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**THE BI-SPEED FLOOR MACHINES**



**CATALOG NOS.**  
**98473, & 98480 (115V, 60Hz)**  
**98474 (230V, 50Hz)**

**OPERATIONS MANUAL / ILLUSTRATED  
PARTS**

Form No. L2136H 4/99 FOR COMMERCIAL USE ONLY  
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## NOTES

This instruction book covers:

<b>CATALOG NO.</b>	<b>98473</b>	<b>98480</b>	<b>98474</b>
<b>SERIES</b>	<b>H</b>	<b>J</b>	<b>G</b>
<b>SIZE</b>	<b>17"(43cm)</b>	<b>20" (51cm)</b>	<b>17"(43cm)</b>
<b>HORSE POWER</b>	<b>1-1/2</b>	<b>1-1/2</b>	<b>1-1/2</b>
<b>VOLTS</b>	<b>115V</b>	<b>115V</b>	<b>250V</b>
<b>AMPS</b>	<b>14.5</b>	<b>15</b>	<b>7.5</b>
<b>CERTIFICATION</b>	<b>*</b>	<b>*</b>	



All specifications are subject to change without notice.

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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.

# IMPORTANT SAFETY INSTRUCTIONS FOR COMMERCIAL USE

WHEN USING AN ELECTRICAL APPLIANCE, BASIC PRECAUTIONS SHOULD ALWAYS BE FOLLOWED INCLUDING THE FOLLOWING:  
READ ALL INSTRUCTIONS BEFORE USING THIS MACHINE

## WARNING: TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY:

Do not leave machine when plugged in. Unplug from outlet when not in use and before changing pads or attempting any maintenance or adjustment. If handle switch lever is activated accidentally, high starting torque will cause machine to move and may cause damage or injury.

To avoid electrical shock, Use indoors only. Do not use outdoors and 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.

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

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 machine over cord. Keep cord away from heated surfaces. Do not unplug by pulling on cord. To unplug, grasp the plug not the cord. Do not handle plug or machine with wet hands.

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

Turn off all controls before unplugging

Connect to a properly grounded outlet only. See Grounding Instructions.

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.

**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 use machine in areas where flammable and/or explosive vapors or dust are present. To avoid fires do not use with a flammable or combustible liquid to clean a floor.

Make sure voltage and frequency at the wall receptacle correspond with that indicated on nameplate 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 plug of the machine.

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

Do not hop the brush or pad holder onto the machine.

**SAVE THESE INSTRUCTIONS**

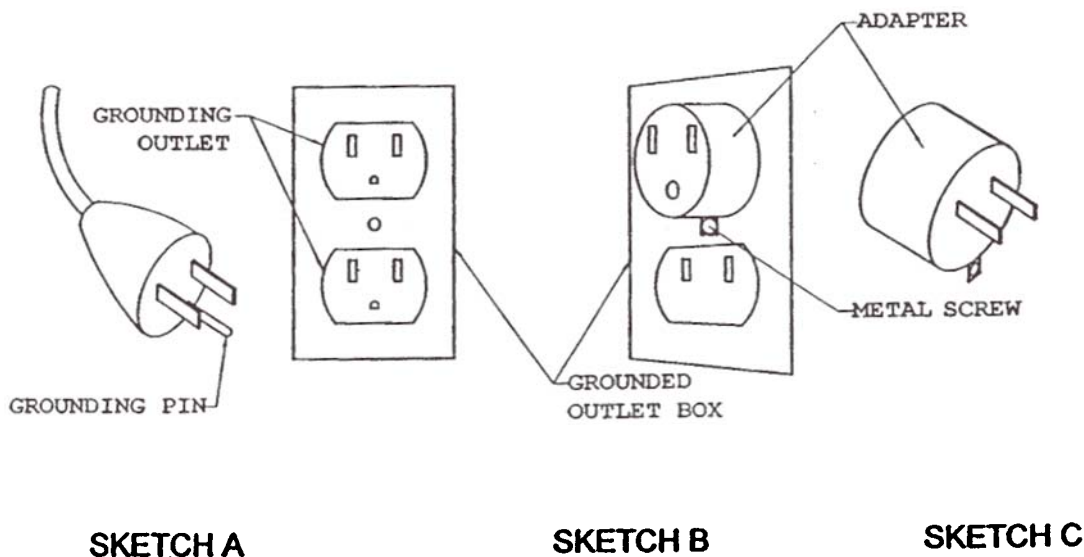
## GROUNDING INSTRUCTIONS

This appliance must be grounded. If it should malfunction or breakdown, of 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 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 qualified electrician can install a properly grounded outlet (sketch A). The green-colored rigid car, 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.

**Note:** In Canada, the use of a temporary adapter is not permitted by the Canadian Electrical Code.



## **WHEN THE MACHINE IS DELIVERED**

Check the carton carefully for signs of rough handling. Remove the machine from the carton and look for concealed damage. If the machine is damaged, notify the carrier immediately and request an inspection. Be sure to keep the carton, packing inserts, packing lists and carrier's receipt until the inspector has verified your claim.

## **BEFORE OPERATING THE MACHINE**

Read the manual carefully and completely before attempting to operate the unit. This manual has important information for the use and safe operation of the machine. **FAILURE TO ADHERE TO THESE INSTRUCTIONS COULD RESULT IN SERIOUS BODILY INJURY OF PROPERTY DAMAGE.** Keep this manual on file and handy. This machine will assure years of satisfactory service if operated and maintained according to recommendations in the manual. If additional information is needed, please contact your local distributor or call:

**TORNADO INDUSTRIES  
7401 W. LAWRENCE AVE  
CHICAGO, IL 60706  
708/867-5100  
FAX: 708/867-6968**

All information and specifications printed in the manual and parts list are current at the time of printing. However, because of Tornado's policy of continual product improvement, we reserve the right to make changes at any time without notice.

## **WARRANTY**

*To protect your investment, promptly fill out the required information on the warranty card that comes with the unit and mail it back to Tornado Industries*

**Note: Service repair and warranty work is not normally handled at the factory.**

## **WARNING**

*The machine was designed for use on floors as per instructions and recommendations written in this manual. Any deviation from its proper use or purpose and the consequential damage that may occur is the sole responsibility of the end user.*

## GENERAL PRECAUTIONS

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.

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 use Bi-Speed Floor machine for rotary brush shampooing, scarifying, or sanding.

Care should be taken to keep cable away from rotating brush.

Do not attempt to repair warranted machines. All repairs must be done by a qualified and authorized repair center. Non warranted repairs will be billed back to the owner of the unit.

Do not use any replacement parts except those specified in the parts list. Unauthorized parts will void the warranty and could cause the unit not to function properly.

**FAILURE TO COMPLY WITH THE ABOVE WARNING INSTRUCTIONS  
WILL VOID THE WARRANTY**

## EXTENSION CORD

If an extension cord is used, use only a three wire 12 gauge extension cord that has three prong grounding type plugs and three prong receptacles that accept the machines plug. Your Bi-Speed Floor machine is equipped with a 14-gauge power cord. Replace or repair all damaged cables.

## PREPARING THE MACHINE

Your Bi-Speed Floor machine is shipped complete and ready for use. Remove machine from pallet and discard bolts. No further disassembly or assembly is required. Prior to operation, familiarize yourself with these operating instructions.

## PAD PLACEMENT/INSTALLATION INSTRUCTIONS

Place pad on floor.

Place pad holder on pad, bristle side down-making sure pad overlaps pad holder uniformly.

Turn over pad holder assembly by grasping pad and pad holder together (pad holder will not "grab" pad yet).

Firmly depress pad with thumbs to engage Center-Lok mechanism. (Note: Do not force pad below Center-Lok bristles.)

Mount pad holder assembly on machine.

## ATTACHING BRUSH OR PAD HOLDER

Be sure cable is not plugged into wall outlet. To attach brush or pad holder raise handle to upright position and tighten the handle tube clamp lever. 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 accessories.

## OPERATING THE BI-SPEED FLOORMACHINE

To adjust handle to desired height, loosen clamp lever, adjust handle to desired height and tighten clamp lever. Plug cable to wall receptacle making sure the voltage and cycles correspond with that indicated on nameplate.

**THE LOCKOUT LEVER MUST BE PUSHED FORWARD FROM THE OPERATORS POSITION TO UNLOCK SWITCH LEVERS.** Right or left switch levers will independently operate motor. Raising or lowering handles lightly controls movement of machine in operation. Raise handle to travel to the right. To make it travel to the left, lower the handle.

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.

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.

#### DAILY OR REGULAR MAINTENANCE

**WARNING:** Always unplug the Bi-Speed Floor machine before cleaning, making adjustments or repairs.

- Check the condition of the floor pad or brush, replace when necessary. Pad holders and brushes must be properly maintained to insure maximum cleaning results.
- Wipe the entire machine down with a general purpose cleaner.
- Raise the handle tube in the up storage position.
- Wipe down the cord when wrapping the power cord for storage. Tuck the last 12" of the cord through the wrapped cord. Do not make a knot at the plug end.
- Store the Bi-Speed Floor machine in an upright position. Do not store with Brush and/or Pad Holder mounted on machine.
- Check for cable damage and repair if necessary.

#### PERIODIC MAINTENANCE

Be sure to use Tornado genuine parts and that an authorized Tornado Service center provides service.

#### TROUBLE SHOOTING HIGH SPEED WOBBLE

Your Tornado Bi-Speed Floor machine has been tested and found to be wobble free with the dynamically balanced pad holder supplied with this machine. If you encounter excessive wobbling do 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 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.

#### MOTOR MAINTENANCE

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

#### 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.

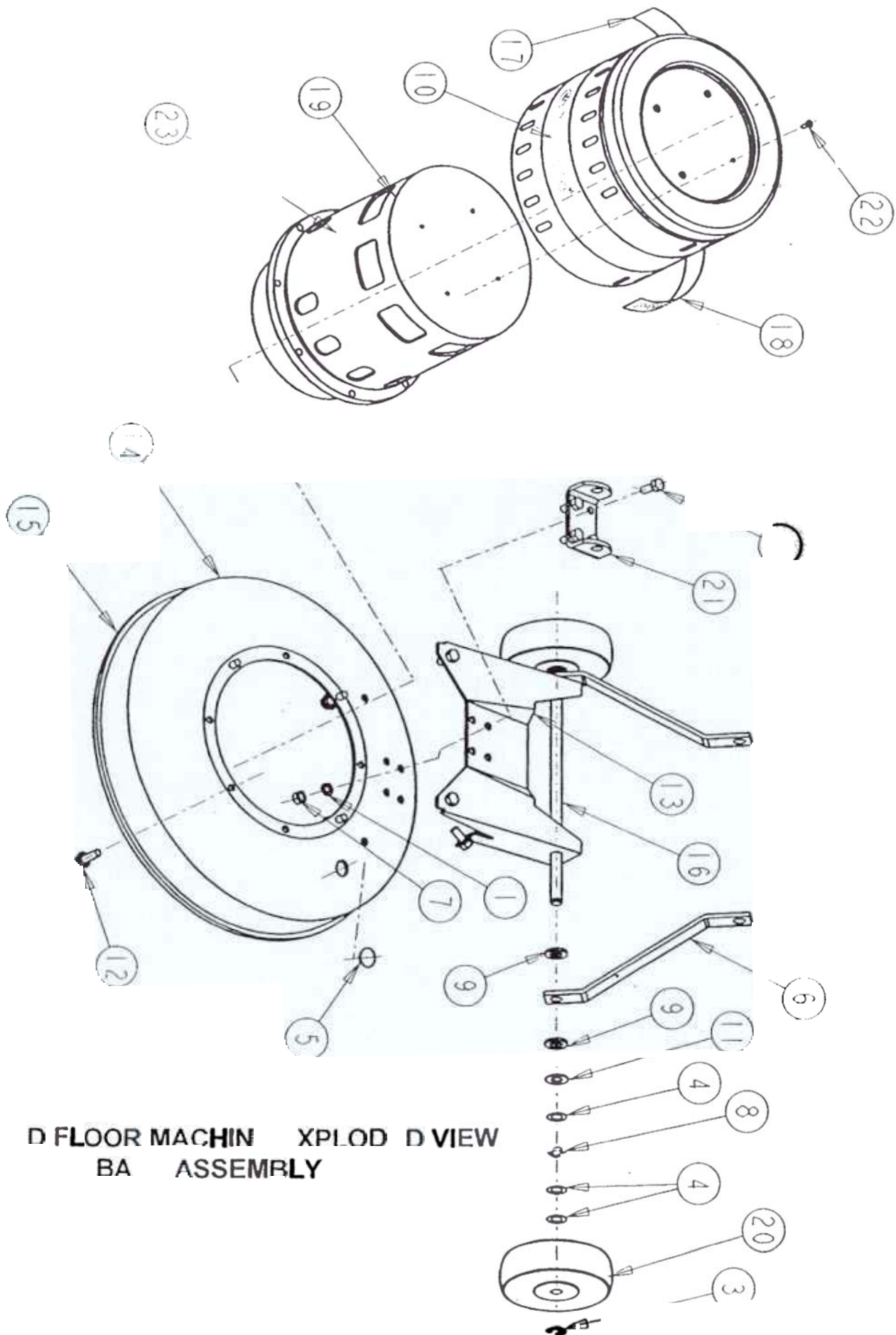


**BI-SPEED FLOOR MACHINE  
98473 & 98480 (115V), 98474 (230V)  
BASE ASSEMBLY**

ITEM NO	PART NO	DESCRIPTION	QTY
1	01577	WASHER-LOCK (17" UNIT ONLY)	8
	01577	WASHER-LOCK (20" UNIT ONLY)	10
2	02109	SCREW- HEX. HEAD CAP (17" UNIT ONLY)	8
	02109	SCREW- HEX. HEAD CAP (20" UNIT ONLY)	10
3	03470	RETAINING RING - 1/2 "E"	2
4	03658	WASHER-PL. 1/2"	6
5	04054	PLUG-HOLE 11/64" DIAMETER	1
6	07517	ARM-HANDLE TUBE PIVOT SUPPORT	2
7	07719	NUT-HEX. (17" UNIT ONLY)	8
	07719	NUT-HEX. (20" UNIT ONLY)	10
8	07723	WASHER-SPRING 1/2"	2
9	12554	WASHER-PLAIN 1/2" (PLASTIC)	4
10	12952	FRONT DECAL	1
11	16581	WASHER-PLAIN 1/2"	2
12	17617	SCREW-HEX FLANGED	4
13	17621	BRACKET-WHEEL MOUNTING (17" UNIT ONLY)	1
*	17620	BRACKET-WHEEL MOUNTING (20" UNIT ONLY)	1
14	18577	BASE-17"	1
*	17624	BASE-20"	1
15	18578	BUMPER-BASE 17"	1
	11094	BUMPER-BASE 20"	1
16	19335	AXLE	
17	19347	LABEL-"CAUTION..."	
18	19346	LABEL-"IF CONNECTED"	
19	18580	MOTOR/GEAR UNIT ASSEMBLY 1.5HP; 115V	
	18592	MOTOR/GEAR UNIT ASSEMBLY 1.5HP; 230V	1
20	19447	WHEEL-5" DIAMETER (GREY)	2
21	07519	BRACKET-HANDLE TUBE MOUNTING	1
22	01896	SCREW - FLAT HEAD	4
23	13000	BAFFLE	1
(24)	10886	SCREW - T.R.T. PAN HEAD	1
(25)	11007	WASHER - LOCK	1
(26)	04145	GROMMET	1

\* ITEM TO BE USED WHERE APPLICABLE

( ) ITEM NOT SHOWN



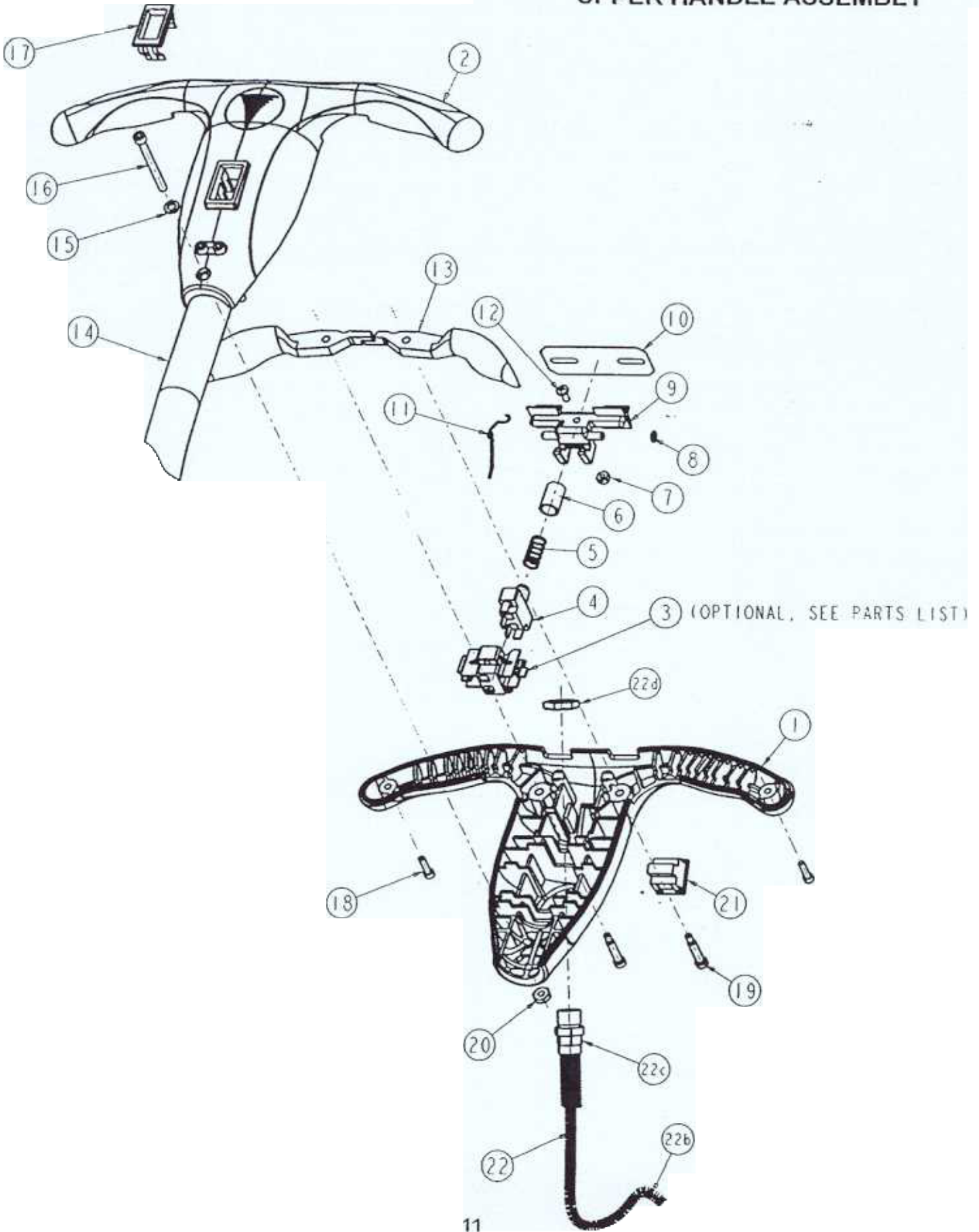
II-SP D FLOOR MACHIN XPLOD D VIEW  
 BA ASSEMBLY

**BI-SPEED FLOOR MACHINES**  
**98473, 98480 (115V, 60Hz)**  
**98474 (230V, 50Hz)**  
**UPPER HANDLE ASSEMBLY**

ITEM NO	PART NO	DESCRIPTION	QTY
1	19359	HANDLE - REAR HALF	
2	19360	HANDLE - FRONT HALF	
3	19926	CARRIER	
4	19932	SWITCH, PUSHBUTTON	
	19357	SWITCH, PUSHBUTTON (230V)	1
5	19922	SPRING, COMPRESSION STEEL MUSIC WIRE	1
6	19924	CAP - PLASTIC (ABS)	1
	19915	CAP - NYLON (230V)	1
7	10894	NUT - HEX LOCK (P/T) #10-24	1
8	19211	WASHER - PLAIN 1/4"	1
9	19651	LEVER LOCK	1
10	19615	ESCUTCHEON - LOCK LEVER	1
11	17157	SPRING - LEVER LOCK RETURN	1
12	03660	SCREW - PAN HEAD #10-24 x 7/16"	1
13	19358	LEVER - HANDLE SWITCH	2
14	19465	HANDLE TUBE	1
15	01574	WASHER - LOCK (H/S) 1/4"	3
16	19619	SCREW - SOCKET HEAD CAP 1/4-20 x 2-1/2"	3
17	30212	LARGE ROCKER	1
18	19351	SCREW - SOCKET HEAD CAP #10-24 x 3/4"	2
19	18991	SCREW - SHOULDER 1/4"D x 1"	2
20	19618	NUT - HEX JAM (HVY) 1/4-20	3
21	19350	COVER - HANDLE AUX. SWITCH OPENING	
22	19348	ASSEMBLY - POWER CORD (115V)	
*	19458	ASSEMBLY - POWER CORD (230V)	1
(22a)	15139	TERMINAL - Q.D. FEMALE	2
22b	19378	CORD - POWER (115V)	1
*	19457	CORD - POWER (230V)	1
22c	30260	STRAIN RELIEF, # 121 BRASS	1
22d	30261	NUT - METAL ZINC/CLEAR	1

\* ITEMS TO BE USED WHERE APPLICABLE  
 ( ) ITEM NOT SHOWN

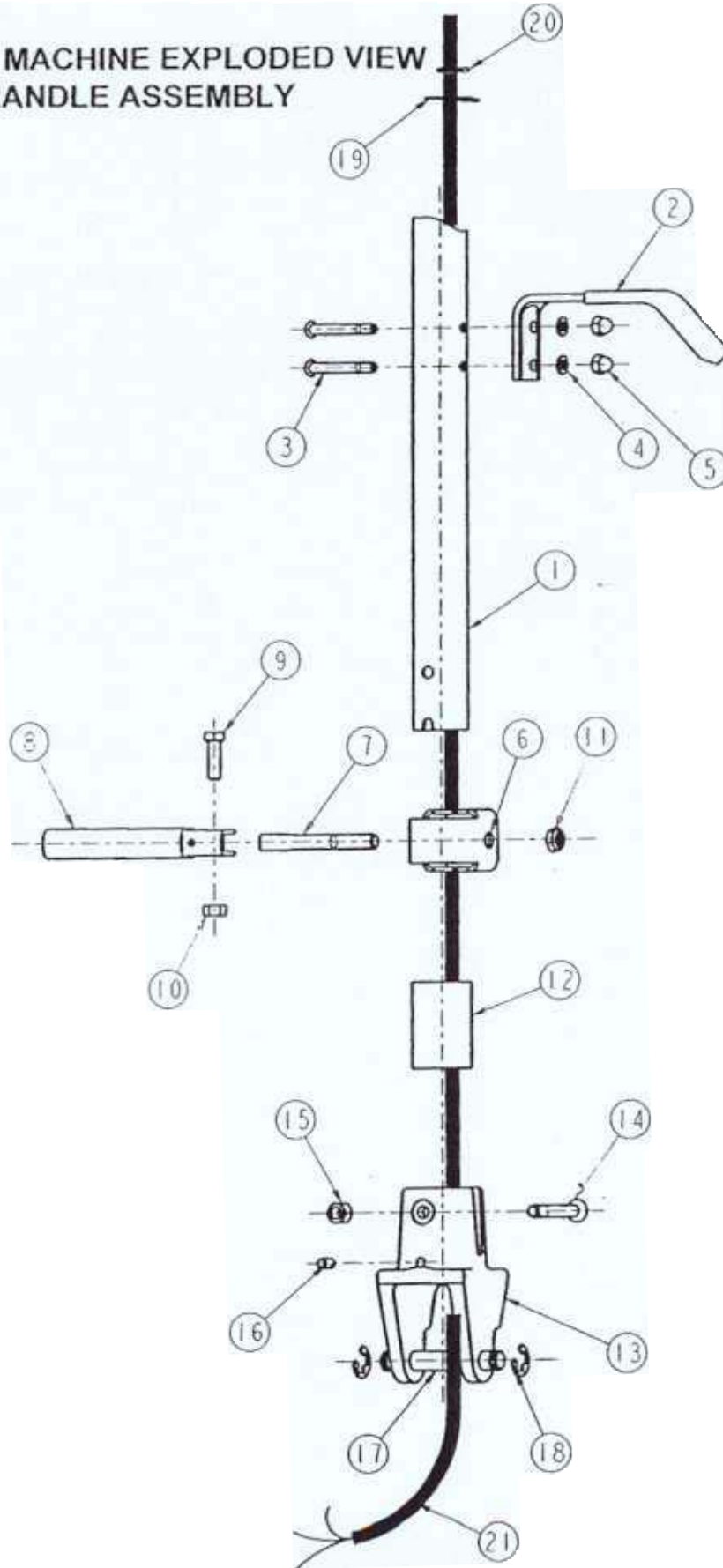
# BI-SPEED FLOOR MACHINE EXPLODED VIEW UPPER HANDLE ASSEMBLY



**BI-SPEED FLOOR MACHINES**  
**98473, 98480 (115V)**  
**98474 (230V)**  
**LOWER HANDLE ASSEMBLY**

ITEM NO	PART NO	DESCRIPTION	QTY
1	19465	HANDLE TUBE	
2	10407	ASSEMBLY-CABLE HOOK	
3	10398	SCREW-ROUND HEAD	2
4	01574	WASHER-LOCK (H/S) 1/4"	2
5	00685	NUT-ACORN	2
6	07526	BRACKET-HANDLE TUBE CLAMP	1
7	07547	PIVOT-HANDLE TUBE CLAMP LEVER	1
8	07883	ASSEMBLY-HANDLE TUBE CLAMP	1
9	03361	SCREW-HEX HEAD CAP	1
10	01589	NUT-HEX LOCK (P/T NYLOK)	1
11	03868	NUT-HEX LOCK (NYL INS)	1
12		ITEM IS NOT APPLICABLE ***ITEM IS NOT APPLICABLE****	0
13	10019	YOKE-HANDLE	1
14	04349	SCREW-OVAL HEAD	1
15	00067	NUT-HEX LOCK	1
16	00058	PIN-GROOVED	1
17	07551	PIN-HANDLE YOKE PIVOT	1
18	03470	RING-RETAINING EXT."E"	2
19	15226	STRAIN RELIEF WASHER	1
20	01608	HOG RING	1
21	19464	ASSEMBLY - HANDLE CABLE	

BI-SPEED FLOOR MACHINE EXPLODED VIEW  
LOWER HANDLE ASSEMBLY

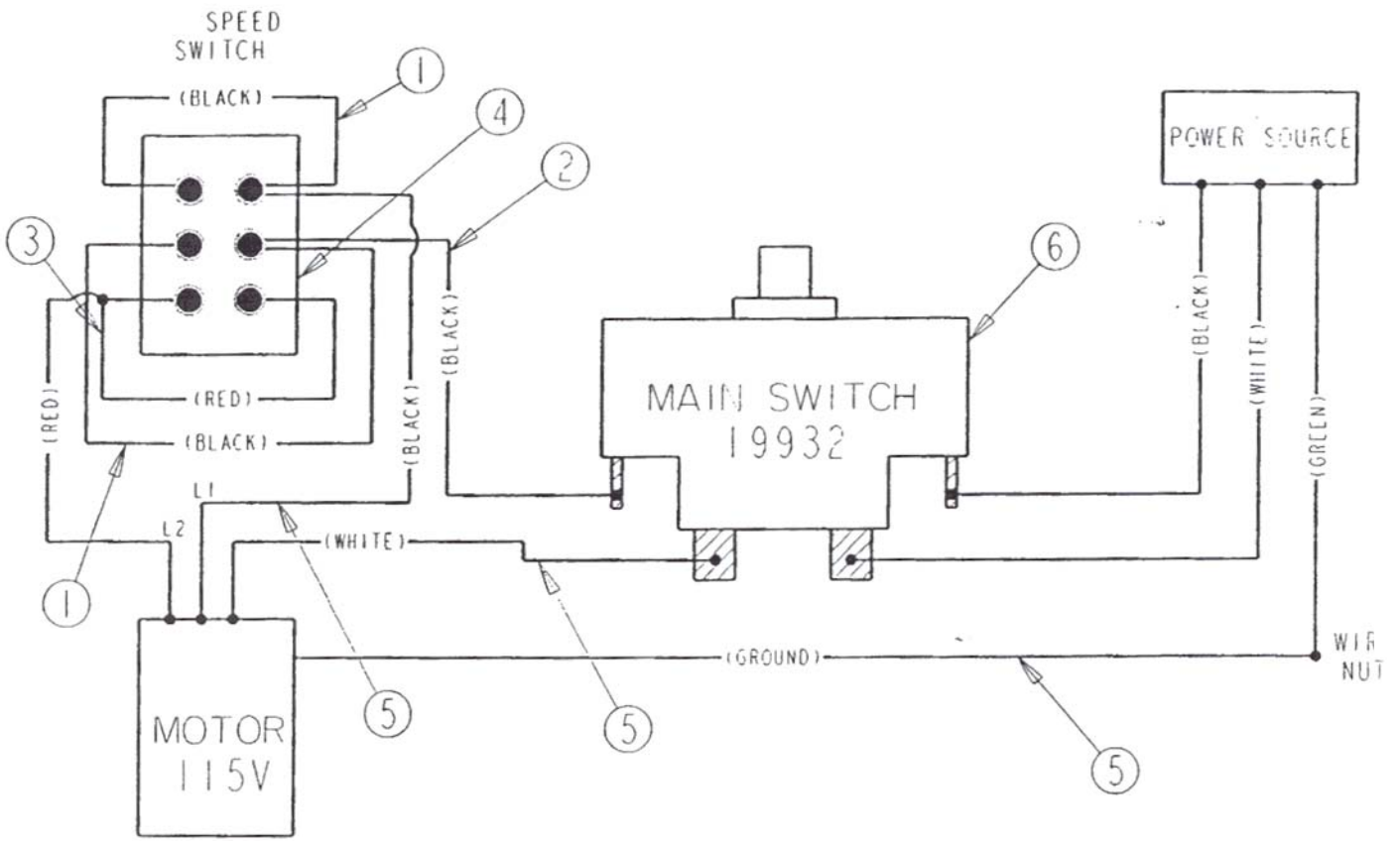


**BI-SPEED FLOOR MACHINE  
98473 & 98480 (115V)  
WIRING DIAGRAM**

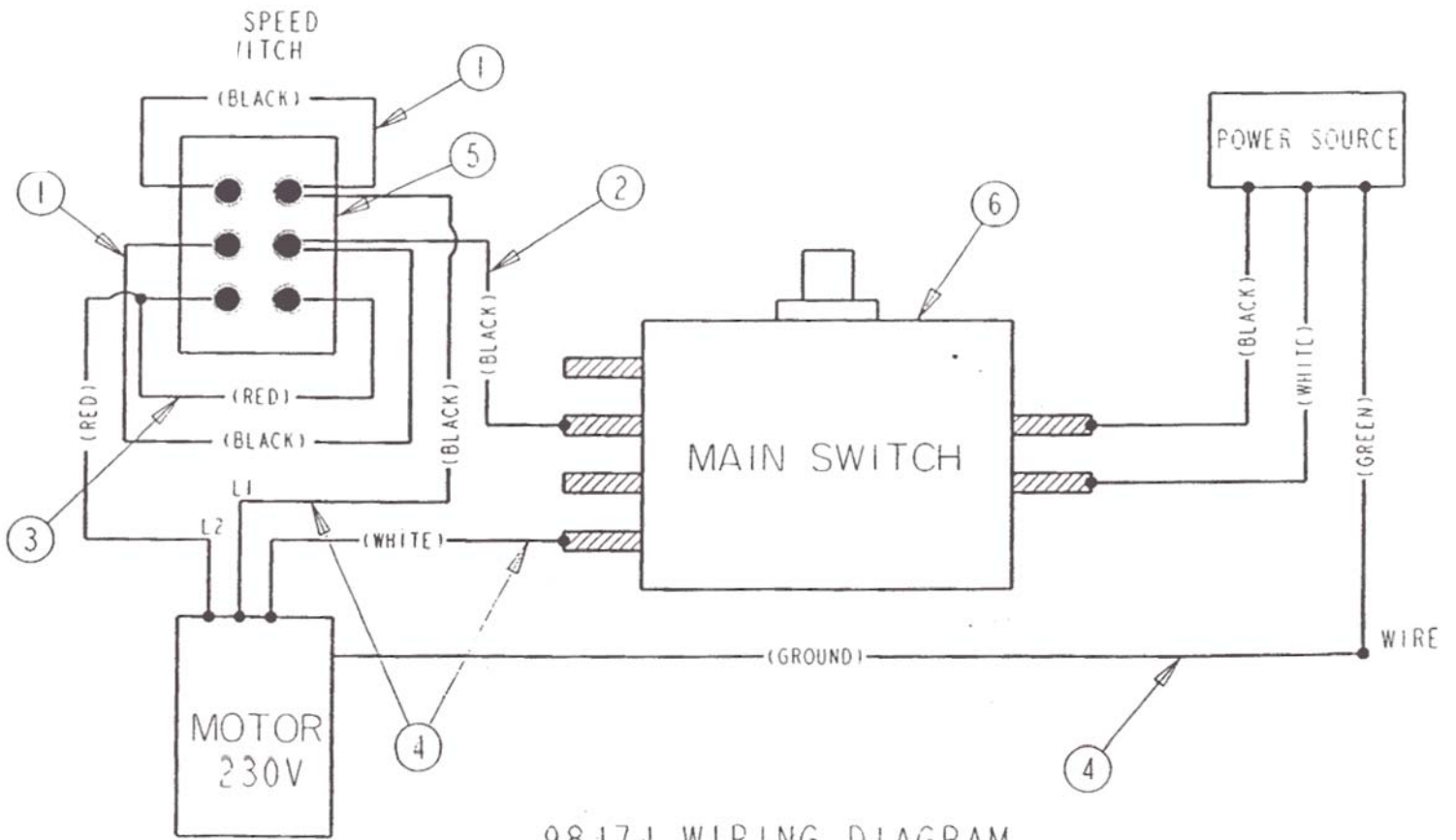
ITEM NO	PART NO	DESCRIPTION	QTY
1	19466	LEAD-14 GA. x 3" BLACK	2
2	19467	LEAD-14 GA. x 3" BLACK	1
3	19468	LEAD-14 GA. x 3" RED	1
4	30212	SWITCH - ROCKER	1
5	19464	ASSEMBLY - HANDLE CABLE	1
6	19932	SWITCH, PUSHBUTTON	1

**BI-SPEED FLOOR MACHINE  
98474 (230V)  
WIRING DIAGRAM**

ITEM NO	PART NO	DESCRIPTION	QTY
1	19466	LEAD-14 GA. x 3" BLACK	2
2	19467	LEAD-14 GA. x 3" BLACK	1
3	19468	LEAD-14 GA. x 3" RED	1
4	19464	ASSEMBLY - HANDLE CABLE	1
5	30212	SWITCH - ROCKER	1
6	19357	SWITCH, PUSHBUTTON	1



4 ND 98480 NG AG AM



98474 WIRING DIAGRAM