

MINUTEMAN  **MAN**®
UNINTERRUPTIBLE POWER SUPPLIES

Minuteman Series

User's Manual



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INTRODUCTION

The MINUTEMAN series Uninterruptible Power Supply (UPS) has been designed to be maintenance-free, and to provide years of excellent service. It will provide superior power protection for personal computers, telephone systems, and other critical equipment, against all commercial power anomalies. Output waveform is a Synchronized Sinewave. Both lamp and audible alarms indicate UPS and commercial power status at all times. Other features include:

- External battery pack options for extended battery runtime.
- Quiet operation
- Excellent non-linear current capability
- LAN communications port (optional)

RECEIVING INSPECTION

SAVE THE PACKING MATERIALS!

Remove and inspect the unit for shipping damage. If damage is found immediately notify the carrier and your dealer. If no damage is found save both the shipping container and the packing foam in case of a later need to return the unit to the factory or to ship it to another location.

WARRANTY REGISTRATION

Complete the warranty registration card provided and mail it within ten days of receipt to register your warranty. **Failure to register your warranty renders it non-valid.**

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

- Read this manual carefully before operating the UPS. All instructions should be followed during installation and maintenance of the UPS and batteries.
- These UPS units are intended for use in a temperature-controlled, indoor area free of conductive contaminants.
- **CAUTION** -- UPS units use batteries for generation of AC voltages, so output receptacles may be electrically hot even when UPS is not connected to commercial power. All repairs should be performed by trained service personnel, since an electrical shock hazard exists.
- **CAUTION** -- Do not remove the cover: there are no user-serviceable parts inside.
- **CAUTION** -- To prevent electrical shock, the 3-wire plug provides earth ground for the UPS chassis. Plug the UPS into a 3-wire grounding type commercial receptacle with grounding conductor connected to earth ground at the service equipment. Removal of the ground pin from the plug or use of a 3 wire-to-2 wire adapter will defeat this safety feature and may result in a shock hazard. Additionally, if the plug is removed to simulate a power failure (not recommended), do not touch the plug conductors or the chassis while the plug is removed.

- **CAUTION** -- Do not allow water or any foreign object to enter the UPS. In case this occurs, immediately turn the unit power switch off and unplug the MINUTEMAN from the commercial receptacle.
- Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from the batteries.
- When replacing UPS batteries, use the same number of sealed lead-calcium rechargeable batteries with the same voltage and ampere-hour ratings as those in the UPS or battery pack. These batteries have pressure-operated safety vents.
- **CAUTION** -- Do not dispose of batteries in a fire. They may explode.
- **CAUTION** -- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes and may be toxic.
- **CAUTION** -- Although battery system voltages are only 24 or 48 volts, battery systems can still present a risk. The current capability of a battery is sufficient to burn wire or tools very rapidly, producing molten metal. Observe these precautions when working on batteries:
 1. Turn the UPS off and disconnect it from the wall outlet prior to connecting or disconnecting battery terminals;
 2. Remove watches, rings or other metal objects;
 3. Use tools with insulated handles;
 4. Wear protective gloves and eyewear;
 5. Do not lay tools or other metal parts on top of batteries.

SELECTION OF UPS LOCATION

- Select a location that will provide air circulation for the UPS at all times. Do not restrict airflow in any way.
- Avoid locations near heating devices.
- Avoid locations near water or excessive humidity.
- Avoid locations where the unit is exposed to direct sunlight.
- Route power cords so they can not be walked on or damaged.

USE OF EXTERNAL BATTERY PACKS WITH MINUTEMAN UPS UNITS

Following is a table which shows the battery packs (BP) which can be used with each Minuteman UPS without any output power derating.

MINUTEMAN UPS	INTERNAL BATTERY SYSTEM	BP TO BE USED
MM450	24VDC, 7 AMP-HOUR	BP24V10 (10 AMP-HOUR)
MM850	48VDC, 7 AMP-HOUR	BP48V10 (10 AMP-HOUR) BP48V17 (17 AMP-HOUR)
MM1300	NONE	BP48V10 (STANDARD) BP48V17 (17 AMP-HOUR)
MM2000	NONE	BP48V17 (STANDARD) BP48V34 (34 AMP-HOUR)

ELECTRICAL SPECIFICATIONS

MODEL #	RATED OUTPUT (WATTS)	FREQ (Hz)	INPUT (VAC/A)	OUTPUT (VAC/A)	BATTERY SYSTEM (VDC)
MM450	315	60	120/3.9	120/2.6	24 (INT)
MM850	600	60	120/7.1	120/5.0	48 (INT)
MM1300	900	60	120/10.8	120/7.6	48 (BP)
MM2000	1400	60	120/16.6	120/11.7	48 (BP)
*MM2000	1400	60	120/12.0	120/11.7	48 (BP)
MM2000/2	1400	50	220/9.2	220/6.4	48 (BP)
†MM2000/2U	1400	60	208/9.6	208/6.7	48 (BP)
	1400	60	240/8.3	240/5.8	48 (BP)

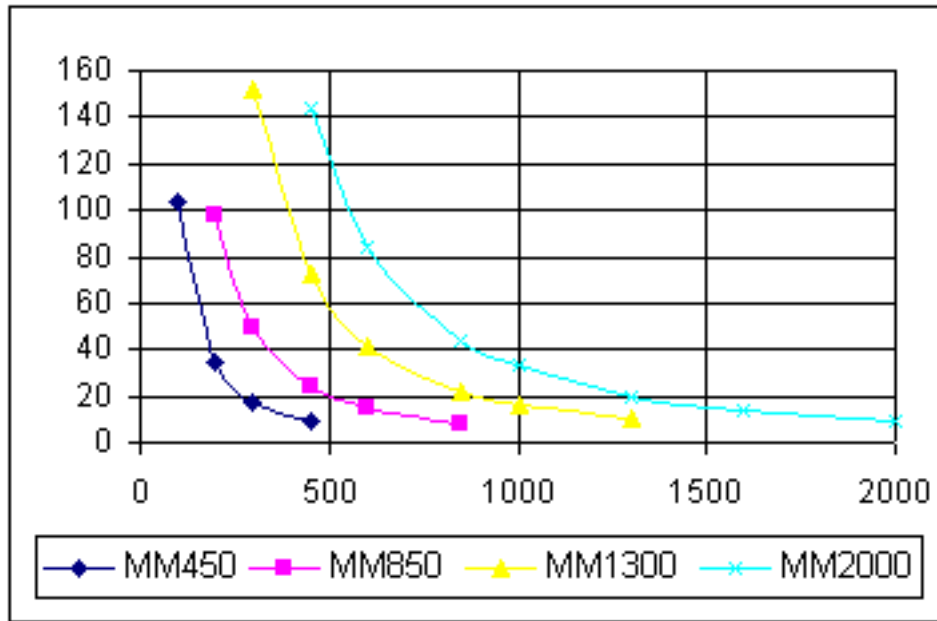
* MM2000 Specifications if optional 5-15P plug is used.

† MM2000/2U available in both 208VAC and 240VAC models.

Input Voltage (AC Mode Function)	120VAC ± 15VAC; 220VAC ± 30VAC	
Input Frequency Deviation for Synchronization.	± 5%	
Inrush Current	1.5x Rated	
Surge Protection	3-way, meets IEEE STD 587	
RFI/EMI/Noise Filtering	Both Common and Normal Modes	
Transfer	<u>120VAC UNITS</u>	<u>220VAC UNITS</u>
Brownout Transfer	102VAC	190VAC
AC Return	107VAC	200VAC
Transfer Speed	2ms Typical	
Inverter Mode (Backup Operation)		
Waveform	Synchronized Sinewave	
Crest Factor (Non-Linear Mode)	3:1	
Overload Capacity (50mSEC Maximum)	3x Rated	
Voltage Regulation	± 5%	
Frequency Regulation	± 1%	
DC-to-AC Efficiency (Full Load)	70%	
Overload/Short Circuit Protection	Electronic and Fused	
Discharged Battery Recharge Time	8 Hours (95% of Full Charge)	
Run Time	See Chart and Graphs	

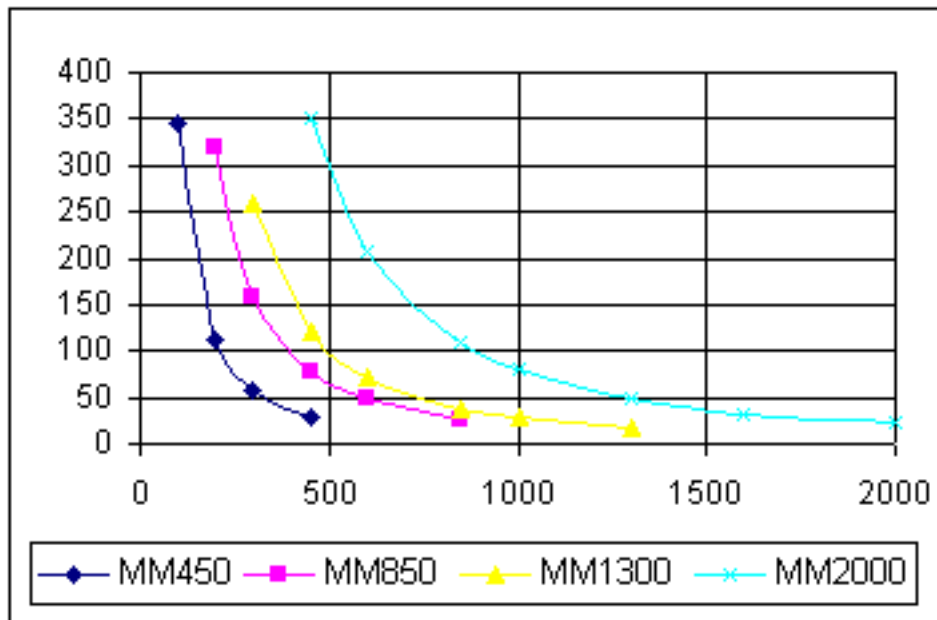
COMPUTER BACK-UP TIME vs. LOAD

Internal Battery System or Standard Battery Pack



COMPUTER BACK-UP TIME vs. LOAD

UPS with Optional Battery Pack



PHYSICAL SPECIFICATIONS

MODEL #	NET WEIGHT (LBS)	SHIPPING WEIGHT (LBS)	DIMENSIONS (L x W x H) (")
MM450	35.6	39	14 x 12.2 x 7.2
MM850	59.5	64	17.1 x 12.2 x 7.2
MM1300	46.9	52	17.1 x 12.2 x 7.2
MM2000	59.0	64	17.1 x 12.2 x 7.2

Operating Temperature0°C to 40°C (32°F to 104°F)
 Storage Temperature-15°C to 40°C (5°F to 104°F)
 Relative Humidity 95% Max., Non-Condensing
 Maximum Altitude Without Derate 15,000 Ft.
 Acoustic Noise Less than 60dB @ 3'

TYPICAL RUNTIME vs. LOAD (MINUTES)

COMPUTER LOAD	MM450 W/		MM850 W/		MM1300 W/		MM2000 W/	
	INT BAT	BP24V10	INT BAT	BP48V10	BP48V10	BP48V17	BP48V17	BP48V34
100VA	104	346	---	---	---	---	---	---
200VA	34	112	98	319	---	---	---	---
300VA	17	58	49	158	152	259	---	---
450VA	9	30	24	78	72	122	144	351
600VA	---	---	15	48	42	71	84	206
850VA	---	---	8	26	22	37	44	108
1000VA	---	---	---	---	16	28	33	80
1300VA	---	---	---	---	10	17	20	49
1600VA	---	---	---	---	---	---	14	33
2000VA	---	---	---	---	---	---	9	22

UNIT DESCRIPTION

Main Power Switch: Turns on all UPS functions, except the internal battery charger on model MM450. Charger on MM450 operates when UPS is connected to commercial power.

Test/Alarm Silencer Switch: Depressing this switch while in the AC mode causes the UPS to switch to the Inverter mode. Depressing the switch while in the Inverter mode silences the **Audible Alarm** until it is reset again.

Input Plugs, Fuses, and Output Receptacles:

MODEL #	INPUT PLUG	INPUT FUSE OR CIRCUIT BREAKERS (CB)	OUTPUT RECEPTACLES
MM450	NEMA 5-15P	5A	4 -- NEMA 5-15R
MM1300	NEMA 5-15P	12A CB	4 -- NEMA 5-15R
MM850	NEMA 5-15P	8A	4 -- NEMA 5-15R
MM2000	NEMA L5-30P	20A	*4 -- NEMA 5-15R
MM2000/2	†Opt. Int.	10A CB	4 -- IEC 320
MM2000/2U	NEMA L6-30P	10A CB	*2 -- NEMA L6-30R

* These units are also available with several combinations of locking and straight blade receptacles.

† Optional International Plugs

LEDS: AC NORMAL: Green when commercial voltage is in range and present, provided battery circuit breaker is closed; off otherwise.

BATTERY IN USE: Red while unit is running in Inverter mode. In AC mode, blinks when batteries are low or DC circuit breaker is off.

OUTPUT LOAD: Functions in AC mode only, providing an indication of the actual output load. Each green LED represents 1/9 of total available output of each unit. The red LED signifies overload.


BATTERY STATUS: Functions in Inverter mode only, providing a measure of battery time remaining. As battery begins to run down, LEDs extinguish from left to right. At low battery warning, only the two red LEDs are still on.

Audible Alarm: Sounds after a ten second delay every two seconds during inverter run mode. Alarm frequency changes at low battery warning to two per second.

Cooling Fan: All units are forced air-cooled; however, fan runs only in Inverter mode.

INSTALLATION AND TEST

NOTE: If a Battery Pack is used with this UPS, refer first to the Battery Pack Owner's Manual Installation Procedure.

1. Ensure that the UPS power switch is "Off" ("  " position). Plug the UPS Power Plug into a grounded commercial power receptacle with proper supply voltage and frequency.
2. Turn the DC Breaker Switch on.
3. Turn the UPS Power Switch "On" ("I" position). With commercial voltage present and in range, the UPS will come on in the AC mode after a short delay.
4. Press and hold the Test/Alarm Silencer button for approximately 30 seconds: the AC NORMAL LED will extinguish. The BATTERY IN USE LED will light, the BATTERY STATUS LED's will light and the Audible Alarm will sound after a short delay. Release the Test/Alarm Silencer Button and the UPS will return to the AC Normal mode after a short delay. AC NORMAL LED will be on and all other indicators off.
5. Verify that the power requirements (VA & watts) of the equipment to be protected are within the capacity of the UPS. Plug in and turn on the various loads. Momentarily press the Test Button and verify proper UPS operation.

NOTE: If any condition experienced during the above test procedure was not as described, refer to the UPS Problem Chart in the back of this manual.

OPERATION

The UPS loads may be controlled by the UPS Power Switch if desired. For Model MM450, the battery charger functions with the Power Switch on or off. For other models, the Power Switch must be on for battery charge; consequently, these units may need to remain on overnight if several power outages occurred during the day.

When a brownout, power interruption, power outage or over-voltage condition occurs, the alarm will sound and the BATTERY IN USE light indicator will glow, indicating that commercial power is lost or unacceptable and MINUTEMAN is now supplying power to your system. With a slower intermittent audible alarm (approximately once every two seconds) and one or more green BATTERY STATUS indicator lights on, the unit is in the normal Inverter mode (BATTERY OPERATION). When the alarm sounds at more rapid intervals (approximately two per second) and all green BATTERY STATUS lights extinguish, about two minutes of battery power remain. If you have not already downloaded your system and turned it off, you must do so at this time. Then the MINUTEMAN Power Switch should be turned off to prevent further battery discharge.

When commercial power returns, switch the MINUTEMAN power switch to the "On" position if it was turned off previously. The green indicator light will come on after a short delay. Return your system to operation, and the MINUTEMAN system will automatically recharge the internal batteries during system operation.

Since most commercial power outages are of short duration, commercial power will probably be restored before the two-minute warning. **IF COMMERCIAL POWER RETURNS BEFORE THE WARNING SIGNAL, THERE IS NO NEED TO SHUT DOWN THE SYSTEM AT ALL.** The MINUTEMAN will switch back to normal AC operation automatically.

During normal AC operation, the MINUTEMAN Unit will quietly protect your system from power surges, voltage spikes and noise interference. No alarms will sound and the green indicator light will remain on during this operation.

SYSTEM BATTERIES

The internal batteries used in the MINUTEMAN UPS UNITS are sealed, maintenance-free, lead-acid, with electrolyte totally absorbed in the plates and separator material. For maximum life, battery temperature should be kept as cool as practical indoors, and at proper trickle charge voltage.

Expected battery service is three to six years at 85°F. For optimum performance, batteries should be replaced after about three years. Replacement batteries can be purchased from Para Systems, Inc. or from your local distributor or dealer. If the UPS is to be stored, allow the batteries to fully charge for 24 hours; then store the unit in a cool, dry location. For extended storage, recharge the batteries every four months. When the batteries are replaced, take the used batteries to a recycle center for proper disposal and reclamation of the lead.

UPS MONITORING CONFIGURATIONS

All models provide an optional UPS monitoring capability (model suffix "K") which will allow direct interface with many different computer operating systems. This capability permits an unattended, orderly shut down of the computer system when commercial power is lost for a long period. Some configurations also provide for a shut down of the UPS after the computer has been shut down, thereby conserving UPS battery capability exists. Contact Para Systems sales department for a more complete, up-to-date list.

Para Systems also offers its own software package "Network Manager," which functions with Novell, UNIX-based, OS/2 and Macintosh operating systems. Network Manager offers many advantages over existing UPS monitoring packages.

Finally, for systems which do not have UPS interface capabilities, user software can be written to read UPS status and provide for system shut down. Software specialists should contact Para Systems, Inc. for more information. The standard UPS DB9 PIN out is provided below for your information.

UPS DIRECT INTERFACE CONFIGURATIONS

- *Novell for AT compatible computers
- Novell for PS/2 computers with mouse port connector
- Microsoft LAN Manager or Microsoft NT
- LANtastic
- AS/400 Systems 9402/9404/9406

* This interface configuration functions with existing Novell UPS monitoring board, SS Keycard or Disk Coprocessor Board. Para Systems Monitoring Board (MB1) is available for new installations which do not already have an add-on monitoring board.

UPS DB9 PIN OUT

Pin 1 Not used

Pin 2 UPS simulates a relay closing (open collector transistor) between Pins 2 and 4 at utility fail.

Pin 3 Not used.

Pin 4 Common ground return (for pins 2,5, and 6).

Pin 5 UPS simulates a relay closing (open collector transistor) between Pins 5 and 4 at low battery warning.

Pin 6 User sends a RS232 high level (>+3V) to turn off the UPS (works only during inverter operation). UPS returns to AC mode when commercial power is restored.

Pin 7 Signal ground.

Pin 8 Reserved.

Pin 9 Reserved.

SERVICE

If any problems are observed with you MINUTEMAN UPS, contact your supplier or Para Systems customer service department. Prior to calling please write down and be prepared to discuss UPS status indication, and if the UPS supplies power -- either in Inverter or AC mode. A chart to assist in locating some common problems appears on the last page.

Do not remove the unit cover, or attempt any service. There are no user-serviceable components inside. Unauthorized service will void the warranty.

POLICY AND INSTRUCTIONS

FOR RETURN OF PRODUCT TO PARA SYSTEMS, INC.

If the UPS must be returned to Para Systems, Inc. for any reason:

1. Call Para Systems at (972) 446-7363 and ask for Customer Service.
2. Describe the problem or reason for return and you will be given a Return Material Authorization Number (RMA #). This number **must** be placed on the shipping carton, preferably on the return shipping label. The RMA # on the carton will ensure prompt handling when received at Para Systems, Inc.
3. Pack the unit for shipment in the original carton and foam as received. Other packaging methods can result in damage to the unit. Remember to pack the power cord supplied with the UPS in the carton.
4. Be sure to enclose the name and telephone number of the person who can authorize repair charges. Also include the address where you want the product returned.

5. Send the UPS freight prepaid to Para Systems headquarters. C.O.D. shipments will not be accepted.
6. If repair is Para Systems' responsibility, per the warranty, there will be no repair charge. The UPS will be repaired and returned freight prepaid, provided the UPS was returned in the original shipping carton and foam. If other packing methods result in shipping damage, repair will be at your expense. If the packaging is not deemed usable for UPS return, there will be a \$10 charge for a new box and foam.
7. If UPS repair is not Para Systems' responsibility, you will be advised of the estimated charges by telephone for your authorization. Should you choose not to have the UPS repaired, there will be a repair estimate charge of \$20. The UPS will be returned C.O.D. for either the repair amount or the estimated cost, plus shipping and handling.

UPS PROBLEM CHART

PROBLEM	POSSIBLE CAUSE	ACTION TO TAKE
When UPS Power Switch is turned on, UPS stays in Inverter mode.	Input fuse blown or input breaker tripped. No commercial power at wall receptacle or commercial voltage too low or too high.	Check fuses and replace if blown, or reset breaker if tripped. Verify power is available and voltage is in range.
UPS comes on in AC mode, but no AC NORMAL LED (green) and BATTERY IN USE LED (red) blinks.	DC breaker is off or tripped.	Switch breaker off and back on.
Backup time is considerably less than expected; battery charge condition is unknown.	Load is greater than estimated. Batteries are not fully charged, or weak.	Check and verify connected load. Recharge batteries for 8 hours and repeat backup test.
Backup time is considerably less than expected at the end of a battery recharge cycle (8 hours), and load is verified.	Charger has failed, or batteries are bad.	Call Para Systems for service.

PARA SYSTEMS, INC.
1455 LeMay, Carrollton, TX 75006

Tel: (972) 446-7363
Fax: (972) 446-9011

LIMITED PRODUCT WARRANTY

PARA SYSTEMS, INC. (PARA SYSTEMS) warrants that this product will be free from defective material and workmanship for a period of two years from the date of the original retail purchase by the end user provided that the warranty registrations card is completed and returned PARA SYSTEMS within ten (10) days of purchase. PARA SYSTEMS or its designated representative will repair, or at PARA SYSTEMS' option, replace any product that has been returned by the purchaser and is confirmed by PARA SYSTEMS to be defective.

This warranty shall be null and void if this product has been altered, opened without authorization, misused or damaged by accident, misapplication, abuse, fire, flood or other disaster.

PARA SYSTEMS SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR OTHER TYPES OR DAMAGES RESULTING FROM THE USE OF THIS PRODUCT OTHER THAN THE LIABILITY STATED ABOVE. THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MECHANICALITY OR FITNESS FOR A PARTICULAR PURPOSE.

MINUTEMAN PLATINUM PROTECTION PLAN LIMITED WARRANTY

In addition to the Product Warranty stated above, Para Systems, Inc. also warrants to the original purchaser of the Minuteman products that all equipment connected to and powered by the UPS and registered under the Minuteman Platinum Protection Plan shall be protected from damage caused by AC power surges, subject to the following terms and conditions. Para Systems or its designated representative will, at Para Systems' option, repair or replace any equipment so damaged, provided the cost of repair or replacement of the equipment does not exceed twenty-five thousand dollars (\$25,000).

TERMS AND CONDITIONS

1. The UPS and connected equipment must be properly installed per the UPS Owner's Manual and in compliance with all applicable electrical and safety code. Extension cords and power adapters are not to be used.
2. This warranty applies only to the original end user purchaser, who must register the UPS and connected equipment within then (10) days of receipt.
3. This warranty gives the purchaser specific legal rights, and the purchaser may also have other unspecified rights which may vary from state to state.
4. A finding will be issued by Para Systems within sixty (60) days or receipt of the affected Minuteman unit/units and all documentation contained in the Minuteman Platinum Protection Plan Claims Packet. A notice of the finding will be provided to the purchaser.
5. This warranty does not cover: a.) any damage to any connected equipment resulting from any cause other than AC power surge, as defined by IEEE Standard 587, which was transmitted through the UPS to the connected equipment; b.) loss of data, software, business profits, claims by third parties and other incidental damages even if Para Systems is advised of the possibility of such damages in advance.
6. This warranty shall be null and void if the Minuteman product is altered, opened without authorization, misused or damaged by accident, misapplication, abuse, fire, flood or other disaster.

PLEASE KEEP THIS DOCUMENT FOR YOUR RECORDS

Model # _____ Date Purchased _____