

Serial No. _____

PO-MANU0-0620BX
February 2008
Rev.D1



MOBILE

(with Optional 12 volt Heater)

OWNER'S MANUAL

Electrical Specifications

Max Amps		
with 110V heater on		1.0
with 12V heater on		8.0
Fan Watts Required		5.0 (12V)
Heater Watts	(110V)	160
	(12V)	90
(when thermostat switches on)		
Average Power		
Use In Watts	(110V)	85
	(12V)	50
(heater on 1/2 time)		



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L7L 5L1 CANADA



RATED CAPACITY

Weekend & Vacation Use

Mobile: 3 Adults or families of 4

Residential & Continuous Use

Mobile: 1 Adults



US COAST GUARD
CERTIFIED
Issued 09/05/97

MOBILE Simple Operating Instructions

Regular Maintenance

1. Rotate the drum 4-6 rotations every other day while you are there and using the toilet.
2. When rotating the drum, rotations are of the drum itself, not the handle.
3. When finished rotating, fold the handle in under the seat. This will mean that the drum is ready to receive waste, and the drum will not move out of the proper position.
4. After each bowel movement, one cup of the bulking mixture should be added to the unit to cover the bowel movement. (Scoop provided is 2 cups)
5. If you are leaving for more than three days, unplug the unit.

Bulking Material

When you run out of our material, you can either purchase our premium mix (Compost Sure) through our offices, or make your own using 60% pine wood shavings and 40% peat moss. The shavings should be no smaller than 1" square in size. Do not use cedar. Any other wood will do. Do not use 100% peat moss as this will clog your drum screen and drains.

Periodic Maintenance

Rake the evaporation chamber (floor of the unit), especially at the two back corners using the tool provided. This is to clear away peat moss from the drains so that they do not get clogged. Do this thoroughly at the beginning and middle of the season for cottage users or bi-monthly if residential, and thereafter if it looks like it needs it (may not need it until the next spring).

Empty some of the contents of the drum into the drawer when the drum is 1/2 full or feels like it is becoming difficult to turn. This is done by pulling out the drum locker and rotating the drum backwards once.

OWNER'S MANUAL

CONTENTS

WARRANTY

SUN-MAR Corp. warrants the original purchaser that this toilet is free from defects in material and workmanship under normal house or cottage use. SUN-MAR Corp. will furnish new parts for any part that fails within three years provided that our inspection shows that such failure is due to defective material or workmanship. Any part supplied by us to replace another part is warranted for the balance of the original warranty period.

This warranty does not cover:

1. Damage resulting from neglect, abuse, accident or alteration; or damage caused by fire, flood, acts of God or any other casualty.
2. Parts and accessories not sold or manufactured by SUN-MAR Corp. or any damage resulting from the use of such items.
3. Damage or failure resulting from failure of the purchaser to follow normal operating procedure outlined in the Owner's Manual or in any other printed instructions.
4. Labor and services charges incurred in the removal and replacement of any parts found defective under the terms of this warranty.
5. All returns to the factory must be made freight prepaid. All shipments from the factory are made F.O.B. Burlington.

This warranty is in lieu of all other warranties expressed or implied, and no person is authorized to enlarge our warranty responsibility, which is limited to the terms of this certificate. The Company reserves the right to change, improve or modify its products without obligation to install these improvements on equipment previously manufactured.

Introduction	How your composting toilet Works	2-5	Chapter 4 Compost Troubleshooting	13-16
	How Composting Works	2	Aerobic Compost Requirements	13
	The Composting Chamber	2	Compost Too Wet	14
	Compost Finishing Drawer	2	Compost Too Dry	14
	Evaporation Chamber	3	Waste not Breaking Down	14
	Winter Use	3	Lumps	15
	MOBILE Explosion Drawing	4	Drum Too Full	15
	MOBILE Part Numbers	5	Flies	16
	Wiring Diagram	5		
Chapter 1 Inspection	Inspection	6	Chapter 5 Mechanical Troubleshooting	17-22
	Check for Damage	6	Urine Odor In Washroom	17
	Check for Parts and Functionality	6	Occasional Urine Odor Outside	18
	Space Required	6	Sewage Odor when drum turns	18
	Other Considerations	6	Fan Noisy	18
			Fan Not Working	19
Chapter 2 Installation	Installation	7-9	Liquid Buildup/	
	MOBILE Rough in Dimensions	7	Lack of Evaporation	19
	Included in you kit	8	Overflowing Liquid	19
	Anchoring your Mobile	8	Heating System Not Working	20
	Piping Location	8	Liquid In Finishing Drawer	21
	Piping Installation	8	Drum Will Not Stay Vertical	21
	The Deck or Roof Vent	9	Drum Will Not Turn	21
	Leading the vent through the roof	9	Drum Door Not Opening/	
	Preparing the filter box	9	Closing	22
	Electrical Considerations	9		
	Drain Installation	9	Composting Accessories	23
	Handling Effluent	9		
Chapter 3 Start Up and Use	Start Up and Use	10-12	Warranty Information	24
	Initial System Start Up	10	Simple Instructions	25
	Annual Start Up	11		
	Periodic Check Up	11		
	Ongoing Maintenance	12		

Introduction

HOW YOUR COMPOSTING TOILET WORKS

The key to the success of the "MOBILE" lies in it's three chamber design. Each of the three chambers; composting, compost finishing, and evaporation have their own independent environments for optimum efficiency.

Composting is a natural recycling process where human waste and toilet paper are broken down by microbes into minerals and converted back to earth. Heat, oxygen, organic material and moisture are needed to transform this waste into good fertilizing soil, perfect for your flower beds.

Oxygen is provided by the ventilation system, and by tumbling the composting drum. Additional organic material is introduced by adding "Compost Sure" (or peat moss mix). The waste entering the toilet is approximately 90% water content. Any excess liquid which is not absorbed will collect on the floor of the unit (evaporation chamber) where it may be evaporated into water vapor and carried back to the atmosphere through the venting system. The remaining waste material is transformed into an inoffensive earth-like substance.

The Composting Chamber

The composting chamber is in the form of a Bio-drum which holds the natural compost heat, provides the necessary mass to maintain a good compost, and is rotated by turning the handle to achieve perfect mixing and aeration.

A drum locker (the white drum locker release button is

above the footrest) automatically maintains the Bio-drum in a top center position with the drum door open so that the drum is positioned to receive new material. To mix and aerate, the drum lock should be pulled to release and the handle rotated clockwise. Turning this handle clockwise rotates the drum counter-clockwise. As the drum rotates the drum door closes automatically so that the waste remains in the drum.

Material is extracted from the drum and into the finishing drawer by pulling the drum lock, and rotating the handle counter-clockwise. The drum turns clockwise, the drum door remains open, and some compost falls into the second chamber; the compost finishing drawer.

Compost Finishing Drawer

The compost finishing drawer sits tucked away below the step-stool, just above the evaporating chamber. Compost from the drum is isolated in the drawer where it is allowed to 'finish' composting. Composted material can be extracted into the drawer and left there for 3-4 weeks until it is time to remove more compost from the drum. To empty the drawer, release the footrest hinges, remove the footrest, and undo the finger screws which seal the drawer.

ACCESSORY ITEMS FOR COMPOSTING

SUN-MAR has developed a number of composting accessory items over the years in response to frequent requests from users. These items may serve to improve composting speeds under some circumstances.

Name	Description	Container	Price*
"Compost Quick"	Solution containing a mixture of enzymes designed to facilitate bacterial activity. Also useful as a cleaner.	16 oz. (250ml) spray bottle	\$15.50
"Microbe Mix"	Special selected dried bacteria to decompose waste also includes dried enzymes.	16 oz, (454 gm) Jar	\$16.00
"Compost Sure"	Bulking material containing a mix of coarse peat moss, and chopped hemp stalk to provide moisture retention, porosity, and free air space within the compost.	30 litre (7.9USG) /bag	\$10.00 *
<i>Price does not include freight - Please call for applicable freight charges</i>			
<i>* Prices subject to change.</i>			

Note:

If the peat moss you are using is powdery and fine, it will result in poor porosity and an excessively wet, oxygen deficient compost. You should change or modify your bulking material. This situation is most likely to happen with central units which are exposed to a lot of flushing liquid. Modify by adding wood shavings, or use "Compost Sure" for optimum results.

Symptom	Cause	Remedial Action	Prevention
Drum Will Not Turn (Cont'd)	Drum fallen from bearings or bearing-plate fallen.	Have your serial number ready. If the drum or bearing plate has fallen, contact Sun-Mar immediately. We will make sure your problem is fixed quickly.	Not a common repair.
Drum Door Not Opening/Closing Properly <i>(Compost will drop into the finishing drawer even when the drum is not being rotated backwards to extract compost).</i>	Drum too full	See Section on "Compost Troubleshooting- Drum Too Full"	Follow items in prevention column for "Drum Too Full"
	Compost encrusted humus deflector	Heavily encrusted humus deflectors, caused by an over-full drum, will push the drum door open with every revolution. The humus deflectors may be accessed by removing the finishing drawer. Use rake to scrape compost from humus deflectors.	Drum should never be more than 1/2.
	Hinges Stuck	Drum Hinges have compost caked on them. Spray with Compost Quick and clean with nylon brush.	
	Hinge(s) broken	Call Sun-Mar to obtain a replacement drum hinge.	

Evaporating Chamber

The third chamber is the floor of the Sun-Mar "Mobile" which forms the evaporation chamber from where excess liquids are evaporated or drained. You will frequently see liquid in this area, which is waiting to be evaporated.

Air is pulled through intake holes at the left side of the toilet by a 12 volt fan; over the evaporating chamber, and up a vent stack which is attached to the top right of the toilet. The 12 volt 5.4W fan is in a fan box which should be placed in the vent stack (wherever it is convenient for space and accessibility for infrequent maintenance).

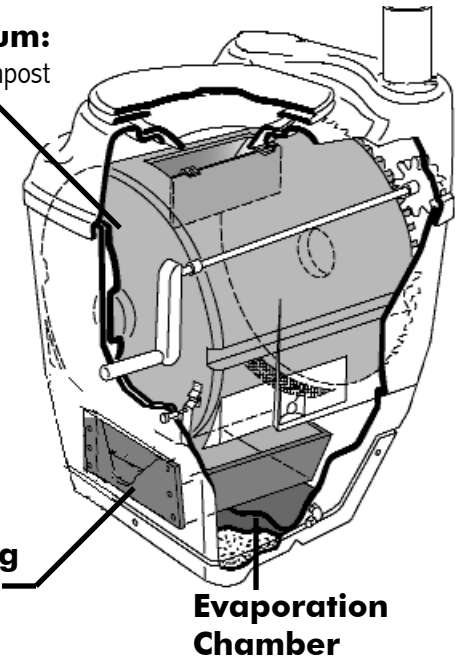
The partial vacuum which the fan creates within the toilet ensures there can be no smell, while the gasket around the drawer opening of the unit ensures liquid in the evaporating chamber cannot escape while the unit is in motion. The evaporation process is further assisted by a thermostatically controlled 12 volt or 110 volt heating element in a separate sealed compartment under the evaporating chamber. The heating system maintains warmth in the evaporating chamber, and the indirect warmth assists the composting process, without the compost drying out. A 1"OD (25mm) emergency drain exits from the back side that should be connected to the right or the left. **It is necessary to connect one of these drains to a container, holding tank or approved facility.**

Winter Use

Because "Sun-Mar" units are made largely of fiberglass and high grade stainless steel, freezing temperatures will not damage the toilet. Composting action decreases as the temperature drops, so for extended use, the toilet should be kept constantly at or above 55-60 degrees F (13-15 C). All exposed vent stack should be insulated to minimize the condensation in the pipe and avoid ice blockages.

If the toilet is in an unheated space, it may be necessary to keep the unit plugged in. Placing a blanket over the unit would also help. These are not ideal composting conditions. Room temperature should be restored as soon as possible for proper composting to occur. In extreme temperatures, an additional source of heat may also be required. If the "Mobile" will be used only occasionally throughout the winter, the toilet may be used as a holding tank with no damage to the unit or the compost. Space should be made in the drum to accommodate winter use.

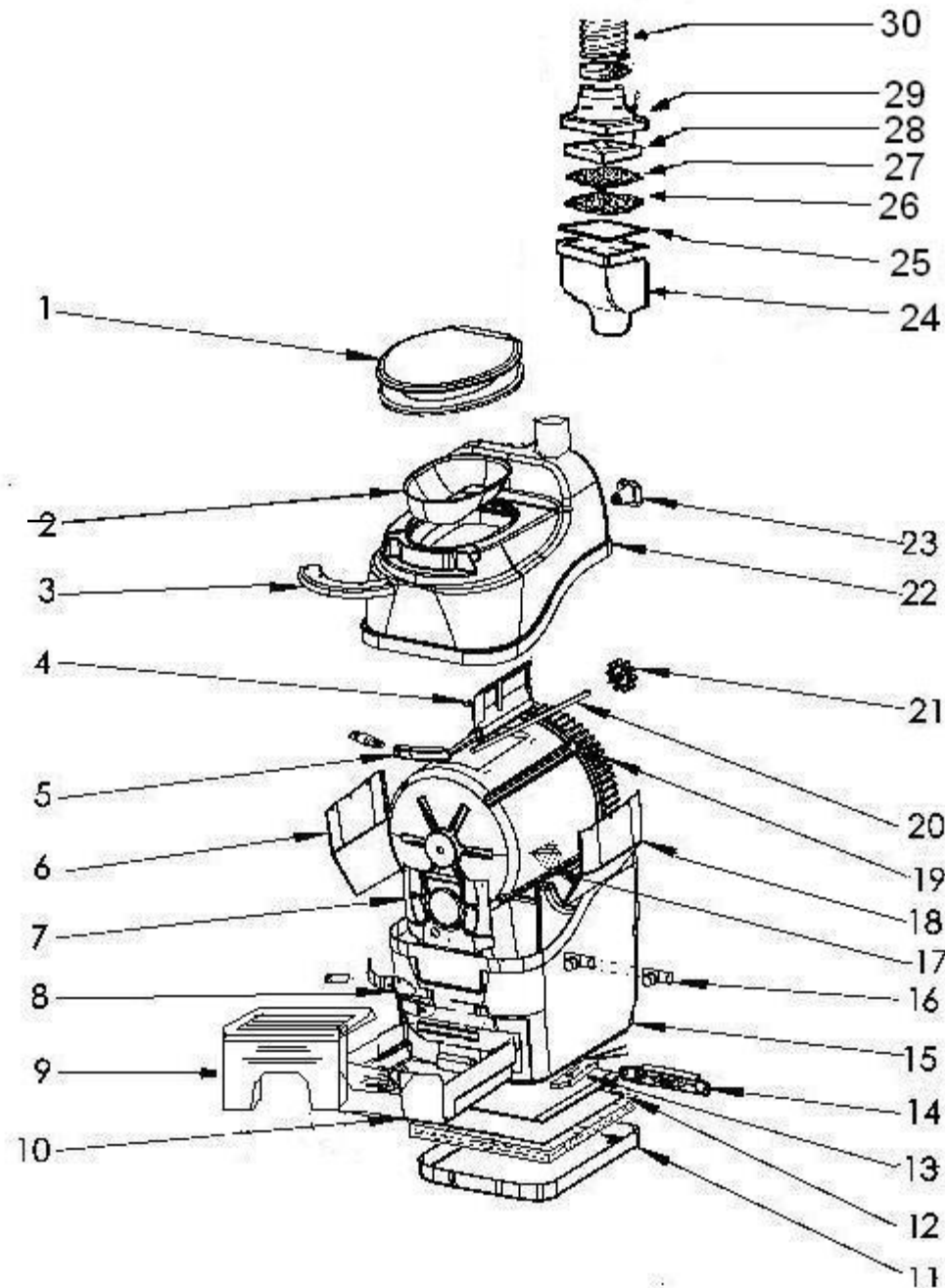
Bio-Drum:
Where compost collects



Finishing Drawer

Evaporation Chamber

MOBILE EXPLOSION DRAWING

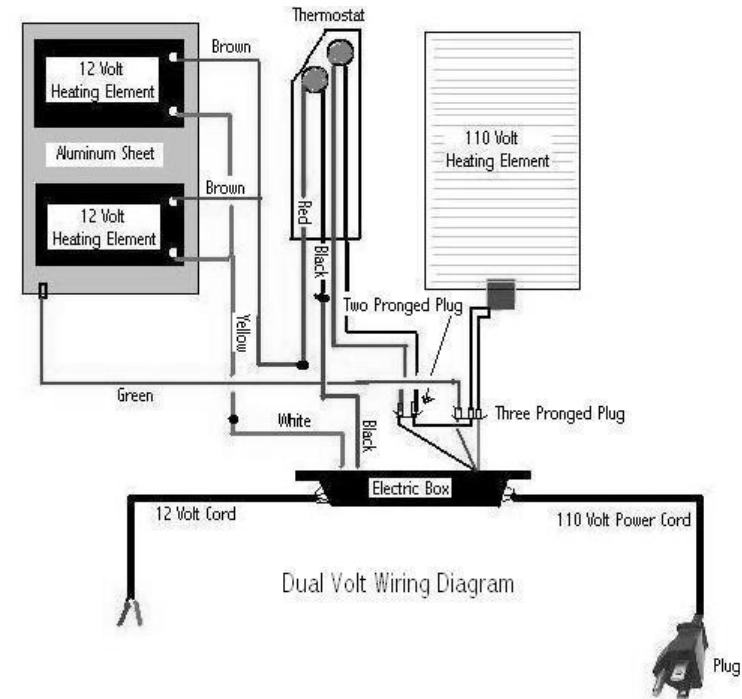


Symptom	Cause	Remedial Action	Prevention
Heating System Not Working (Cont'd)	Heating Element Failure	Have your serial number ready and call Sun-Mar for a replacement. (Detailed instructions are included with the replacement part) Please note: Because this part is not easy to replace, and because there is far less chance that you will need this part than a thermostat; we recommend trying to replace the thermostat first. Have serial number ready and call Sun-Mar for a replacement part.	If you ever remove the unit from the bathroom for cleaning, DO NOT use a pressure hose around the base of the unit.
Liquid in Finishing Drawer	Drum Screen Clogged	Rotate drum 180 degrees so that the drum screen is on top - you will just be able to see the edge of the drum screen if you take out the bowl liner. Spray the drum screen with Compost Quick and then scrub screen with wire brush. You may want to hook up your overflow drain beforehand if there is a large liquid buildup in the drum.	
	Unit tilted forward	Use a 1/4" to 1/2" (6-12mm) wedge piece under the front of the unit to raise the front and drain liquid more easily towards the back of the unit. Call Sun-Mar if the problem persists.	Install toilet level or tilting slightly backwards, DO NOT install the toilet tilting forwards. If you are unsure of the grade of a bathroom floor, install it with a wedge piece.
Drum Will Not Stay Vertical	Drum Locker Broken	Have serial number ready and call Sun-Mar for a replacement part.	When returning the drum to top dead center position, do not bang against drum locker with excessive force. Remember to pull out the drum locker button before rotating the drum backwards or forwards.
Drum Will Not Turn	Set screw securing handle to shaft has broken	Drill out set screw and replace, or get handle replacement kit (instructions included).	Not a common repair.
	Steel pin securing gear wheel to shaft has broken	Have your serial number ready and call Sun-Mar for a replacement Small Gear Kit.	Keep composting drum from becoming overloaded. This puts undue strain on the nylon gear.

Symptom	Cause	Remedial Action	Prevention
Overflowing Liquid (Cont'd)	Drains Blocked	<p>1. Rake peat moss away from back two corners of "Mobile". These are the "buildup" areas. Use 'hook' end of rake to run pull debris from under drain baffles. If drains are still clogged, proceed to step 3.</p> <p>2. Check drain line for kinks, blockages or upward bends. Remove and flush if blockages present, unkink if bent and ensure that the drain pipe is sloping downward. If your drain pipe is in order, proceed to step 3.</p> <p>3. Finishing drawer screws not tight enough or gasket material damaged.</p>	<p>1. A clogged drain is not very likely to happen if you rake your evaporating chamber 3-4 times per year for continuous use.</p> <p>2. Use premium 1"ID (25mm) hose for the drain line. A good hose will be less likely to kink. Use elbows or fittings around bends to prevent kinks.</p> <p>3. Tighten finger screws, or replace gasket material.</p>
Heating System Not Working	Test to determine whether failure has occurred	Pull drawer out and put your hand in the evaporation chamber (Not in the liquid). If there is no warmth rising from the floor of the unit, your heating system is not working. It is most commonly the thermostat that has failed. If you notice a lack of evaporation, but there is still warmth in the heating chamber, see "Liquid Buildup" for solutions.	
	Thermostat Failure	Have your serial number ready and call Sun-Mar for a replacement. (Detailed instructions are included with the replacement part) If the insulation behind the thermostat access cover is moist or discolored, or heating does not work after the new thermostat has been connected, then the heating element has failed.	Your thermostat and fan are the two constantly moving parts on the unit, and so are the most likely to fail. Both are easy to replace.

MOBILE PART NUMBERS & DESCRIPTIONS

#	PART	DESCRIPTION	#	PART	DESCRIPTION
1	PP-TOILS-0208DX	Toilet Seat Bone	13	AO-THER-0310DX	Thermostat Dual Voltage
2	PP-BOWLL-0026EX	Bowl Liner	14	AO-ELECB-0001AX	Electric Box
3	AO-FRIBC-0467BX	Front Cover Bone	15	PF-TANKS-0659XX	"Mobile" Tank
4	PP-HINGE-0249BX	Plastic Drum Hinges	16	AP-DRAIO-0306XX	Safety Drain
	AO-DRUMD-2004XX	Drum Door	17	PM-DRMSE-0194BX	Drum Screen
5	AO-HAND0-0307CX	Swivel Handle Bone	18	PP-DEF_R-0758XX	Hummus Deflector
6	PP-DEF_L-0757XX	Humus Deflector Left	19	AF-DRUM0-0524XX	Drum
7	PF-BEAE-0528FX	"Mobile" Front Bearing Plate	20	AO-SHAFA-0854XX	"Mobile" Shaft Kit
8	AO-DRUML-0465XX	Drum Lock Mechanism	21	AO-SMALL-0440XX	Small Gear Kit
9	PP-FOOT0-0547XX	Snap Apart Hinge	22	PF-TOP_S-0521XX	"Mobile" Top Kit
	PO-FOOT0-0536XX	Mobile Folding Footrest	23	PP-SHAFH-0001XX	Shaft Holder & Support
10	AO-DRAW0-0820XX	Mobile Drawer	24	PF-FILTB-0738BX	Filter Box Bottom
11	PF-HEATT-0660XX	Mobile Heater Tray	25	PO-MESHO-0741XX	Plastic Mesh
12	AO-HEATE-0004AX	Heating Element C9806	26	PO-FILTB-0623XX	Zeolite Filter
	PO-HEATE-0160BX	12 V Heating Element X 2l	27	PO-CARBF-0130XX	Carbon Filter
	PP-GASK0-0188BX	Rubber U Channel	28	PM-FAN14-0730XX	12 Volt 5.4 Watt Fan
			29	PF-FILTT-0738TX	Filter Box Top
			30	PP-PIPEP-0643XX	Flexible Pipe Piece



Chapter 1 Inspection

This chapter describes how to inspect your new Mobile prior to installation for damage and to make sure you have received all of the parts.

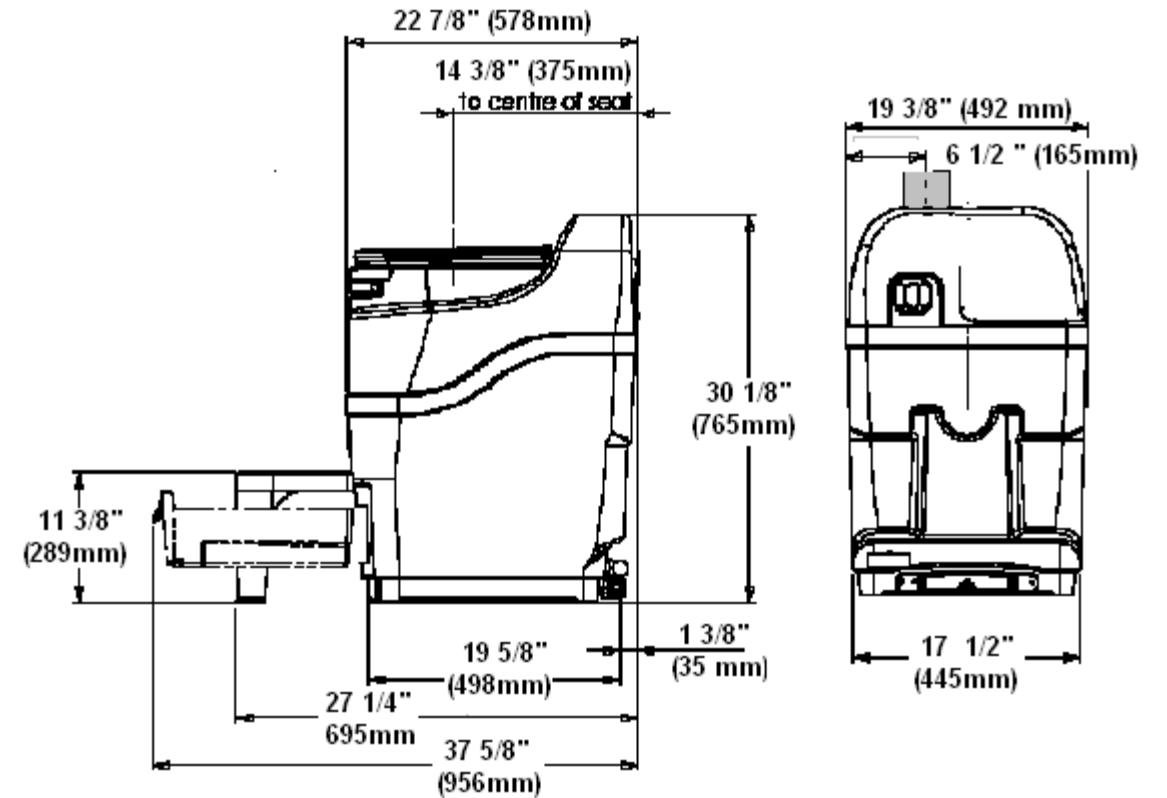
Receiving your Composting Unit	
Inspecting the unit for damage	<p>i) If there is any visible damage to the carton- the contents of carton MUST be inspected before signing bill of lading. Damaged units should be refused. Call Sun-Mar immediately.</p> <p>ii) Before signing the shipping papers and dismissing the driver.- ensure that the carton contents have been inspected.</p> <p>iii) If the shipper has left- Report the damage immediately to the transport company and call Sun-Mar.</p> <p>iv) Soon after delivery, remove the “Mobile” carefully from the carton- If there is hidden damage, or for any service Questions, contact Sun-Mar to determine the best course of action.</p>
Check Carton Contents and Familiarize Yourself with the “Mobile”	<p>Check to make sure the carton contains everything on the packing list. Notify Sun-Mar if you are missing anything.</p> <p>i) Turn the crank handle clockwise to rotate the Bio-drum for mixing and aeration.</p> <p>ii) Pull the white drum locker button, on the front of the unit and turn the crank handle counter-clockwise to simulate extraction of the compost.</p> <p>iii) Connect the 12 Volt fan and the 12 volt heating element to the 12 volt supply. Check that the fan is working, (this fan pulls 5 Watts and should be on when the unit is being used). The 12 volt heater can be run when there is sufficient 12 volt power available. The power supply for the heater should be fused at 10-15 amps which is more power than you will require.</p> <p>iv) Plug the unit in and wait for 15 minutes. Place your hand on the floor of the evaporating chamber (the floor of the unit, under the drawer) to check that it is warm to the touch, so that you know the heater and thermostat are functioning properly.</p> <p>v) The footrest attaches to the unit via two hinges. When it is necessary to remove the finishing drawer, release the hinges. When the footrest is removed, unscrew finger screws securing finishing drawer to the toilet, and pull out the compost finishing drawer (situated below the footrest) where the compost drops for finishing.</p>
Space Required	When selecting the best place for your toilet, make sure that there is room (an extra 12” or 30cm is required) to remove the finishing drawer.
Other Considerations	The location of the vent stack, and the emergency drain may determine the best place for the toilet. Ensure that the toilet is level front to back or is sloping slightly backwards. The unit should not tip forward. This will ensure that liquid is contained within the unit.


Symptom	Cause	Remedial Action	Prevention
Fan Not Working	Debris in fan or Mechanical Failure.	Have your serial number ready and call Sun-Mar for a replacement.	The fan is a continuously moving part which will eventually have to be changed. Do Not turn on and off daily.
Liquid Buildup/ Lack of Evaporation	Increased usage.	The amount of liquid varies substantially between installations. The overflow drain MUST be installed for cottage or residential use. You will definitely need this drain if: conditions are humid, or you expect the toilet to see a lot of liquid use.	Install the overflow drain. Rake evaporating chamber vigorously at spring start-ups for cottage use, and once every other month for residential use.
	Failure of heating system	Check “Heating system not working:.”	Install the overflow drain.
Overflowing Liquid	Overflow drain not hooked up	Connect overflow safety drain (See also increased usage above)	
	Thumbscrews in drawer not tight enough	Tighten the thumbscrews until rubber gasket around the drawer is slightly compressed.	

Symptom	Cause	Remedial Action	Prevention
Occasional Urine Odor Outside	Deck fitting is located in a sensitive place. Filter materials need to be installed or need changing.	<ol style="list-style-type: none"> 1. Add lime to the evaporation chamber - as much as you think necessary. You will have to rake more often if you do this. You can also add lime to the compost if desired, but no more than 1/2 cup (125ml) per week as it may upset the PH balance in larger amounts. 2. Install a bag of Zeolite, and one of Activated carbon in the fan box to ensure air emerging from the vent is 'polished'. (These materials can be obtained from Sun-Mar). 	Downdraft is dependent on wind direction. If symptoms occur, add lime or change filter materials.
Strong Sewage Odor Present when drum turns	Compost is anaerobic	Begin following: "Compost Troubleshooting" suggestions.	Follow "Ongoing Maintenance" and use proper bulking material.
Fan Noisy	Fan damaged in shipping, or bearings are beginning to wear if it is rattling.	<ol style="list-style-type: none"> 1. If it is rattling, it may need to be cleaned or the bearings are worn and the fan needs to be replaced. 2. A hum is the normal sound the fan will make. If you are in a very quiet setting it will be more noticeable. 	Clean the fan with a small brush and/or compressed air nozzle once a year. To do this, remove the fan assembly by taking off the snap cap covers and unscrewing the screws which hold it in. This will prevent wear and lengthen the life of your fan.

Chapter 2 Installation

MOBILE ROUGH IN DIMENSIONS



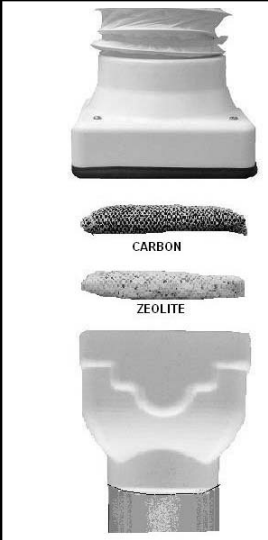
Included in your kit	1- Owners Manual 1- Warranty Card 1- Bowl Liner 1- Footrest 1- Rake 2- 3" x 30"(75mm X760mm) PVC Pipe	1- Mobile Hardware Kit 1- Fan Filter Box 1- Bag Carbon (Filter Materials) 1- Bag Zeolite (Filter Materials) 1- 1" X 8 Feet(25mm X 244cm) Drain Hose 1- Compost Sure
Anchoring the Mobile	<p>The Mobile unit has an anchoring bracket that is found in the center back of the unit. To anchor the Mobile, measure two points 19" (48cm) from the floor that are 6" (15cm) apart and draw a line on the wall between the two points. Cut a piece of 2'x4" (90x406mm) wood stud. Attach the 6" (15cm) long piece of 2x4 (90 x 406mm) wood stud vertically to the wall so that the 4" (406mm) side is flat against the wall and the 2"(90mm) side is just below the line that you have drawn on the wall. Push the Mobile against the wood stud so that the bracket on the back of the Mobile is over hanging the 2"x4" (90x406mm) wood stud. Use a pencil to mark the placement of the holes in the bracket on to the wood stud. Pull the Mobile away from the wall and use an electric drill to pre-drill holes where you have marked the wood stud. Push the Mobile back into place and attach the anchor bracket to the wood stud by inserting 1"(25mm) screws through the holes in the top of the bracket and screwing the 1" (25mm) screws into the corresponding holes in the wood stud. Tighten the screws until they are flush with the top of the bracket.</p>	
Piping Location	<p>Venting consists of the vent inlet assembly, 3" (75mm) grey sewer pipe, a fan box. This should be installed as vertically as possible, with the filter box installed in a location convenient for infrequent maintenance.</p> <div data-bbox="290 760 674 1133" style="display: inline-block; vertical-align: top;">  </div> <p data-bbox="674 792 1244 954">Use the flexible vent pipe on the top of the filter box to enable filter material changes (see page 9). Do not use the flexible vent pipe on the bottom of the filter box. The bottom of the filter box should be completely vertical on top of the rigid vent pipe.</p>	
Piping Installation	<p>Piping and fittings are of standard 3" (75mm) PVC sewer pipe. Additional pipe or fittings are easily available should you need them, from a building supply dealer. If you cannot find them near your location, they are available in 30"(760mm) lengths directly through us.</p> <ol style="list-style-type: none"> i) The vent stack should be installed as near to vertical as possible. ii) Silicone caulking should be used for the connection of the vent stack to the toilet because at some time the toilet may have to be moved. iii) Position the fan box in the vent stack where maintenance can be carried out conveniently. iv) If using the flexible hose, use at the top of the filter box so that moisture does not collect in the corrugations. v) All connectors in the vent pipe should be sealed. vi) Minimize the number of sharp angles because each reduces vent efficiency. Do not use any 90 degree elbows, since this will reduce air flow substantially. 	

Chapter 5 MECHANICAL TROUBLE SHOOTING

Most problems are prevented through proper maintenance and the use of proper bulking materials in the toilet. If you do have a problem, the Trouble Shooting section will help you solve it. If you still have further questions, contact technical service at Sun-Mar for advice at 1-888-341-0782

Symptom	Cause	Remedial Action	Prevention
Urine Odor in Washroom	Horizontal runs or downward slopes on pipe are causing condensate to block pipe.	Re-install the vent so there are no longer any low points where condensate can collect. If re-installation is not possible, drill a small hole in the bottom of the low point (preferable outdoors) to allow condensate to drain. (Note: watch for icing in winter at this hole.)	Install wall brackets on vent pipe to prevent settling. DO NOT install horizontal runs as liquid will collect and block ventilation, causing odor.
	Fan has failed	Have your serial number ready and call Sun-Mar for a replacement. Instructions are included with the replacement fan.	The fan is a constantly moving part and has a finite service life.
	Room where unit is located is air-tight.	<ol style="list-style-type: none"> 1. Hold a lighter up to the air intake hole on left side of the unit. Air should be drawn into the hole. If air is not easily pulled in, check venting for too many bends or horizontal lengths and/or provide more ventilation to the room. 2. Install fresh air intakes on any competing appliances. 	Install your "Mobile" in a room with plenty of ventilation and watch for competing appliances such as bathroom fans and wood stoves. A ventilation fan in the bathroom is not required when an "Mobile" is installed.
	Vent stack has too many bends and/or horizontal lengths.	Re-install the vent stack to reduce the number of bends/eliminate horizontal lengths.	Install the vent with minimal bends and NO horizontal or downward slopes.
	Too much filter materials in the filter box.	Only put enough carbon and zeolite in the filter bags to cover the bottom of the filter box 1/2" (12mm) deep.	In the filter bags there is more than enough filter material. Remove some and save it for future use.
	Blow-back when moving the unit.	Install a vent siphon on the top of the vent to help create a draw up the vent stack when you are moving the unit. Call Sun-Mar for suggestions.	

Symptom	Cause	Remedial Action	Prevention
Flies Present	<p>-compost too dry</p> <p>-compost anaerobic</p> <p>-kitchen/garden waste added</p> <p>-foreign material added</p>	<p>1. To get rid of flies, you can use any pesticide that is used on your garden. Pesticides used for garden use are not anti-bacterial so are safe to use on your compost. If you prefer not to use a pesticide in your compost, the unit should be cleaned out completely and washed with soapy water to kill any remaining eggs. Once the unit is washed, it should be rinsed well to remove all traces of soap before restarting the compost.</p> <p>2. If using a pesticide to kill the insects, it may be purchased from a local garden center or hardware store.</p> <p>3. If using a liquid, sprinkle about 1/2 cup of the mixture directly over the compost. Using a spray bottle, apply throughout the entire toilet (finishing drawer, evaporating chamber, drum, outside of drum) until the fly population is eliminated. Open a window or door to ventilate the room while applying and keep children and pets away from the area for a few hours after application. Repeat if you see another fly after the initial application.</p> <p>IMPORTANT: Application of a pesticide in a Sun-Mar composter is not a health concern because all Sun-Mar units are vented.</p>	<p>1. Keep compost moist. In order to determine a good level of moisture, shine a flashlight into the drum. The compost should have a slight gloss or shine. If it does not, add warm water to it until it reaches this consistency. Fungus gnats tend to be attracted to a dry compost, due to the fungus which begins to form on the surface when it dries out. A good, moist compost will not be attractive to flies.</p> <p>2. Do not add topsoil from the ground, composted matter, or kitchen scraps to the toilet. Flies may be present in, or attracted to these items.</p> <p>3. See "Compost Remediation" if the compost smells- anaerobic compost will attract flies and drastically reduce the performance of your composting unit</p> <p>4. Use "Compost Sure" or a mixture of peat moss and non-cedar wood shavings.</p>

The Deck or Roof Vent	The deck vent is not supplied: one should be purchased which fits the decor and function of your mobile vehicle. The deck fitting should discourage downdraft and also prevent liquid (especially sea-water) from entering the toilet. It should also encourage ventilation of the toilet at all times.	
Leading the vent through the roof	Where the piping is taken through the roof, a roof flashing should be used to seal the installation. DO NOT install horizontal sections of vent pipe to avoid leading the vent through the roof.	
Preparing the Filter Box	<p>Place the fan filter box in the vent stack where it is easily accessible to replace the filter materials. The filter materials (Carbon and Zeolite) will come in fabric bags that should be folded so that they will fit inside of the filter box. The bags that you receive with the composting unit may have too much material to fit in the filter box. You will have to remove enough of the filter materials (Carbon and Zeolite) so that you will only have about 1/2" (12mm) of Carbon in one filter bag and 1/2" (12mm) of Zeolite in the other filter bag (too much filter materials will stop the air-flow in the composting unit). Place the Zeolite and Carbon filters on top of the plastic mesh inside of the filter box. Place the top (smaller portion) of the filter box into the bottom of the filter box (part with plastic mesh). When attaching the filter box to the vent, use the flexible vent hose to connect to the vent from the top of the filter box and a rigid coupling at the bottom of the filter box.</p>	 <p>The diagram illustrates the components and assembly of the filter box. At the top is the white plastic filter box with a mesh top. Below it are two cylindrical filter bags, one labeled 'CARBON' and one labeled 'ZEOLITE'. At the bottom is the assembled unit, showing the filter box placed inside a larger container with a vent pipe connected to the bottom.</p>
Electrical Considerations	A ground fault interrupter (GFI) circuit is recommended to protect the 110 volt portion of your Mobile from power surges. This may be installed directly on the wall socket or at the circuit breaker. Connect the 12 Volt fan in the fan box to the 12 volt supply and also connect the 12 volt heater. This fan pulls 5 watts and should be on whenever the unit is being used. On the other hand, you will want to arrange the 12 Volt heater so that this will on only when there is sufficient 12 volt power available. The 12 volt circuit should be fused at 10-15 Amps.	
Drain Installation	The Mobile has 1" (25mm) OD safety drain that exits from the back right and left of the unit. The Mobile has limited evaporating capacity when used with electricity, the safety drain MUST be connected . To connect one of the drains, (whichever side is convenient), remove the plug, attach a 1" (25mm) hose ID and secure with a hose clamp. Ensure there are no kinks or upward bends in the drain hose.	
Handling Effluent	<p>In an "Mobile", there will be effluent. The following are possible options to take care of the liquid:</p> <p>-Use a container which is emptied periodically (water jug or small barrel). This ensures a closed loop system.</p> <p>-Plumb into an existing septic or holding tank line.</p>	

Chapter 3
Start Up and Use

Although the start up instructions remain the same no matter what your application, different situations will require different actions and this chapter will explain what they are.

Initial System Start Up

Begin operation by carrying out the start up procedure described below, and then continue with the “Ongoing Toilet Maintenance” routine. It normally takes six weeks before a compost is properly established. You will know this has happened when:

- **Compost Volume increases more slowly**
- **Compost turns black and becomes loam-like**
- **Toilet paper decomposes within a few days**

	Action	Why?
ADD	2 gallons(500ml) of peat mix (1/3 the 30 liter bag provided for the Mobile to the drum.	-Provides carbon base and initial mass for compost.
ADD	1/2 Microbe Mix packet at start up, other 1/2 in two weeks	-Adds necessary microbes which will breakdown the compost.
POUR	About 1/2 gallon (500ml) of warm fresh water (not sea water) into the drum	-Moistens carbon base
PLUG IN	Fan and heater are operating	-The unit is ready for use
SPRAY	“Compost Quick” enzymes into drum before and after mixing. Coat the evaporation chamber with it before using the unit.	-Speeds start up of compost by acting as a catalyst to assist bacteria. -Prevents possibility of start-up odor in the evaporating chamber.
RAKE	Loose peat moss from the evaporating chamber until the compost is established, which takes approximately 6 weeks.	-Until the compost is active, some peat moss may fall through the screen or drum door into the evaporating chamber

* Toilet paper is a good source of carbon and should be added after use.

Symptom	Cause	Remedial Action	Prevention
Waste not Breaking Down at all (cont'd')	Antibiotics or Sea-water have been added	Empty drum. Hose out inside of drum. Restart compost according to “Initial System Startups”.	When used normally, antibiotics will only slightly slow compost. Add Sun-Mar Microbe Mix and Compost Quick during this period to accelerate compost action. Urinating elsewhere during this period will also help minimize the damage to the compost.
Lumps <i>If many large lumps have formed in drum, you will need to remove them or break them up with the rake tool. Follow the prevention column to ensure this does not happen.</i>	Compost Too Dry	Follow instructions for “Compost Too Dry” above. And also add 1/2 (500ml) gallon of warm water.	Follow recommendations for checking and adding moisture in “PERIODIC CHECKUP”.
	Over-Rotation of Drum	Drum should NOT be turned daily. Follow “ONGOING TOILET MAINTENANCE”, and also add 1/2(500ml.) gallon of wood shavings.	Drum should be turned three times a week, 6 rotations each time; once before departure for weekend use.
	Peat moss used as bulking material with no wood shavings.	Begin using 60% wood shavings(any wood except cedar, cypress or eucalyptus, bamboo, sugar-cane), 40% peat moss as bulking material.	Use proper bulking material.
Drum Too Full <i>Note: The drum is too full when it is over 1/2 full, and the door is not closing properly.</i>	Compost not emptied into finishing drawer in a timely fashion.	1. Remove compost until drum is only half full or less. Rotate compost thoroughly to aerate, and add compost accelerants (Compost Quick and Microbe Mix) if available. 2. If you need to dump more than one drawer of compost, and you do not already have a suitable backyard compost heap, you may try an open-slatted wooden crate (such as the kind used to package fruits and vegetables). Layer compost with bulking material and leave crate outside for 2 months or more to finish composting.	When drum is 1/2 full, remove some compost to the finishing drawer by rotating the drum backwards, to avoid surprise over-filling of drum. Do NOT let drum get above 1/2 full. (The drum is 1/2 full when the level of the compost reaches 3-4” (75-100mm) below where the drum door hangs) This will lead to lack of aeration, and anaerobic compost, and the inconvenience of having to remove more than one drawer.
	Kitchen/Garden Waste added		Do Not add kitchen or garden waste.

Symptom	Cause	Remedial Action	Prevention
Compost Too Wet <i>Your compost is too wet when there are standing pools of liquid. Compost will smell of sewage and is anaerobic</i>	Compost porosity is poor. Too much peat moss has been used as a bulking material. This is compacting, preventing liquid from draining through, and leaving no free air space for oxygen.	For an immediate improvement in porosity add about 1/2 gallon (500ml) of wood shavings, of any kind (except cedar, cypress or other anti-bacterial wood) to the drum. On an ongoing basis, change bulking material to Compost Sure or 60% wood shavings and 40% peat moss mix.	Use Sun-Mar Compost Sure or 40% peat moss, 60% wood shavings as a bulking material.
	Drum screen clogged	Rotate drum 180 degrees so that the drum screen is on top, take out the bowl liner. Scrub screen with wire brush. You may want to hook up your overflow drain beforehand if there is a large liquid buildup in the drum.	
Compost Too Dry <i>Compost is too dry when compost looks flat and brown rather than rich and black.</i>	Moisture not being added periodically or before departure.	Add 1/2 to 1 gallon (500ml -1 liter) of hot water to compost in order to bring it up to appropriate moisture level.	Follow section on moisture in "PERIODIC CHECKUP".
	Toilet not used for urination.	Peat moss retains moisture. 40-60% moisture content is ideal for aerobic microbes to thrive.	Use toilet for urination.
	Lumps present	Insufficient bulking material or not enough peat moss.	Add correct bulking material.
Waste not Breaking Down at all <i>If this is the case, the drum will fill up quickly</i>	Room Temperature under 50-60F(13-15C)	Install heat source to increase temperature. Temperature should be kept above 55-60F (13-15C) constantly if toilet will be used on an ongoing basis.	Install unit in warm area. The warmer the area, the better your compost will be! If evening temperatures fall below the prescribed temperatures on a residential unit, consider installing a heat source on a timer for evenings.
	Bleach or other anti-bacterial chemicals added.	Empty drum. Hose out inside of drum. Restart compost according to "Initial System Startups".	Never add bleach, seawater or cleaning chemicals.

Annual Start Up (seasonal units only)

Many units are only used regularly throughout the summer. For such seasonal units Sun-Mar recommends that the following start up procedure be followed at the beginning of the season.

Action	Reason for Action
Empty the compost that had been left in the finishing drawer, and use the rake to clean out the evaporation chamber.	- <i>Your fertilizer is ready.</i> - <i>This is a good time to remove peat debris</i>
Remove additional drawers of compost by releasing the drum lock (white button under the foot stool), and rotating the drum clockwise (the handle turns counter-clockwise) to extract compost into the drawer. (At the beginning of the season, it will all be finished compost) Empty the drawer and repeat extraction cycle until the level in the compost in the drum is reduced to about 4" (100mm).	- <i>Frees space in the composting chamber for the new seasons composting.</i>
Add 1/2 gallon (500ml) of warm water.	- <i>Raises moisture level</i>
As an option for optimal composting, Add SUN-MAR "Microbe Mix" or unsterilized black earth from a garden center. We do not recommend using topsoil as it may contain fly larvae. SUN-MAR "Compost Quick" enzyme can also be used as a compost accelerant.	- <i>Even though the compost still has microbes in it, you may want to start the year by replenishing your batch of microbes.</i> - <i>Compost Quick helps to accelerate the action of the microbes.</i>

Periodic Check Up

Once your unit has been through initial or annual startups, and ongoing maintenance procedures are being followed, Sun-Mar recommends a system of periodic checks be undertaken.

Action	Reason for Action
Rake peat moss debris from the evaporation chamber, making sure to rake from the rear of the chamber, including the back two corners of the unit. Raking should occur on a bi-monthly period. This is ideally done when the floor of the unit is dry.	- <i>Ensures drains cannot get plugged and evaporation is improved.</i>
Check your compost moisture level once every two weeks for continuous users. This can be done by shining a light into the Bio-Drum. The compost should have a slight gloss or shine to it. A moisture meter may also be used if so desired. Range should be 4-6, which represents 40% to 60%	- <i>A good compost is between 40% and 60% moisture content.</i> - <i>Prevents lumps, ensures toilet paper breaks down quickly.</i> - <i>Prevents insects</i>

Ongoing Toilet Maintenance

The procedure below is designed to keep the compost:

- **Moist, but not too wet**
- **Well aerated and mixed**
- **Well balanced and aerobic**

Action	Reason for Action
Add 1 cupful (250ml) or 2 handfuls of Sun-Mar Compost Sure (or mixture of 40% peat moss and 60% non-antibacterial wood shavings) to the Bio-Drum after every bowel movement. This usually represents one cupful per person per day of use.	<ul style="list-style-type: none"> - Maintains the carbon/nitrogen balance - Absorbs liquid - Helps oxygen penetrate for aerobic composting
Turn Handle to rotate the drum 6 complete revolutions of the drum, three times per week when in use, or, if used only at weekends, only on departure.	<ul style="list-style-type: none"> - Mixes and oxygenates the compost
Unplug the unit if you are leaving for a period of more than a few days. If you are leaving one weekend and coming back the next, you may unplug the unit. Consider installing a timer to shut the unit off after 48 hours to evaporate excess liquid. If you are leaving for a period of more than a few days, or the compost appears dry, add approximately 1/2 gallon (500ml) of warm water to keep the compost moist.	<ul style="list-style-type: none"> - unplugging unit will conserve power and keep compost from drying. - addition of water helps keep the compost moist
<p>Extract some compost into the finishing drawer when the drum is 1/2 full. It is 1/2 full when the compost reaches a level about 3-4 inches below the drum door when the door is open.</p> <p>To empty some compost into the drawer, pull the drum locker button and rotate the handle counter-clockwise (to turn the drum clockwise). Turn at the same speed you would normally do for mixing. If necessary, use the rake to level the compost in the drawer. Leave the compost in the finishing drawer to finish for 3-4 weeks or until you next need to remove compost from the drum. We recommend storing compost in a container before using.</p> <p>If your unit is used seasonally and is not used heavily, you may not have to remove any compost at all during the season. If so, follow "Annual Startups".</p>	<ul style="list-style-type: none"> - Moves some compost to the next stage for finishing - Ensures that the drum does not get too full - Provides extra time for composting to be completed

CAUTION

1. Do **NOT** add or clean the toilet bowl with chemicals. Chemicals will kill the bacteria. **INSTEAD**, clean the bowl liner with "Compost Quick", or very hot water and baking soda.
2. Do **NOT** add plastic, glass, metal, cleaning fluids, cigarettes. Add only waste and bulking material.
3. Kitchen or garden waste are **NOT** recommended.

Chapter 4 Compost Troubleshooting

This chapter will deal with problem that may arise with your compost, what is required to make your compost healthy and how to correct problems if they arise.

Aerobic Compost Requirements

In a Sun-Mar, a good compost is predominantly aerobic, which means that oxygen is available for aerobic bacteria throughout the Bio-drum. Aerobic bacteria consume waste quickly and odorlessly to produce carbon dioxide and water vapor and leave behind a small fraction of the original waste volume in the form of basic minerals. The end compost is a mix of valuable minerals and bulking material that has not decomposed.

To work effectively to break down waste, aerobic bacteria need oxygen, moisture, available carbon (from the bulking material), and warmth.

In a Sun-Mar, oxygen is provided by the tumbling of the drum and the bulking material leaving free air space within the compost. Moisture is provided by the waste, and is made available to aerobic bacteria by the moisture retention properties of the bulking material. If the compost is too dry, add warm water.

In summary, to keep the compost aerobic, it is important to rotate the drum, add bulking material, and keep the compost moist.

Oxygen

Lack of oxygen becomes a problem where:

- Too much moisture eliminates the free air space,
- A lack of bulking material limits free air space,
- Aerobic bacteria use up oxygen in the compost.

Lack of oxygen causes the compost to become increasingly anaerobic, which means that aerobic bacteria are displaced by anaerobic bacteria. Anaerobic bacteria work slowly and produce undesirable ammonia, hydrogen sulphide, and methane. Consequently, the maintenance of 'free air' space by periodically rotating the drum and adding the right bulking material is very important in Sun-Mar units. Excessive rotation is not helpful and can harm the compost by disturbing the bacteria too much.

Moisture

If there is too much moisture, and the compost is approaching saturation, oxygen is pushed out and anaerobic activity predominates. On the other hand, if there is too little moisture, aerobic activity slows. For this reason, it is important to maintain adequate moisture levels (40-60% moisture content is ideal). Generally, if you shine a flashlight in after mixing, there should be a slight sheen of moisture on your compost.

Warmth

Too little warmth will cause aerobic activity to slow. Below 55-60 degrees F.(13-15C), microbes will go dormant and composting will stop. Composting speeds increase dramatically with temperature.

Characteristics of a Bad Compost

If your compost is over 8 weeks old and it exhibits one or more of the following characteristics, then an operating change is indicated.

- ✓ Extraction required too often (under 4 weeks)
- ✓ Large Lumps present in compost
- ✓ Compost muddy or clay-like
- ✓ Flies present (this may also be a problem with foreign matter being added to unit; see section on flies)
- ✓ Compost has strong unpleasant smell of sewage when drum is turned.
- ✓ Toilet paper present in finishing drawer

Troubleshooting

In using this troubleshooting section, you should follow remedial action in the order that they are given, unless you are sure of the problem. You should see improvement in a week, and your compost should be back to normal in 2-3 weeks. If it is not, make sure that "Ongoing Toilet Maintenance" is being followed and check the mechanical troubleshooting section.