1	11007	Lockwasher

Item No.	Qty.	Part No.	Description
81	1	10395	Tube, Handle
82	1	12962	Washer, Strain Relief
83	1	1608	Hog Ring
84	2	1713	Lockwasher
85	2	10886	Screw
87	1	6824	Connector
88	1	16168	Strain Reliever
89	1	16159	Washer
90	1	16169	Locknut, Conduit
91	2	17167	Screw
92	1	6685	Switch
93	1	17165	Switch-Spring
94	1	17245	Washer
95	1	16154	Safety Lock
96	1	15228	Label
97	1	17157	Lock Spring
98	1	3660	Screw
99	1	10894	Nut
100	1	15228	Warning Label
101	1	14413	Warning Label
102	2	16152	Lever
103	1	11802	Nameplate, Handle
Motor Parts*			
	4	13667	Carbon Brushes
	1	13954	Rectifier
	1	13138	Triac
	4	21007	Brush Spring
Gear Parts*			
	1	21003	End Shield
	1	5702	Coupling

\*-Not Shown



**Exploded View of PLANETARY GEAR  
REDUCTION UNIT  
For TORNADO Floor Machines  
Code 8480C & 8470C**



NOTE: (1) Refill gear unit with 8½ oz. of SHELL DARINA EP2 Grease

**PLANETARY GEAR  
REDUCTION UNIT  
FOR 14194 MOTOR  
AND GEAR UNIT  
14352 Motor  
and Gear Unit**

INDEX NO.	PART	DESCRIPTION	QUAN. REQ.
1	4179	BALL BEARING	2
3	11732	BRG. SPACER	1
4	11733	CAP—SCREW	6
5	5705	LOCKWASHER	6
7	5707	INBOARD CAGE BEARING	1
8	21003	END SHIELD	1
9	11737	HOUSING COVER	1
10	11738	DRIVE HOUSING	1
11	11739	DRIVE HOUSING SCREW	6
12	11823	CAGE—3 PLANET	1
13	11742	PINION SHAFT	1
15	5715	OUTBOARD CAGE BEARING	1
16	11743	IDLER GEAR	3
17	5717	SPINDLE BEARING	6
18	11744	SHAFT	3
*	11745	GREASE (8½ OZ.)	1

\*NOT SHOWN