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Find the *Wheaton 348960* at our website: ***Click HERE***

Wheaton Instruction Manual

http//www.wheatonsci.com

Modular Cell Culture Roller Apparatus

348940-348948,
348960-348968

Models A and B

Includes Instructions for Options

Battery Back-Up

349017

Rotation Alarm

349011

1501 N. 10th St. Millville, NJ 08332-2093 T + 800-225-1437 / 856-825-1100 F + 856-825-1368

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Rev. 6/22/99
50028944 Rev. 2/16/99

WARRANTY

Wheaton Science Products warrants this product to be free from defects in material and workmanship for a period of one (1) year from the date of shipment. If repair or adjustment is necessary within the warranty period and has not been the result of mishandling or abuse, the unit may be returned prepaid, provided that return authorization has been obtained. Wheaton Science Products will correct the defect or adjust the unit at no charge.

Items returned for repair or adjustment should be packed very carefully to prevent damage and should also be insured against carrier damage. Should the unit arrive damaged as a result of transit, a claim will need to be made against the carrier. The shipping carton should not be discarded but retained until inspection by a representative of the carrier is made.

Wheaton Science Products will repair or adjust out of warranty products at a nominal charge.

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GENERAL SAFETY INSTRUCTIONS

NOTE: EVEN THE SAFEST EQUIPMENT CAN CAUSE INJURY IF THE USER IS CARELESS.

1. **KNOW YOUR INSTRUMENT** - Read the operating manual carefully. Learn the equipment's application and limitations.

2. **GROUND ALL EQUIPMENT** - If electrical, this instrument is equipped with a grounding type plug. The green/yellow conductor in the cord is the grounding wire and should never be connected to a live terminal.

3. **AVOID DANGEROUS ENVIRONMENT** - Electrical instruments designed to process liquids must be operated with extreme caution. If liquid comes in contact with internal electrical components or wires, fire or electrical shock may occur. Adequate surrounding work space should be provided during use. Do not operate electrical instrumentation in a combustible atmosphere.

4. **WORK SURFACE** - Keep well lighted. Be certain the work surface is clean, level and sturdy enough to support the weight of the unit, particularly if it is to be filled with liquid.

5. **WEAR PROPER APPAREL** - Do not wear loose clothing, neckties or jewelry that might get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.

6. **WEAR SAFETY GOGGLES** - Wear safety goggles at all times. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.

7. **DON'T OVERREACH** - Keep proper footing and balance at all times.

8. **MAINTAIN INSTRUMENT WITH CARE** - Keep screws tight and unit clean. Check periodically for worn or damaged parts. Inspect the plug and cord before each use. Do not operate this instrument if there are signs of damage.

9. **AVOID ACCIDENTAL START UP** - If electrical, always make sure the switch is in the "OFF" position before plugging instrument into outlet.

10. **DISCONNECT INSTRUMENT** - Always disconnect the instrument from the power source before servicing.

11. **DO NOT BLOCK COOLING VENTS IF PROVIDED**

12. **DO NOT OPERATE THIS EQUIPMENT IN ANY MANNER NOT SPECIFIED IN THIS MANUAL**

13. **KEEP THE OPERATING MANUAL FOR THE INSTRUMENT IN A SAFE PLACE NEAR THE INSTRUMENT FOR QUICK AND EASY REFERENCE.**

14. **IT IS RECOMMENDED THAT A FIRE EXTINGUISHER ALWAYS BE LOCATED IN AREAS WHERE ELECTRICAL INSTRUMENTS ARE BEING USED.**

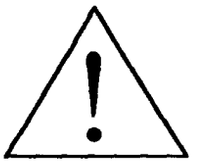
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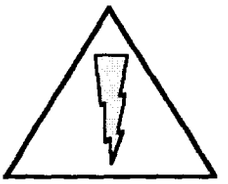
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SAFETY SYMBOLS USED IN THIS MANUAL



A Warning symbol indicates attention to an operation that can cause operator injury, improper function of or damage to the equipment and possible problems with the process.



A Danger symbol indicates attention to an operation that could cause electrocution or severe injury or death.

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COMPLIANCE NOTICE

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1.0 **SPECIFICATIONS** - MODULAR ROLLER APPARATUS

OPERATING VOLTAGE:	110-120 VAC 50/60 Hz
POWER CONSUMPTION:	35 watts
BOTTLE SPEED:	0.25 to 5.3 RPM
INSTALLATION CATEGORY:	Class II
ENVIRONMENTAL:	
Operating temperature:	15 °C to 40 °C
Humidity:	80% up to 31°C. 50% at 40°C.
Altitude limit	2000 meters

DIMENSIONS AND CAPACITIES

CATALOG #	STANDARD DRIVE	POSITIONS	WIDTH X DEPTH X HEIGHT	WEIGHT
348940	BASE w/1 DECK	5	29 3/4" x 24 3/8" x 13 ½"	70 LBS
348941	BASE w/2 DECKS	10	29 3/4" x 24 3/8" x 20 5/8"	91 LBS
348942	BASE w/3 DECKS	15	29 3/4" x 24 3/8" x 27 ¾"	112 LBS
348943	BASE w/4 DECKS	20	29 3/4" x 24 3/8" x 34 7/8"	133 LBS
348944	BASE w/5 DECKS	25	29 3/4" x 24 3/8" x 42"	154 LBS
348945	BASE w/6 DECKS	30	29 3/4" x 24 3/8" x 49 1/8"	175 LBS
348946	BASE w/7 DECKS	35	29 3/4" x 24 3/8" x 56 ¼"	196 LBS
348947	BASE w/8 DECKS	40	29 3/4" x 24 3/8" x 63 3/8"	217 LBS
348948	BASE w/9 DECKS	45	29 3/4" x 24 3/8" x 70 ½"	238 LBS
348949	DECK ONLY	5	29 3/4" X 24 3/8" x 7 1/8"	21 LBS

CATALOG #	ALL POSITION DRIVE	POSITIONS	WIDTH X DEPTH X HEIGHT	WEIGHT
348960	BASE w/1 DECK	5	29 3/4" x 24 3/8" x 13 ½"	70 LBS
348961	BASE w/2 DECKS	10	29 3/4" x 24 3/8" x 20 5/8"	91 LBS
348962	BASE w/3 DECKS	15	29 3/4" x 24 3/8" x 27 ¾"	112 LBS
348963	BASE w/4 DECKS	20	29 3/4" x 24 3/8" x 34 7/8"	133 LBS
348964	BASE w/5 DECKS	25	29 3/4" x 24 3/8" x 42"	154 LBS
348965	BASE w/6 DECKS	30	29 3/4" x 24 3/8" x 49 1/8"	175 LBS
348966	BASE w/7 DECKS	35	29 3/4" x 24 3/8" x 56 ¼"	196 LBS
348967	BASE w/8 DECKS	40	29 3/4" x 24 3/8" x 63 3/8"	217 LBS
348968	BASE w/9 DECKS	45	29 3/4" x 24 3/8" x 70 ½"	238 LBS
348969	DECK ONLY	5	29 3/4" X 24 3/8" x 7 1/8"	21 LBS

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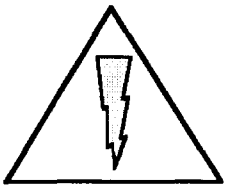
2.0 INTRODUCTION

The Wheaton Modular Roller Apparatus allows large-scale propagation of monolayer cell cultures in standard glass and plastic roller bottles. Extra decks can be added to existing units as modular requirements expand – up to 9 decks total.

The Wheaton Modular Roller Apparatus uses a powerful DC gear motor and can accommodate bottles 108-121 mm in diameter and up to 550 mm in length, with a bottle speed range of 0.25 to 5.3 rpm assuming 110 mm bottles.

If short roller bottles are utilized, twice as many bottles may be placed on the apparatus. To provide ease of operation, all controls are conveniently located on the front panel. A locking speed control prevents accidental changes in drive speed, while a reference meter permits replication of speed settings.

3.0 GENERAL INFORMATION



This section contains a general description of the Wheaton Modular Roller Apparatus. This section also contains instructions for initial inspection, installation and connecting the Roller Apparatus to ac power.

3.1 SAFETY CONSIDERATIONS

WARNING ! IMPROPER GROUNDING CAN RESULT IN ELECTRICAL SHOCK. IN THE EVENT OF A SHORT CIRCUIT, GROUNDING REDUCES THE RISK OF SHOCK. THIS INSTRUMENT MUST BE GROUNDED.

1. This instrument is equipped with a cord having a grounding wire and an appropriate grounding plug. The plug must be used with an outlet that has been installed and grounded in accordance with all local codes and ordinances. The outlet must have the same configuration as the plug. DO NOT USE AN ADAPTER.

2. Do not modify the line cord that has been provided. If it does not fit the available outlet, contact your nearest Wheaton distributor for the proper line cord for your area.

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3.2 COMPONENT DESCRIPTIONS

Refer to Figure A for component identification.

Power inlet module: Location of the line cord entry. Contains the fuse and voltage selection module.

Step Down Transformer: Steps down line voltage if 220V operation is selected.

Motor Controller Board #4: Controls the 90VDC motor. Speed is set by turning the adjustment knob.

Motor: Turns all the rollers of the rack via two main belt trains running down the back of the roller rack.

Rotation Alarm (option): Senses roller rotation and provides an audible and visual alarm in case of rotation failure.

Battery Backup (option): Provides backup power to the motor in case of power outage. Backup speed is independent of main speed and is controlled by adjusting backup speed knob.

Two options are available for Wheaton Modular Roller Apparatus. These include a rotation alarm system and a battery back-up system. The rotation alarm and battery back-up systems are housed within the control unit of the apparatus.

In the event of drive belt breakage, motor or other drive system failures, the rotation alarm will display a flashing LED and audible alarm. A remote jack is also provided for connection to an external monitoring system.

The battery back up provides auxiliary power to the apparatus in the event of power failure. The unit features an automatic charger and heavy-duty rechargeable batteries for reliable operation and long life. The battery backup system also provides independent control of bottle speeds from 0.25 to 1.5 rpm for a duration of 24 hours.

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3.3 INITIAL INSPECTION

When you receive your Modular Roller Apparatus, inspect it for any obvious damage that may have occurred during shipment. If any damage is found, notify the carrier at once. Warranty information is shown in the front of this manual. Check to confirm that there are no broken switches, displays and pulleys that the unit is not dented or scratched.

3.4 INSTALLATION

Install the unit where there will be adequate room for the unit to operate. Provide enough clearance around the unit so as to keep items away from the rotating belts and pulleys.

3.5 INPUT POWER REQUIREMENTS

This equipment is designed to operate from a nominal 115V single phase AC power source at 47 to 63 Hz. An indication on the rear of the unit shows the nominal input voltage set for the unit at the factory. See Figure H.

3.6 POWER LINE CORD

This unit has been shipped from the factory with a power line cord that has a plug appropriate for your area. If the wrong power cord has been shipped for your particular application, contact your nearest Wheaton dealer for the proper cord. The Modular Roller Apparatus has been equipped with a 3-wire grounding type power cord. The unit is only grounded when it is plugged into an appropriate receptacle. Do not operate the unit without adequate grounding protection.

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4.0 OPERATION (see figure I)



CAUTION: Keep hands and fingers away from rotating parts of the machine. Do not remove any safety guards or operate the machine without the safety guards.

IMPORTANT: This apparatus was designed to run partially filled bottles for standard cell culture applications. Please consult Wheaton engineering if you have any special application which requires full bottles.

1. Plug the unit into an appropriate source of AC power.

2. Turn the unit on by depressing the power switch.

3. Adjust the speed control for the desired rotation speed and lock the control into position with the hex locking nut on the control shaft.

4. The relative speed of the drive system is displayed on the front panel meter. Readings shown are not actual bottle rpm values, but relative values directly proportional to motor speed. The meter provides a convenient method of reproducing relative motor speed settings.



CAUTION! A fully loaded roller apparatus is extremely heavy, care should be taken when moving the equipment while it is loaded with bottles.

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ADDENDUM FOR 50028944 MANUAL

The following replaces text in above named manual.

ITEM: 5.1 MOTOR LUBRICATION SCHEDULE

PAGE: 13

When operating under normal conditions, check motor oil level every 4 to 5 months.

Refer to Fig O.

Remove motor and refill gear head to the indicated oil level with a good quality rust and oxidation inhibited oil conforming to AGMA #5 (SAE #50 non-detergent) with a viscosity range of 918-1122 SUS @ 38°C (100°F), viscosity index of 90 minimum, and pour point of –18°C (0°F) maximum. (Bodine Lubricant #L0-38) **DO NOT OVERVFILL!**

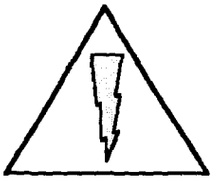
To obtain replacement oil, look for a distributor near you at: www.bodine-electric.com.

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5.0 MAINTENANCE - FOR QUALIFIED SERVICE PERSONNEL ONLY



DANGER! NEVER ATTEMPT TO PERFORM REPAIRS IF THIS INSTRUMENT IS PLUGGED IN! IN ORDER TO AVOID SERIOUS ELECTRIC SHOCK OR ELECTROCUTION, THIS INSTRUMENT MUST BE DISCONNECTED FROM THE SOURCE OF AC POWER BEFORE IT IS WORKED ON.

As with any piece of laboratory equipment, periodic inspection for worn and/or damaged parts should be performed on a regular basis in order to maintain optimum performance. How often is dependent upon usage, working environment, speed, etc.

5.1 MOTOR LUBRICATION SCHEDULE (SEE FIG. C)

When operating under normal conditions, check motor oil level every 4 to 5 months or 600 operating hours, whichever occurs first. Refill gearhead to the indicated oil level with a good quality rust and oxidation inhibited oil conforming to AGMA #5 (SAE #50 non-detergent) with a viscosity range of 918-1122 SUS at 38°C viscosity index of 90 minimum and pour point of -18°C max. Do not overfill.

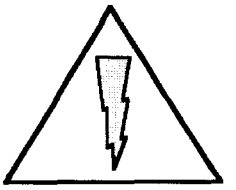
5.2 INSTRUMENT MAINTAINENCE SCHEDULE

Item	Action	Interval
Roller Bearings	Roller bearings are greaseless and require no lubrication. Inspection is required for physical damage only.	Once a year
Rubber Rollers	Check rollers for residue buildup. Rollers can be wiped down with Alcohol or a common household spray cleaner.	At each harvest interval
Nuts, Bolts msc Hardware	Check for general tightness, replace missing hardware	Once a year
Drive Belts (black)	Replace belts if frayed or internal cords are showing	Once a year
Horizontal Belts (clear)	Replace belts if excessively yellow or cracked	Every six months
Pulleys	Check for tightness on roller shafts, replace if damaged.	Once a year
Motor Brushes	Replace if brush length is less than 6mm	Once a year

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6.0 TROUBLE SHOOTING - FOR QUALIFIED SERVICE PERSONNEL ONLY



DANGER! NEVER ATTEMPT TO PERFORM REPAIRS IF THIS INSTRUMENT IS PLUGGED IN ! TO AVOID SERIOUS ELECTRIC SHOCK OR ELECTROCUTION, THIS INSTRUMENT MUST BE DISCONNECTED FROM THE SOURCE OF AC POWER BEFORE REMOVAL OF ANY PROTECTIVE COVERS.

Unit will not operate;

Cause: Fuse blown.
Remedy: Replace fuse with proper size and type. (see fuse replacement)

Unit will not operate;

Cause: Supply voltage low or at zero.
Remedy: Check house receptacle with a voltmeter.

Cause: On/Off power switch in **"off"** position.
Remedy: Switch power switch to **"on"** position.

Motor runs but roller(s) will not turn;

Cause: Drive and/or deck gear pulley(s) loose.
Remedy: Tighten gear pulley(s) with allen wrench.

Cause: Belt(s) worn or broken.
Remedy: Replace defective belts.

Switch on but motor fails to rotate;

Cause: Speed control set too low.
Remedy: Increase motor speed as required.

Cause: Motor control board defective.
Remedy: Replace defective board.

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Switch on but motor fails to rotate;

Cause: Drive motor defective.
Remedy: Replace defective motor.

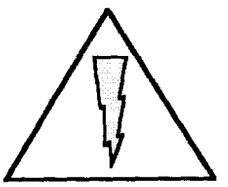
Motor fails to maintain constant rotation speed;

Cause: Motor control board defective.
Remedy: Replace defective board.

Cause: Drive motor defective.
Remedy: Replace defective motor.

Cause: Line voltage varying by more than +/-10%.
Remedy: Have mains checked by a qualified electrician.

6.1 MOTOR REPLACEMENT (SEE FIGS. A AND B)



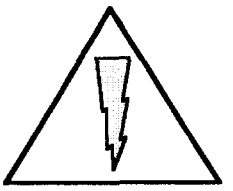
DANGER! BE CERTAIN THE UNIT IS DISCONNECTED FROM THE AC POWER SOURCE.

1. Unplug unit from the power source.
2. Remove the screws which secure the cover to the control housing and remove cover.
3. Locate and unplug the red and black motor leads.
4. Loosen the four screws which secure the motor to the control housing. ***Do not remove screws.***
5. Remove the drive belts from the motor drive gears.
6. Using a 3/32" allen wrench, loosen the set screws securing the drive gears to the motor shaft (two per gear) and then remove the gears.
7. Remove the four screws which were loosened in step four.
8. Carefully remove the motor from the base unit.
9. For reassembly, reverse the above procedure using new motor.

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6.2 MOTOR BRUSH REPLACEMENT (SEE FIG. C)

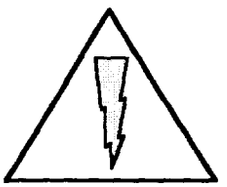


DANGER! BE CERTAIN THE UNIT IS DISCONNECTED FROM THE AC POWER SOURCE.

1. Unplug unit from the power source.
2. Remove the screws which secure the cover to the control housing and remove cover.
3. Locate and remove the red and black motor leads.
4. Loosen the four screws which secure the motor to the control housing. ***Do not remove screws.***
5. Remove the drive belts from the motor drive gears.
6. Using a 3/32" allen wrench, loosen the set screws securing the drive gears to the motor shaft (two per gear) and remove gears.
7. Remove the four screws which were loosened in step four.
8. Carefully remove the motor from the unit.
9. Locate the motor brush retaining screws and remove by turning counter-clockwise. Turn slowly, being careful not to lose the spring located behind the retaining screw.
10. Remove and inspect motor brush and replace if length is less than 6mm.
11. For re-assembly, reverse above procedure.

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6.3 SPEED CONTROL BOARD REPLACEMENT (SEE FIG. A)



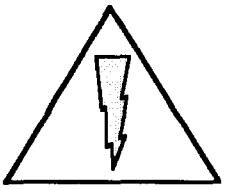
DANGER! BE CERTAIN THE UNIT IS DISCONNECTED FROM THE AC POWER SOURCE.

1. Unplug the unit from the power source.
2. Remove the screws which secure the cover to the control panel, and remove cover.
3. The control board is mounted to the front bottom of the control housing. Unplug the control board from the wiring harness.
4. Remove the two screws which secure the control board to the standoffs.
5. Remove the locking nuts from the speed control potentiometer.
6. Remove the hex nut that secures the potentiometer to the face of the control unit.
7. Remove the defective control board from the unit.
8. For reassembly, reverse above procedure using the new control board.

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6.4 FUSE REPLACEMENT (SEE FIG. H)



DANGER! BE CERTAIN THE UNIT IS DISCONNECTED FROM THE AC POWER SOURCE.

1. Disconnect the cord-set from the AC power source.
2. Locate power input connector/voltage selector module
3. Remove the fuse drawer by using a small flat screwdriver to lift the tab
4. Replace with new fuse:

115 vac unit use 1 ¼ X ¼ 3AG, 250V, 0.750AT fuse, be sure the voltage selector window in the drawer shows 115 v. and the correct cord set is used.

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7.0 SPECIFICATIONS FOR BATTERY BACK-UP

(see also general specifications for overall unit)

1. Batteries used ..... (2) Panasonic LCR12V 3.4P 12V, 3.4Ah

OR

(2) Powersonic Model PS-1230 12Volt, 3.0Ah

2. Startup Voltage 20.4V

Battery voltages below 20.4 volts indicate batteries hooked up wrong or damaged batteries. Charger will trickle charge at a rate of 10ma if it detects a battery voltage of below 20.4V

3. Battery Recharge time .... about 8 hours

Recharge in 8 hours for completely discharged batteries, shorter charge times for partially discharged batteries. Indicator lights will switch from yellow to greenwhen charge cycle is complete.

4. Float voltage ..... about 29.3 volts

Float voltage is applied when green LED is **ON**, (figure E), indicating charge is complete. Voltage to batteries must be maintained between 29.0 and 29.7 volts during float stage for maximum battery life.

5. Recharge voltage ..... 26.7 volts

If batteries are discharged below this voltage, charger will go from float mode into bulk charge mode.

6. Typical Battery Service Life ..... 2.5 to 3 years

Assuming battery storage and operation in a 37°C incubator.

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8. 0 INTRODUCTION

The Wheaton Battery Backup System is a factory installed option which will provide 24 hours of auxiliary power automatically to the roller apparatus should a primary power failure occur. This integrated system consists of two sealed lead acid batteries, an automatic charging system and an independent speed control which can be preset to maintain standard bottle speeds of 0.125 to 1.5 RPM during a primary power outage.

9. 0 OPERATION

1. The battery backup system utilizes two sealed lead acid batteries which must be maintained in a fully charged state to insure proper auxiliary operation. The charging circuitry charges the batteries whenever the roller apparatus is plugged in and power is applied to it. The charging circuit will charge the batteries even if the power switch on the roller apparatus is in the off position.

2. If primary power is lost while a roller apparatus is in normal operation, the charger circuitry will automatically switch the roller apparatus to operate on its internal batteries. Any speed indicators, belt alarms, or communications functions will be inoperative while the apparatus is running on its batteries. Once primary power is restored, the charger will automatically switch the apparatus back to normal operation.

9.1 TESTING AND SPEED ADJUSTMENT (SEE FIG. I)

1. With the roller apparatus plugged in and in normal operation, unplug the unit from its power source to simulate a power failure. A small click should be heard and the unit should immediately start running on its batteries.

2. To adjust the running speed of the roller apparatus while running under battery backup, find the battery backup speed control marked "auxiliary speed". Adjust the battery backup speed control to the desired speed with a screwdriver and lock the setting using the external lock nut on the control shaft.

THIS SPEED CONTROL ADJUSTS THE SPEED OF THE UNIT WHILE OPERATING UNDER BATTERY BACKUP ONLY AND DOES NOT AFFECT THE SPEED OF THE UNIT DURING NORMAL OPERATION IN ANY WAY.

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9.2 OPERATING FEATURES

1. Provide battery backup of roller rack system for 24 hours.

2. Complete recharge of batteries in about 8 hours.

3. Automatic shutdown and precise monitoring of battery voltage when charge is complete. See point #3 under BATTERY CHARGING CYCLE.

4. LED indicators show when batteries are charging and when batteries are fully charged. See Figure 'E'.

5. Charger automatically tracks ambient temperature and adjusts charge voltage for correct charging levels at elevated incubator temperatures. See point #3 under BATTERY CHARGING CYCLE.

6. If batteries are incorrectly hooked up or severely discharged due to damage the charge will automatically switch to trickle mode and will output only 10ma of current.

9.3 BATTERY CHARGING CYCLE

Discharged batteries are charged using a three step charging cycle.

1. **Bulk or Main Charge.** The charger is in constant current mode. A constant current of about 0.85 amps is fed into the batteries. The charger monitors the rising battery voltage while feeding the current.

2. **Topping off Charge.** The charger switches from a constant current to a constant voltage charge mode. When the charging battery voltage reaches about 30V, the charger switches to an elevated charging voltage of about 32V. This elevated voltage insures a completely charged battery. The battery charge current begins to taper off.

3. **Float Charge.** When the charge current tapers to about .085A (1/10th of the main charge current), the charger switches to a float voltage of about 29.3 volts. The float voltage is constantly applied to the battery while the charger is on until supply power is cut off. The float voltage is specified on the side of the battery (14.5-14.9V at 25°C for a 12V battery) and is the most critical step in maintaining overall battery life. The float voltage must be precisely set and must be derated for temperatures above 25°C.

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9.4 BATTERY KILLERS

1. **Heat.** Operating Sealed Lead Acid (SLA) batteries at elevated temperatures significantly decreases overall service life. Typical life for a SLA battery at room temperature is about 6-7 years. Overall service life for a SLA battery working in a 37°C incubator is about 2.5-3 years.

2. **Overcharging.** Overcharging of the battery will cause the water in the electrolyte gel to evaporate, making the battery age prematurely. A float voltage just 5% above the specified float voltage for the battery will start the decomposition of the gel electrolyte.

3. **Deep discharge.** A 12V SLA battery is considered completely discharged when its open circuit voltage is 11.64V. Discharging SLA batteries below this level will impair the battery's ability to accept a recharge.

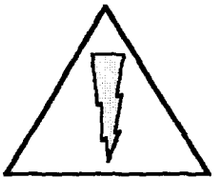
9.5 SHELF LIFE AND STORAGE OF BATTERIES

An SLA battery will self discharge over time. The self-discharge rate is dependent on storage temperature. New batteries received by the manufacturer are fully charged. An SLA battery should not be allowed to self discharge below 80% of its capacity. An SLA battery will typically self discharge to 80% in 18 months in a 4.4°C or cooler warehouse. An SLA battery will self discharge to 80% in less than 3 months if left in a 40° C warehouse.

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10.0 TROUBLESHOOTING - FOR QUALIFIED SERVICE PERSONNEL ONLY



DANGER - ELECTRIC SHOCK HAZARD EXISTS DURING MOST TROUBLESHOOTING PROCEDURES. SERVICE PERSONNEL MUST USE PROPER SAFETY PRECAUTIONS

*** NOTE ***

Troubleshooting should be done using at least partially discharged batteries. A normally functioning charger will automatically shut down if batteries are fully charged. Batteries pulled from stock should have a full charge when new.

10.1 Circuit Description

a. When voltage is applied to J1 or J2, relays RL1 and RL2 are energized and connect the batteries to the charger circuit. Charger chip U2 monitors battery voltage. If charging is needed, U2 regulates the output of power transistor Q1 that feeds current into the batteries. Pin 10 of U2 (open collector), is pulled to ground and the charging LED, D3 (see figure 'E') is ON.

NOTE: U1 will be warm to the touch whenever the charger is on. Q1 will be warm to the touch when batteries need charging and yellow charge LED is on.

b. If batteries are fully charged, charger chip U2 will regulate Q1 to maintain a float maintenance voltage of about 29.3V to the batteries. Pin 10 of U2 goes high and the float LED is ON. See figure 'E'.

NOTE: Q1 should be cool to the touch when batteries are fully charged and green float LED is ON.

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10.2 Circuit conditions when charging.

Measure battery voltage before starting charge. When charger is plugged in, an audible click of the relays should be heard.

a. If operating properly, battery voltage should start to rise when charger is plugged in. Voltage should rise at a rate of about 1 volt per hour. Battery voltage may rise quicker if batteries are near full capacity. Battery voltage during charging may be near 32 volts DC just before charging cycle is complete.

If the battery voltage doesn't start rising:

1. Check for 12VDC at U1
2. Check for proper resistor values R1-R7
3. Check for blown Q1 or U2.
4. Check for blown fuse (see figure 'E')

10.3 Circuit conditions when in float mode.

Charger enters float mode when batteries are fully charged. Battery voltage should level off to between 29.0 - 75.7VDC at 25°C. Green LED should be ON and battery voltage should stop rising.

a. If ambient temperature is significantly lower than 25°C, battery voltage may be slightly higher. Float voltage is automatically adjusted at -48mv/°C. Float voltage at 15°C may be between 29.5 - 30.3 VDC.

b. If ambient temperature is significantly higher than 25C, battery voltage may be slightly lower. Float voltage at 37 ºC may be between 28.4 - 29.2VDC.
If the battery voltage doesn't stop rising or doesn't finally settle into proper float voltage:

1. Check for proper resistor values R1-R7
2. Check for blown Q1 or U2.

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10.4 Circuit conditions when battery backup is in use.

Relays will de-energize and batteries will connect to J4-4 and J4-5. If main power switch of roller unit is on, batteries will run motor with voltages up to 24V. Control pot connected to J3 regulates battery voltage to motor.

If motor doesn't run, check:

1. Control pot turned up
2. Blown U4
3. Wrong or missing R13.

13.5 Fuse Replacement (see figure E)

Locate the fuse holder marked F1 on the battery backup board. Replace with type below:

1 ¼ X ¼ 3AG 250V, 0.5AF

FACTORY INSTALLED BATTERY BACKUP
CAT. #349017- PARTS LIST

ITEM NO.	DESCRIPTION	WHEATON NO.
1	SCREW, #6-32 X 1/4" LG., PPHM	I052239
2	PCBA, BATTERY BACKUP	I052686
3	BRACKET, BATTERY BACKUP	50026828
4	BATTERY, 12V, 3.4 AMP	I052685
5	WIRE SET, BATTERY BACKUP	50026831

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11. 0 SPECIFICATIONS - ROTATION ALARM SYSTEM (SEE FIG. F)

1. Rotation Failure Detection Method.....Magnetic Reed Switch

   Four magnetic reed switches are located at the farthest end of the main drive belt train, two for each half of the roller rack. Magnets embedded into plastic pulleys close the magnetic reed switches as they pass during normal rotation.

2. Time between rotation failure and user notification .... 3 minutes

   The Rotation Alarm System will notify the user of a rotation failure within three minutes of the occurrence.

3. Rotation Alarm indicators:

   a. Front Panel light indicators:

   Three LED indicators located on the front panel will flash at a rate of approximately 1-second during an alarm condition. LED indicators are ON in normal operation.

   b. +12V DC output:

   A +12V DC signal is available at the front panel interface jack on pins 2 (+12V) and 4 (GND). During alarm condition the +12V signal switches ON/OFF at a rate of approximately 1 second. During normal operation the +12V signal is steady ON. The +12V DC output can source 25ma of current.

   c. Dry contacts:

   A set of dry contacts are available at the front panel interface jack on pins 1 and 3. Contacts are CLOSED constant in alarm condition and OPEN constant in normal condition. Contact ratings are .5 amp at 24VDC and 0.25 amps at 115VAC.

   d. Audible Alarm:

   An Audible alarm tone of 2700Hz +/- 500Hz will cycle on/off at a rate of approximately 1 second during an alarm condition.

4. User interface ..... 4 pin MIC jack.

A 4 pin male MIC jack socket is located on the front panel of the roller apparatus for user interface of the Rotation Alarm System.

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12. 0 INTRODUCTION

The Wheaton Rotation Alarm System is a factory or retrofitable option which will monitor a roller apparatus for operation. Magnetic sensors located in the main drive train detect the passing of magnets embedded into the plastic pulleys of the drive system. If a magnet fails to pass a sensor within 3 minutes, the Rotation Alarm System will activate and will flash the front panel LED indicators, send a pulsing +12VDC signal, close a set of dry contacts and sound an audible alarm.

12.1 CIRCUIT OPERATION PRINCIPLE

The Rotation Alarm System uses four magnetic reed switches located in the main drive train on the last deck (furthest deck from the drive motor) to detect rotation. In this way, any belt breakage between the drive motor and the last deck will be sensed. Magnets embedded in the plastic pulleys beneath the reed switches pass by the reed switch sensors during normal operation. As the magnets pass by, the reed switch closes sending a signal back to the Rotation Alarm circuit board located in the roller apparatus control housing.

Four independent timer circuits on the Rotation Alarm circuit board monitor each magnetic reed switch. As the embedded magnet passes each magnetic reed switch, each of the four timer circuits are reset to begin a new three minute timing period.

If any of the magnetic reed switches fails to reset its respective timer circuit, within the 3 minute timing period, that timer circuit will send a signal to put the Rotation Alarm circuit board in alarm mode.

When in alarm mode, the circuit board will begin flashing the front panel LED indicators, close a set of dry contacts, send a pulsating +12VDC signal from the front panel remote annunciation jack, and sound an audible alarm.

13.0 TESTING

13.1 Testing with unit in Rotation Alarm in full operation.

a. Turn the roller apparatus to the **"on"** position.
b. Turn the main speed control fully counterclockwise so that the roller apparatus stops rolling.
c. The Rotation Alarm system should indicate rotation failure within 3 minutes, the LED indicators should flash and an audible alarm should be heard.
d. Reset the Rotation Alarm by first turning the speed control clockwise and then by turning **"off"** then **"on"** the roller apparatus power switch.

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13.2 Testing by disconnecting rotation alarm sensors.

There are two magnetic reed switches for each half of the roller apparatus, two for the left main drive train and two for the right drive train. Each set of two magnetic reed switches (right or left side) are connected a single cable that runs the entire length of the roller apparatus and terminates in a 5 pin plastic connector directly onto the rotation alarm board located in the electronics enclosure of the modular roller apparatus.

a. Disconnect magnetic reed switch cables by unplugging the cable connector from the rotation alarm board.

b. Turn the roller apparatus to the **"on"** position.

c. The Rotation Alarm system should indicate a rotation failure within 3 minutes and the LED indicators should flash.

d. Reset the Rotation Alarm by first plugging in the removed magnetic reed switch cable, then by turning **"off"** then **"on"** the roller apparatus power switch.

13.3 Testing the remote annunciator jack.

Follow procedure 13.1 above to set unit into alarm mode. See figure I for annunciator jack pin locations.

a. Using a multimeter, set meter to ohms measurement and connect to pins 1 and 3 of the remote annunciator jack. BEFORE alarm condition, the pins should read INFINITE ohms. AFTER alarm condition, pins should read ZERO ohms.

b. Using a multimeter, set meter to read +12VDC or greater and connect positive lead to pin 2 and ground lead of pin 4. BEFORE alarm conditions, the pins should read +12VDC steady. AFTER alarm conditions, pins should read pulsating +12VDC / 0VDC at a rate of approximately 1 second.

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14.0 USER INTERFACE CONNECTIONS

The remote annunciator jack allows a user to interface the Rotation Alarm system to a plant security / process monitoring system. A system that detects either a +12VDC signal or a dry contact closure can be used. See figure I for remote annunciator jack pinouts. Specifications are as follows:

a. Dry contact (pins 1 and 3): ..... .5 Amp at 24VDC

b. +12VDC pulse signal approximately 1 second on / off ..... 0.25ma source

15.0 TROUBLESHOOTING

Equipment required: Multimeter measuring ohms and volts, #1 Phillips screwdriver, small magnet.

15.1 Rotation Alarm false alarms

a. Magnetic reed switch cable not properly connected.
Check to see that the magnetic reed switch cable connectors are properly plugged into the roller apparatus control housing.

b. Break in magnetic reed switch cable.
Check continuity of the magnetic reed switch cable by unplugging the magnetic reed switch cable from the roller apparatus control housing. Use a multimeter set to read ohms and insert leads into pin respective pin sockets to measure continuity of the magnetic reed switch. Pass a small magnet over the reed switch while measuring continuity. A detected presence of a magnet over the reed switch will measure ZERO ohms, while no detected presence of a magnet will measure INFINITE ohms. Refer to figure G.

c. Magnetic reed switches misaligned.
Make sure screws and nuts holding magnetic reed switches are in place and tight. Tighten with a #1 Phillips screwdriver if needed. Alignment is critical to proper operation of the switches. Make sure both reed switches are over the face of the plastic pulley so that they can read the embedded magnet.

d. Main speed control turned all the way down.
Roller apparatus must be rotating for the Rotation Alarm system to operate properly. Turn main speed control clockwise to start rollers turning.

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15.2 Rotation alarm fails to operate, LED indicators are OFF.

a. Make sure main power switch to the roller apparatus is "ON".

b. Fuse is blown on Rotation Alarm Circuit Board.
Refer to figure F for proper identification of the Rotation Alarm circuit board. Remove the control housing cover of the roller apparatus and locate the Rotation Alarm circuit board. Replace fuse with a 1 ¼ X ¼" 250V 3AG 0.25AF fuse.

15.3 Rotation alarm fails to operate, LED indicators are ON.

a. Short in magnetic reed switch cable.
Use steps in section 15.1b to check continuity of reed switch cable.

15.4 Plant Process detection equipment fails to detect Rotation alarm signals.

a. Interface cable incorrectly wired.
Refer to section 14.0 'User Interface Connections' and figure I for testing and proper cable hookup to the Rotation Alarm system.
b. Missing signals from Rotation Alarm remote annunciator jack.
Refer to section 13.0 'Testing' and figure I for pin identification and testing of the remote annunciator jack.

15.5 Fuse Replacement for Rotation Alarm

Refer to figure F and locate the fuse holder on the main control board marked F1 for the rotation alarm. Replace fuse with a 1 ¼ X ¼" 250V 3AG rated at 250V .25AF.

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WHEATON MODULAR ROLLER APPARATUS – PARTS LIST (FIG. A)

ITEM NO.	DESCRIPTION	USE QTY.	WHEATON NO.
1	CABINET, BASE	1	
2	FRONT RAIL BASE	1	50026843
3	REAR RAIL BASE	1	50026856
4	ASS'Y SPEED CONTROL	1	I052720
5	BRACKET MOTOR	1	50028918
6	MOTOR, 28 RPM, 90VDC .312" DIA SHAFT	1	I052713
7	MAINS POWER SWITCH DPST	1	I055305
8	METER, VOLTAGE, 0-100VDC	1	50028579
9	FACE PLATE	1	50028921
10	PULLEY, 3/8" DIA HOLE	2	I052730
11	SCREW, #6-32 X 3/8" LG. PPHM	19	I052240
12	NUT, HEX, #6-32	16	50029919
13	WASHER, STAR, #6 INT. TOOTH	20	I052273
14	SCREW, HEX HEAD, ¼-20 X ½ LG	2	I052363
15	SCREW, #10-32 X ½" LG PPHM	4	I052320
16	SCREW, SET, #10-32 X ¼" LG	4	I052353
17	WASHER, STAR, #10 INT. TOOTH	4	I052338
18	WASHER, STAR, ¼" INT. TOOTH	18	I052370
19	SCREW, HEX HEAD, ¼-20 X 1 ¾" LG.	8	50030017
20	SCREW, HEX HEAD, ¼-20 X 1 ¼" LG.	8	50030019
21	CASTER, SWIVEL	2	I052742
22	CASTER, LOCKING SWIVEL	2	I052743
23	WASHER, PLAIN, ¼" ANSI TYPE A SS	16	50027727
24	XFMR, DP-241-8-120	1	I052736
25	PCBA BATTERY BACKUP (OPTION)	1	I052686
26	PCBA ROTATION ALARM (OPTION)	1	50026935
27	PCBA LED INDICATOR (OPTION)	1	I050985
28	CABLE TIE (NOT SHOWN)	9	I051479
29	ASS'Y JUMPER 110V	1	I053957
30	ASS'Y OUTPUT JACK CABLE ROT ALARM	1	I050984
31	CABLE, GROUND WIRE	1	50028934
32	MAIN WIRE HARNESS	1	50028866
33	WIRE HARNESS BATTERY BACKUP	1	50028900
34	CONNECTOR #8 RING	1	50029482
35	CONN, HOUSING 4PIN PLASTIC	1	I051484
36	CABLE ROTATION ALARM	1	I050984
37	ADHESIVE CABLE MOUNTS	7	I051478
38	BATTERY, 12V 3.4AH	2	I052685
39	IEC POWER INLET MODULE	1	50028571
40	CONN, ¼" PUSHON	2	50029024
41	LED BUSHING	3	I052719
42	SCREW, #4-40 X ¼" LG. PPHM	2	50029857
43	BRACKET BATTERY BACKUP	1	50026828
44	FUSE DRAWER 115V	1	50028574
45	VOLTAGE SELECTOR MODULE	1	50028576
46	FUSE, 1 ¼ X ¼ 3AG .750 AT 250V	1	50028854
47	LABEL, USE LEAD ACID BATTERIES	1	50028903
48	LABEL, ! INTERNATIONAL CAUTION	1	50028414
49	LABEL, SECONDARY GROUND	3	50028530
50	LABEL, MAIN GROUND	1	50028527

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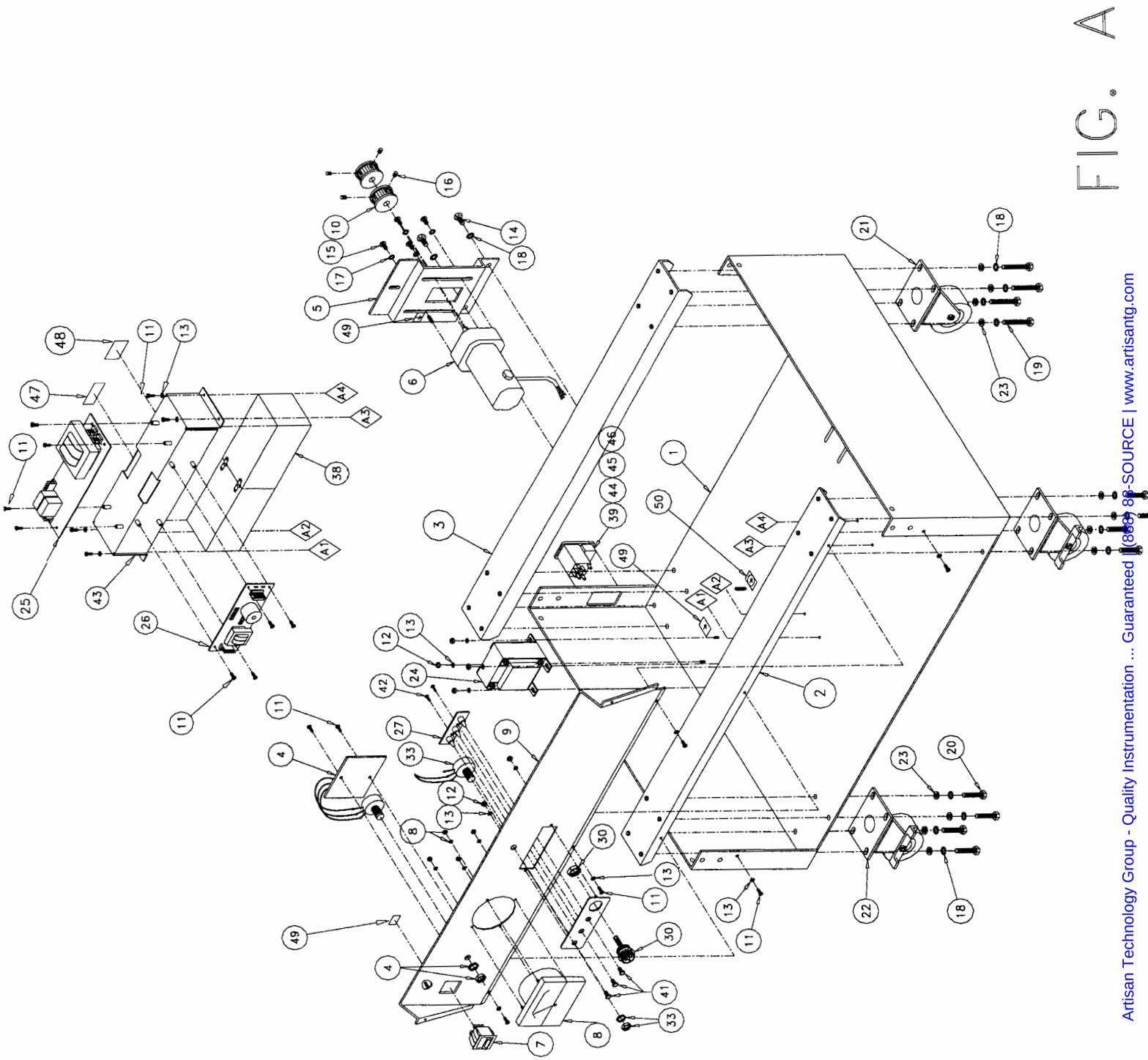


FIG. A

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MODULAR ROLLER DECK ASSEMBLY – PARTS LIST (FIG. B)

ITEM NO.	DESCRIPTION	USE QTY.	WHEATON NO.
1	BASE ASSEMBLY		
2	DECK, SUB ASSEMBLY		WL052699
3	MOTOR GUARD		50028835
4	END COVER		50026868
5	PULLEY, TOOTHED		I052714
6	BELT, DRIVE 225L025		I052719
7	SCREW, #6-32 x 3/8" LG. PPHM		I052240
8	WASHER, STAR #6 INT. TOOTH		I052273
9	SCREW, HEX HEAD, ¼-20 X ¾" LG		I052365
10	SCREW, HEX HEAD ¼-20 X ½" LG		I052363
11	WASHER STAR ¼" INT. TOOTH		I052730
12	NUT HEX ¼-20		50030018
13	TOP, CABINET		50028838
14	BELT, DECK 210L025		I052734
15	DECK SUPPORT RAIL		I052701
16	GUARD, DECK BELT (NOT SHOWN)		I052704
17	RAIL, UPRIGHT		50026864
18	NUT, HEX, #6-32		50029919
19	LABEL, WHEATON SERIAL#		50030538
20	LABEL, LINE VOLTAGE		50028826
21	LABEL, PINCH CRUSH		50028829
22	LABEL, ! (INTERNATIONAL CAUTION)		50028414
23	LABEL, CE MARK (230V ONLY)		50028416
24	LABEL, GROUND		50028530
25	LABEL, MET NRTL LISTED		50028589
26	ASS'Y MAGNETIC TRIP PULLEY		I050990
27	GUARD, DECK BELT		50026929
28	SCREW, #4-40 X 3/8" LG., PPHM		50029858
29	WIRE TIES		I051479
30	ASS'Y ROTATION ALARM CABLE		50028937
31	BELT, CLEAR ENDLESS (NOT SHOWN)		I052737

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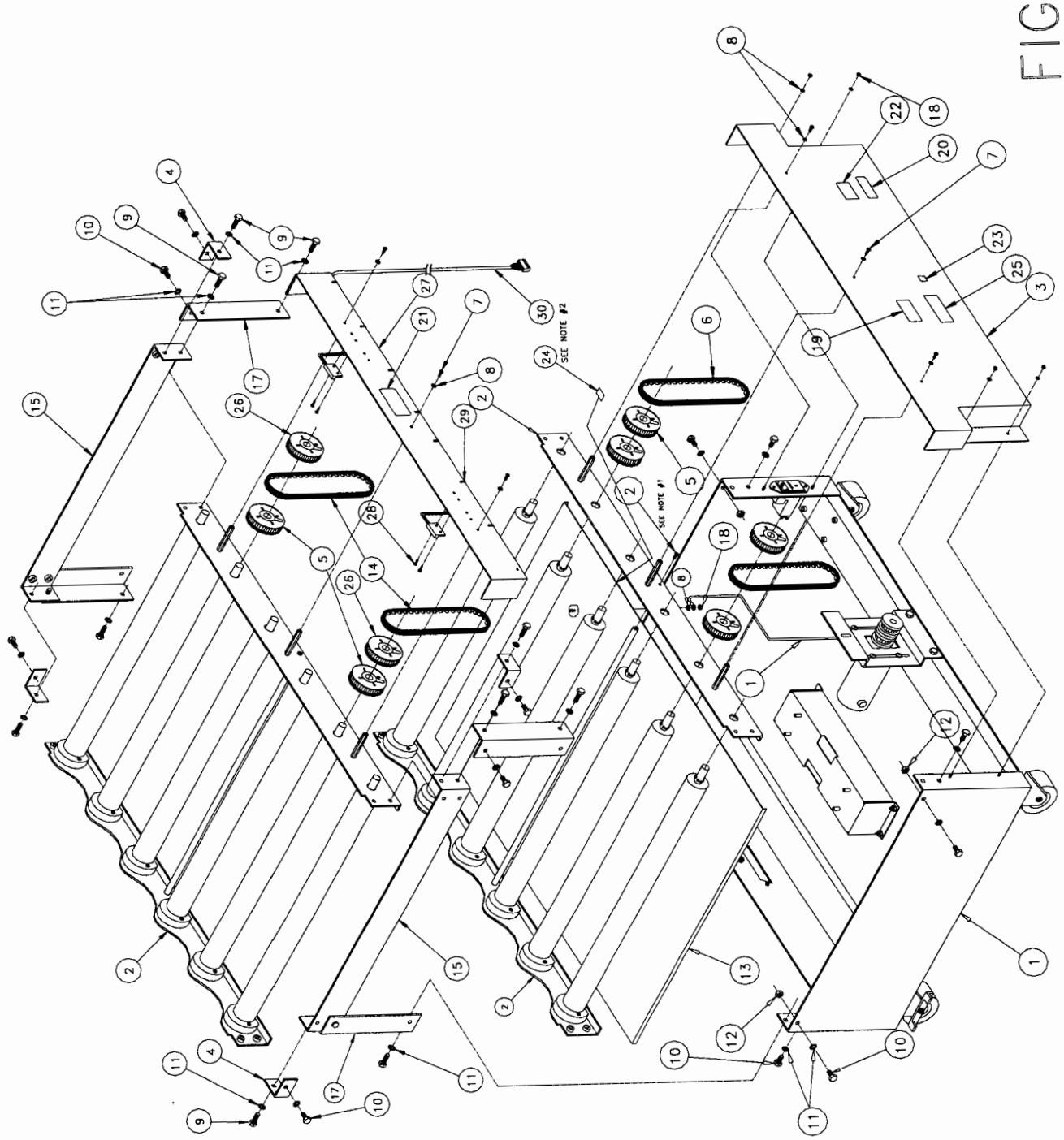


FIG. B

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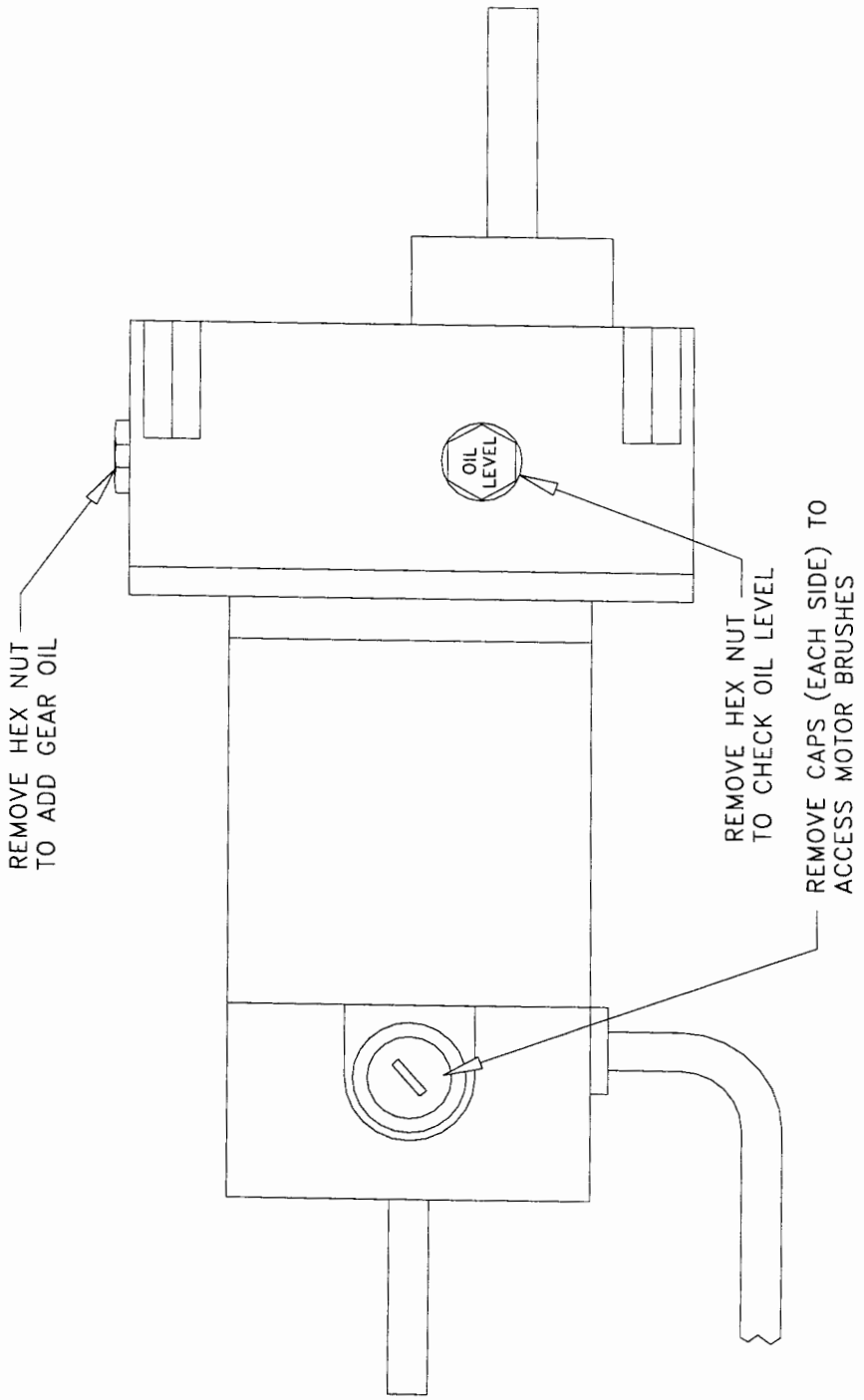


FIG. C

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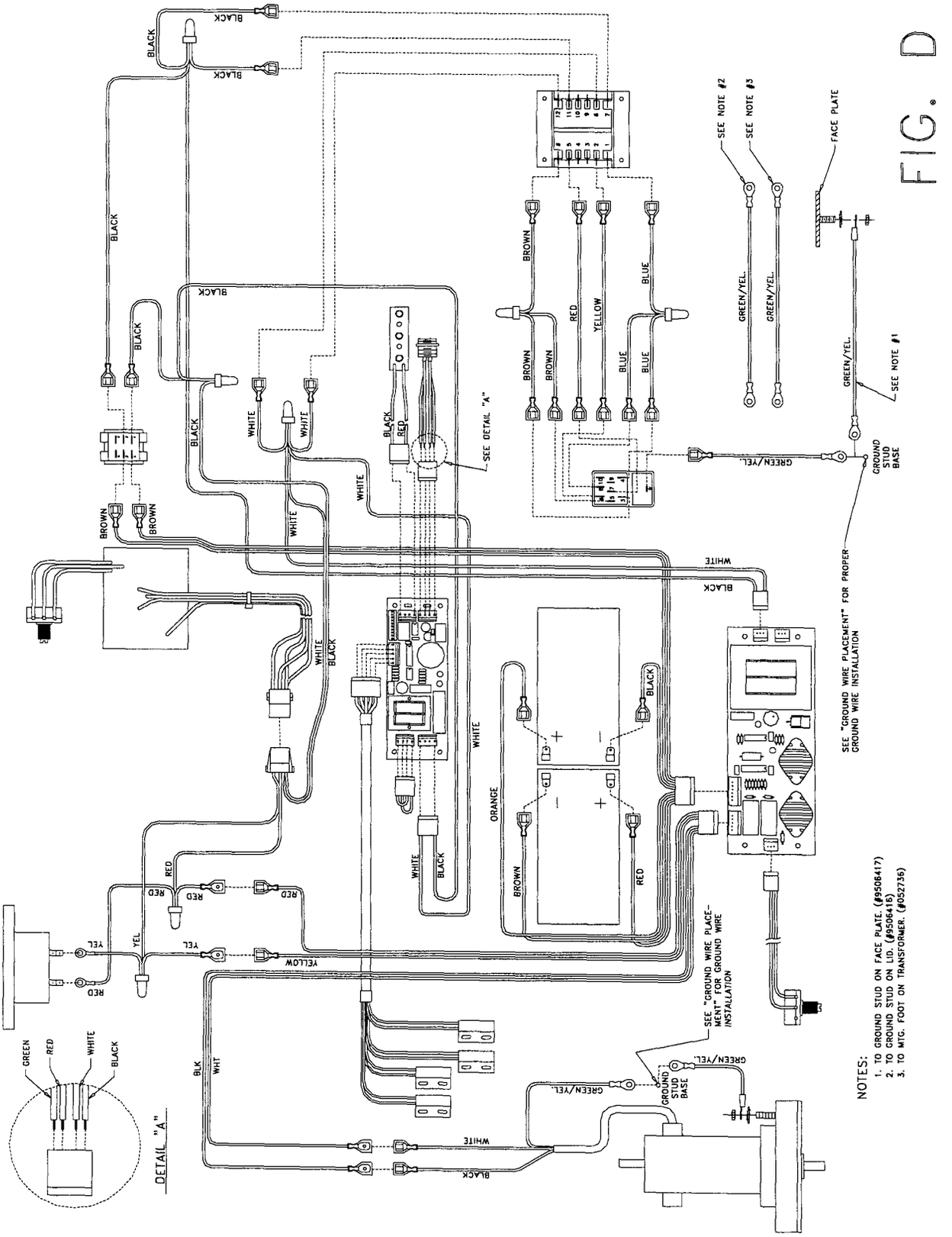


FIG. D

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BATTERY CHARGE INDICATORS AND FUSE REPLACEMENT

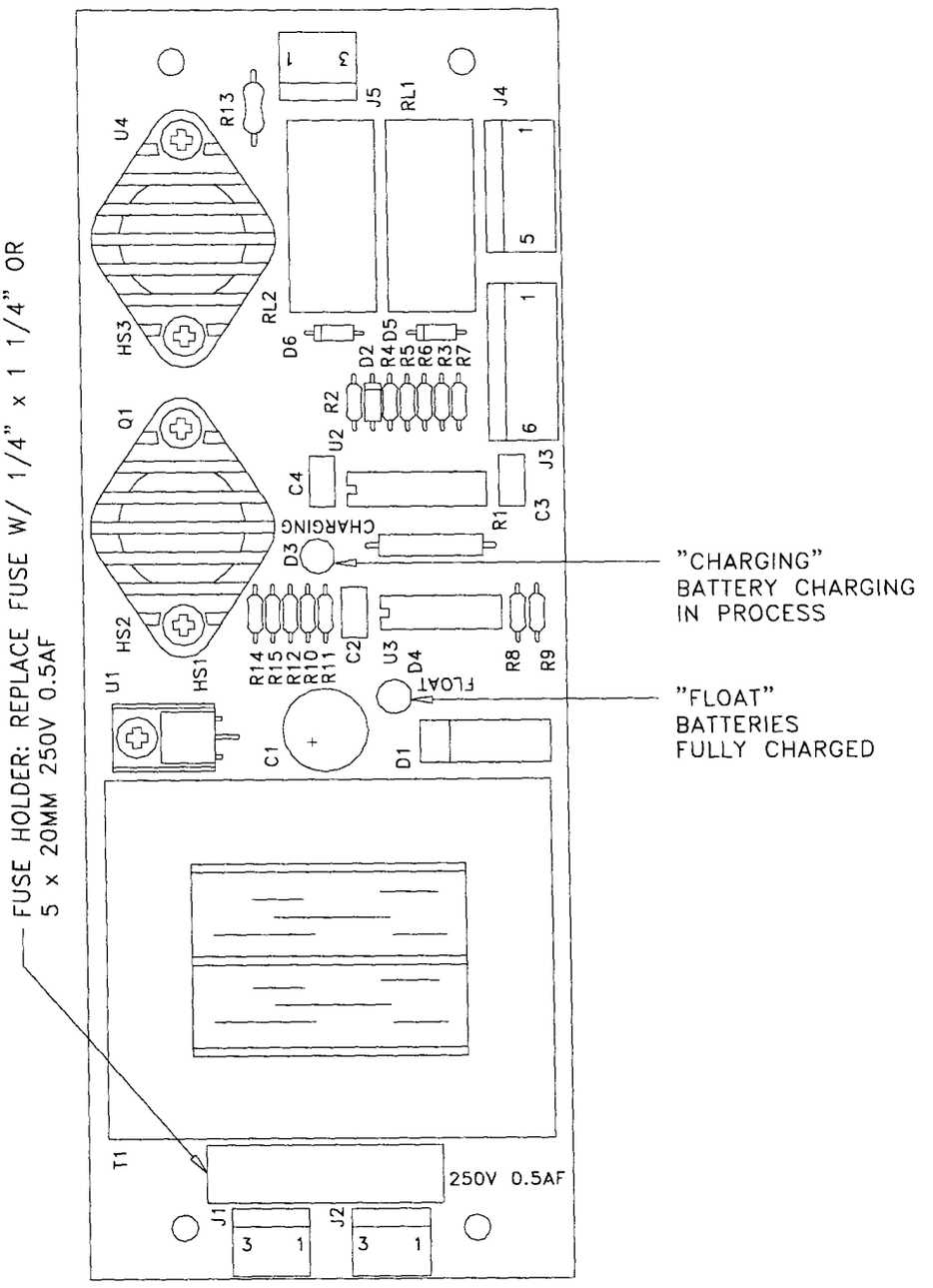


FIG. E

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ROTATION ALARM FUSE REPLACEMENT

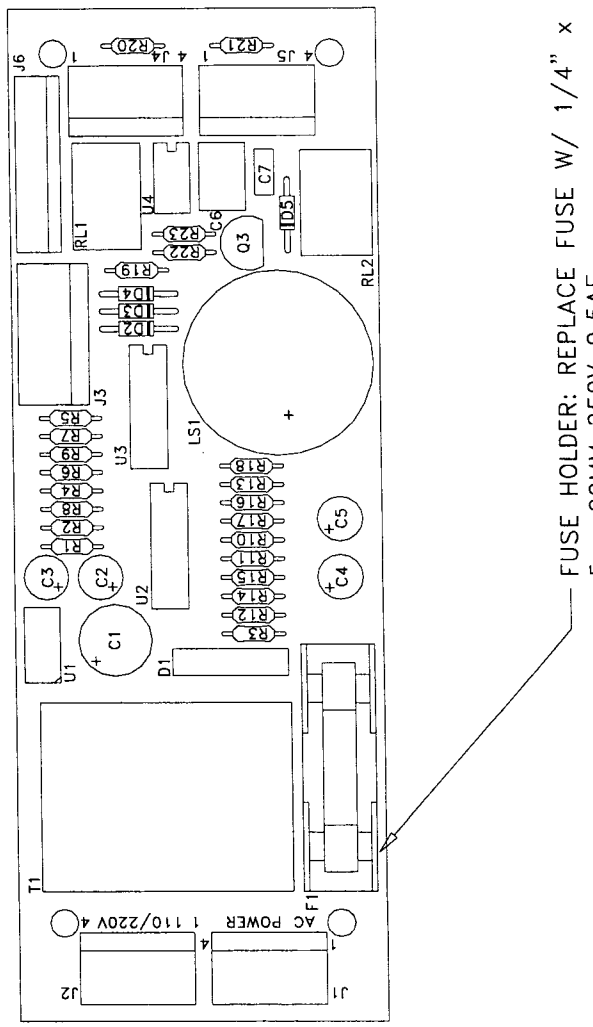


FIG. F

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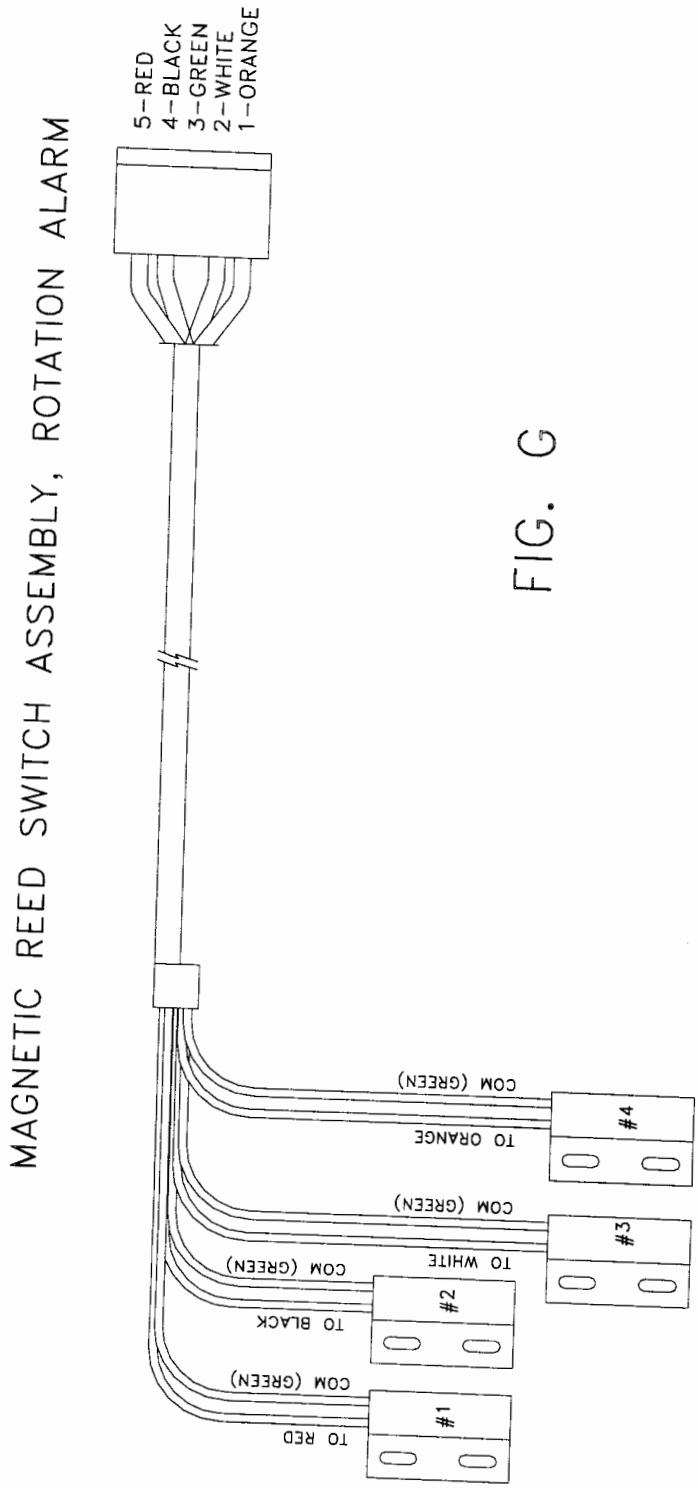
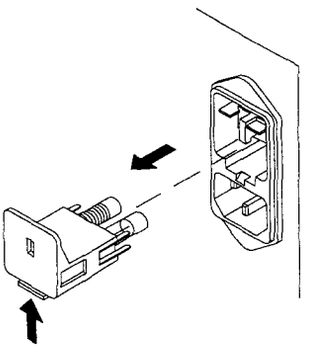


FIG. G

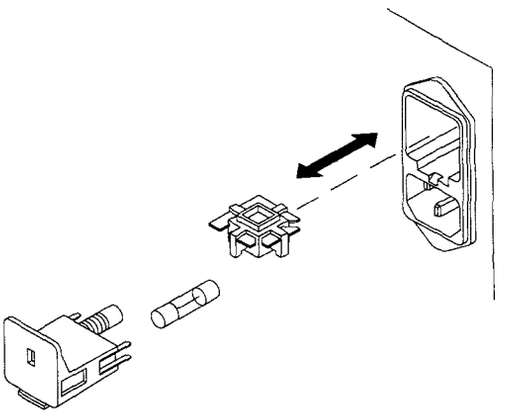
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1. Remove the power cord. Remove the fuse–holder assembly using a 1/8" flat blade screwdriver.

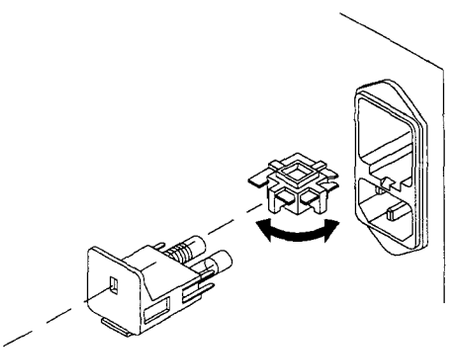


2. Install the correct line fuse(s). Remove the power line voltage selector from the power line module.



115VAC: 0.750AT 250V 3AG fuse

3. Rotate the power line voltage selector until the correct voltage appears in the window.



115 VAC

4. Replace the power line voltage selector and the fuse holder assembly in the rear of the unit.

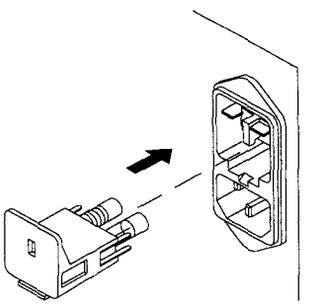


FIG. H

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FIGURE I CONTROLS AND THEIR FUNCTIONS

1. **ON/OFF Power Switch:** Depress the upper part of the switch (1) to turn ON the modular roller apparatus. Depress the lower part of the switch (0) to turn OFF the modular roller apparatus.

2. **Locking Speed Control:** Used to adjust roller speed during normal operation. Using a flat head screwdriver, turn the control clockwise to increase speed and counterclockwise to decrease speed. The locking nut on the speed control shaft can be used to lock the shaft to prevent accidental speed changes.

3. **Panel Meter:** Provides visual indication of relative motor speed. Useful for reproducing speed settings and establishing benchmarks for new procedures.

4. **Backup Speed Control (option):** Used to adjust roller speed during battery backup operation ONLY. Using a flat head screwdriver, turn the control clockwise to increase speed and counterclockwise to decrease speed. The locking nut on the speed control shaft can be used to lock the shaft to prevent accidental speed changes.

5. **Rotation Alarm Indicators and Remote Jack (option):** Used to indicate roller rotation failure due to broken belts or motor failure. Lights are usually ON in normal operation and FLASH in alarm condition. The remote jack provides low level signals to a process detection device.

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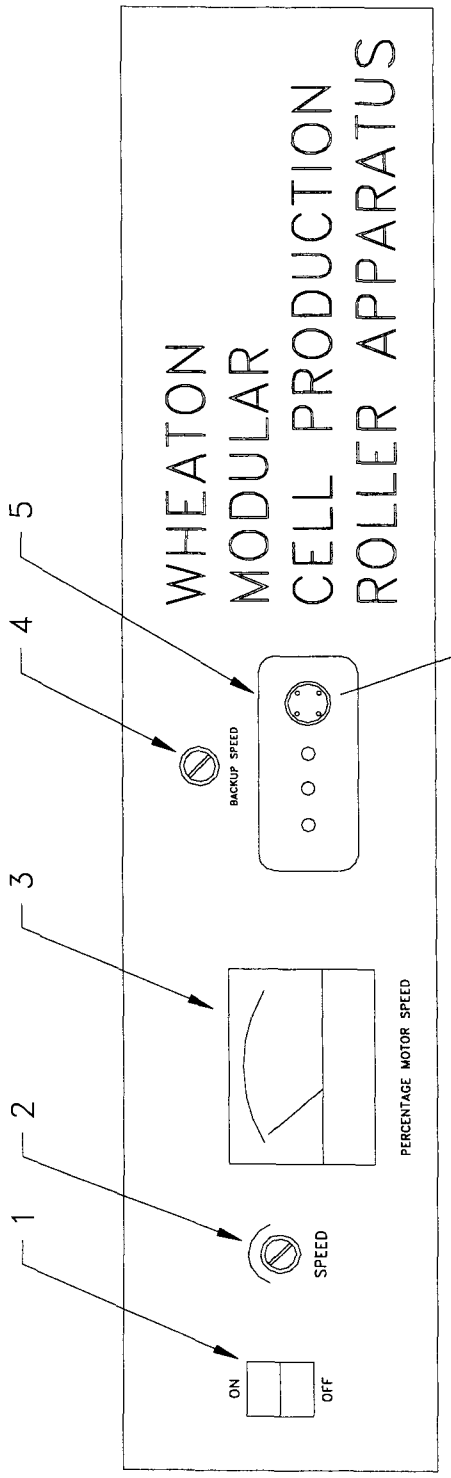


FIG. 1

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MODULAR ROLLER DECK ASSEMBLY – PARTS LIST (FIG. J)

ITEM NO.	DESCRIPTION	USE QTY.	WHEATON NO.
1	RAIL, FRONT SUPPORT	1	I052702
2	RAIL, REAR SUPPORT	1	I052705
3	ASSEMBLY, ROLLER/SHAFT	6	I054128
4	ROD, DECK SUPPORT	12	50026837
5	BEARING, SLOTTED	12	I052776
6	SCREW, 6-32 X 12"LG PFHM	24	I052250
7	SCREW, #8-32 x 1/2" LG. PPHM	1	I052289
8	WASHER, STAR #8 INT. TOOTH	1	50029959
9	SPACER, 3/8" HEX, #6-32 THREAD	3	I051433
10	WASHER, NYLON	12	50028196

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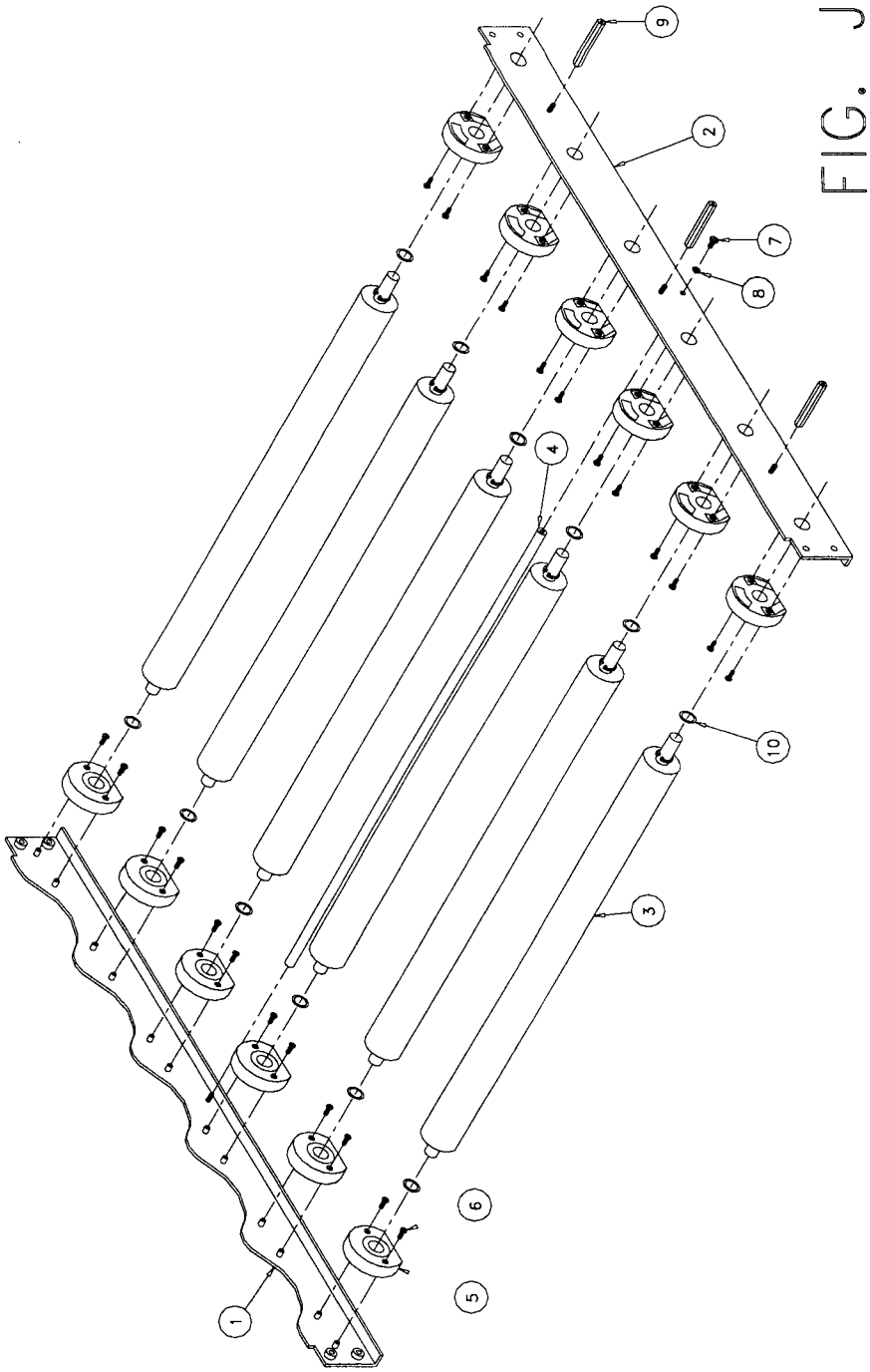


FIG. J

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NOTICE

Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le material du Canada

United States

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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