O2Compost
Compost Systems & Training

Aerated Compost Micro-Bin

Operations Manual

Protecting Our Land and Water Resources

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Aerated Micro-Bin Compost System
Operations Manual

Congratulations!

I want to personally thank you for purchasing the Aerated Micro-Bin Compost System and for being an Advocate for Agricultural Sustainability. Our mission is to help horse owners and, in fact, everyone in agriculture to convert their thinking from "waste problem" to "resource opportunity". Our motto is, "Education before Legislation". Our primary goal is to make the aerated static pile compost technology the standard – a universally accepted Best Management Practice - for converting raw organic materials into a high value finished product. Thank you for being a leader among your peers.

There are an estimated 7 million horses in the United States alone and countless horses worldwide. With regard to water quality, horse manure management has become a critical issue in most states (and countries). As a result, regulators are: 1) taking aggressive action against horse farms that pollute surface and ground water; and 2) strongly supporting composting as a viable alternative to off-site disposal. With your help, we can develop the means to make a dramatic and important difference to our environment, preserve the equestrian way-of-life, and do so simply and economically.

The O_2Compost Micro-Bin System has been developed specifically to compost the manure, bedding and waste feed generated by 1 to 4 horses. In fact, it is well suited for all small farms or petting zoos with a wide array of livestock (e.g., sheep, goats, chickens, llamas, rabbits, etc.). It is also ideal for homeowners and gardeners with large quantities of grass, leaves and weeds to compost as well as schools and camps with an abundance of food scraps. The applications are far reaching – we are currently working on a cost-effective, solar powered Micro-Bin System for remote locations.

The Micro-Bin System is designed to be inexpensive, portable and easily expanded. It includes a small, 1/4 horsepower electric blower and a cycle timer that allows for easy adjustment of both the On-time and Off-time. While these components are inexpensive, our tests have shown that they work extremely well for this scale of composting and should provide years of service. This training program may be all that a small farm needs to take full advantage of aerated composting. It may also serve as an inexpensive starting point to learn about aerated composting and then determine whether a permanently installed, larger aerated compost system is more appropriate.

For those who are not familiar with O_2Compost, please allow me to take a moment to introduce ourselves. As a group of environmental engineers and scientists, O_2Compost specializes in compost system design and operator training. We have been involved in the composting industry since the early 1990's, at which time we designed and constructed very large compost systems to manage municipal and industrial organic waste-streams. Since the mid-1990's, our primary focus has been on processing agricultural by-products of nearly every variety. Our systems have become progressively smaller in an effort to reach everyone with an "organic waste disposal issue". One of our goals is to help farms and stables convert an on-going expense into a new profit center. Yes, manure is a waste; and Yes, manure is a resource – it is simply a matter of perspective and a choice to have a positive impact on the environment. In my opinion, the benefits derived from composting and using compost verge on miraculous.

Goals & Objectives

Our primary goal is to solve a universal manure management problem, simply and economically. Based on our experience: 1) most people resist change; and 2) few people will change if the new methods don't save both time and money. Aerated composting involves no turning of the pile thereby saving a considerable amount of labor and equipment time. Also, because we convert a raw material into a value-added product, we save the cost of disposal and create a new profit center for those who choose to sell the finished product. In fact, there is a new trend among horse owners to reuse their finished compost as stall bedding, thereby significantly reducing the cost of virgin bedding materials.

By utilizing the heat generated in the composting process, we are able to destroy parasites, pathogens and weed seeds in the finished product. We are therefore able to produce a safe product with unrestricted use in gardens or back on pastures that are actively being grazed.

Proper manure management can dramatically improve the health of your horses by significantly reducing:

- ✓ parasites and pathogens and related intestinal problems;
- ✓ dust, ammonia and related respiratory ailments;
- ✓ muddy conditions and related hoof problems; and
- ✓ flies and related eye and skin infections.

The topic of manure management and horse health is discussed in great detail in the newly published book, "How to be the Perfect Horsekeeper" by Karen Hayes, DVM. Copies of this book are available through O_2Compost. For more information about horse health and related issues, please also visit Dr. Hayes web site: www.integralhorse.com.

One of our key objectives is to help horse owners protect surface and ground water resources from manure-based contamination.

- ✓ Ammonia in very small concentrations is toxic to many species of fish;
- ✓ High BOD (i.e. biochemical oxygen demand) levels will suffocate fish;
- ✓ High nutrient levels, phosphorus in particular, will lead to algae blooms which will in turn lead to a reduction in dissolved oxygen and will suffocate aquatic life; and
- ✓ Invasive weeds brought in with animal feed will displace indigenous wetland plant species.

Controlling offensive odors and flies at the "muck pile" can easily be accomplished simply by inducing airflow through the compost pile. By adding a 6-inch thick layer to the top of the pile, odorous gases are absorbed and nutrients are retained in the finished product. The heat of composting destroys fly larvae and the compost cover is not an inviting breeding habitat. All this and no pile turning!

Composting is a Win, win … win, win, win opportunity for all concerned. Thank you for investing in the O_2Compost Micro-Bin System and your commitment to make a difference.

Peter Moon

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The Key to Successful Composting is Oxygen

The air we breathe contains nearly 21% oxygen at sea level. After fresh air has been introduced into an active compost pile, either by turning or through induced airflow, the oxygen level in the pile drops off very quickly - often to less than 1% within 30 to 45 minutes. This is an extremely important principle to understand, especially if your objective is to produce high-quality compost in a relatively short amount of time and with the least amount of labor.

With aerobic composting where the oxygen level is maintained at 8% or greater, the main by-products of the composting process are carbon dioxide, water and heat. With anaerobic composting, the by-products include a wide variety of complex, highly odorous chemical compounds, plus water and heat. All life forms and organic systems (including composting) produce some odors. However, with aerobic composting, the quality of the odor is often described as "pleasant" and the intensity as "mild". With anaerobic composting, the odor is often highly objectionable and the intensity can be strong to extreme, thus potentially leading to neighbor complaints and visits by local health inspectors.

Aeration is the key to successful composting! Proper aeration accomplishes the following:

- Controls the pile temperature and significantly increases the rate of composting;
- Mitigates problems with offensive odors, flies and rodents;
- Destroys pathogens, parasites and weed seeds;
- Degrades vaccines, antibiotics, worming agents and pesticides;
- Produces superior quality compost with strong market value;
- Is ideal for pre-composting feedstocks for worm composting; and
- Produces a compost rich in aerobic microbes, ideal for compost tea.

With aerated compost systems, the pile temperature must exceed 131°F (55°C) for a minimum period of three days to ensure pathogen destruction. The pile temperature can be easily controlled by increasing or decreasing the airflow into the pile. When air is first introduced into a static (non-aerated) compost pile, the resultant increased microbial activity causes the temperature of the initial mix to rise very rapidly, often to well over 150°F in 24 hours or less. Unfortunately, temperatures much over 160°F actually decrease the rate of composting by decreasing the number and diversity of the microbes in the pile. While it may seem counter-intuitive, additional airflow into the pile causes the pile temperature to decrease by expelling (displacing) excess heat to the environment. Good news: with decreased temperatures, beneficial micro-organisms do re-colonize the pile. In short, managing the frequency, duration, and volume of airflow enables you to optimize the composting process.

With aerated composting, the active phase typically lasts 21 to 30 days and the subsequent curing phase lasts an additional 30 to 60 days. During the active phase, the compost is not turned and, therefore, the cost for labor and equipment are significantly reduced. The cost for power to run the blower is incidental, typically only pennies per day.

Mix of Materials

The compost materials (also referred to as “feedstocks”) need to meet certain criteria to achieve optimum conditions for the micro-organisms to function efficiently and to avoid offensive odors. These criteria include:

1. Nutrient Balance, in particular Carbon to Nitrogen ratio (C:N) of 30:1;
2. Moisture Content of 55% to 65%;
3. Bulk Density of 800 to 1,200 pounds per cubic yard (cy); and
4. A Homogeneous mix of materials.

In general, the manure and bedding from a horse stall meet all of these criteria. Raw manure alone is excellent for composting and even when mixed with a small amount of bedding, it will yield very high quality compost within a relatively short period of time. Horse manure mixed with cow, chicken or rabbit manure as well as fish and green waste, also makes a superb finished compost product.

Particular attention does need to be paid to the moisture content, because of potential drying during periods of extended hot and cold weather. If the moisture content drops much below 50%, the composting process will effectively stop.

A simple "squeeze test" can be performed to evaluate moisture content. Using a rubber glove, take a handful of the compost mix and squeeze it very tightly. With a moisture content of approximately 60%, a few drops of water may be squeezed from the mix and a seam of liquid may form between your fingers. Also, the manure ball will hold together but will crumble easily when loosened. With a bit of practice, visual examination of the mix will suffice.

With aerated bin composting, the material is not turned. Therefore, it is important to ensure the correct moisture content going into the bin. If the top layer of the compost mix appears too dry, simply spray it down and turn the top 6 inches over with a rake prior to adding the next batch of manure and bedding.

It should be noted that the moisture content cannot effectively be adjusted once a bin is full. With horse manure and bedding, it takes a surprising amount of water to change the overall moisture content, and it is very difficult to get the mix too wet. However, if the mix of materials is exposed to prolonged rainfall and it does become excessively wet, the void spaces will fill up with water and will impede oxygen exchange and greatly inhibit the composting process. In this case, the mix may be spread out and allowed to dry or additional dry material can be blended into the mix. Unfortunately, this does require re-handling of the material and should be avoided as part of routine operations.

In situations where a large amount of waste feed is also added to the mix, this needs to be blended thoroughly to avoid creating pathways through which the aeration can short circuit, thereby negating the pressure needed to maintain uniform airflow.

Bin Start-up

To set-up and start a new batch of compost, do the following:

1. Assemble bin panels (refer to appropriate attachment section);
2. Assemble aeration system, with aeration holes facing down (Refer to Figure 1);
3. Place a 6" layer of coarse material (e.g., clean bedding) over perforated pipe sections;
4. Mix and moisture condition raw materials as needed;
5. Progressively place the raw, initial mix in bin to within 6 inches of top;
6. Cover the raw materials with a 6 inch layer of damp finished compost or bedding material;
7. Take initial temperature readings and note on a temperature log (Refer to Attachment A);
8. Set timer for 30 seconds On / 30 minutes Off;
9. Repeat Steps 1 – 8 for second bin; and
10. Relax and marvel at the simplicity of aerated composting.

Note that in Step 3, a layer of dry, coarse bedding material is placed over the perforated pipe section. This layer serves to further distribute airflow across the base of the pile and then vertically up through the mix of materials. This layer should extend to within 6 inches of the bin sides (it should not extend out to the bin sides, as this may lead to air leaks in the system).

Note that in Step 6, a 6-inch thick layer of damp finished compost or bedding material is placed on top of the raw feedstock materials. This layer is very important and serves four purposes:

1. It insulates all of the raw materials to ensure that they reach 131° F (or higher) for a minimum of 3 days to destroy parasites, pathogens and weed seeds in the mix;

2. It acts as a biofilter to absorb potentially offensive odors and to retain nutrients in the compost;
3. It helps to maintain proper moisture conditions in the top layer of the mix by allowing some drying of the cover and minimizing over-wetting of the raw materials by rainfall; and
4. It serves as a vector (i.e., fly) barrier, wherein the heat of composting destroys insect larvae in the mix and prevents airborne flies from accessing the raw material for breeding.

To function properly, this cover layer must be kept moist and may be wetted down at any time by simply spraying with a hose and re-mixing to a depth of 6 inches, if necessary.

Typical Observations During Start-up

Many Macro-Bin users have reported that at first the bin seems to fill up faster than anticipated but as the mix of materials nears the top, it seems to slow down considerably. This is because the weight of the material on top consolidates the material below, resulting in volume reduction.

Second, when the bin becomes roughly half full, the volume of material is sufficient to retain heat and therefore the composting process is initiated prior to starting airflow. The heat in the pile rises from bottom to top and as it does so, fresh air is slowly drawn into the base of the bin through the aeration pipes. This is referred to as passive aeration and results from convection (also referred to as the "chimney effect"). In some cases, passive pile temperatures can exceed 160°F. With active aeration, these temperatures can be easily brought down into the ideal range.

Third, in cold climates, the ambient air is not only cold but it is also very dry. Excessive aeration can cool the pile down excessively, but more importantly it can also strip needed moisture out of the material such that the composting process will suddenly stop altogether. The only remedy for this situation is to break down the bin, thoroughly rewet the mix and start again. Because some of the heat potential of the raw material has been utilized, it is also advisable to add roughly 50% raw material to the mix.

Fourth, as the mix of materials nears the secondary Curing Phase of composting, mushrooms and white fibrous fungi (actinomycetes) will likely appear on and in the compost. This is a good sign, evidence that the fungi is working on the more resilient forms of carbon in the mix, including the cellulose in the manure and remnant feed.

Last, following the Active Phase of composting, the material that is removed from the bin will retain some of its former structure (for example, there will be remnant manure balls in the mix). It is during the subsequent Curing Phase that the texture will change to more of a soil-like consistency.

Process Monitoring

- **Purpose of Monitoring**

  When learning to compost using the aerated static pile method, it is important to take temperature readings periodically in order to:

  1) confirm that the mix of materials reaches at least 131°F for a minimum of three days to destroy parasites, pathogens and weed seeds (in the composting industry, this is referred to as a "Process to Further Reduce Pathogens" or PFRP);

2) observe the relationship between airflow, pile temperature and moisture content; and

3) develop a sense of confidence that "all is going well" by simply observing the pile. As stated previously, heat is a by-product of the microbial activity within the compost mix. A small amount of airflow will generally cause the temperature to go up rapidly, sometimes as high as 175°F. After reaching PFRP, the fastest rate of decomposition occurs at temperatures between 110°F and 120°F.

To cool the pile down, we need to increase the airflow to displace the heat from the pile with cooler, ambient air. However, when we increase the airflow, we may also be over-drying the mix, in which case the microbial activity slows or stops entirely. This is particularly true in hot-dry and cold-dry climates. As a compromise, it is preferable to have a pile that is too hot than one that is too dry.

- **Frequency of Gathering Pile Temperature Data**

At first, it is important to take pile temperatures on a relatively frequent basis. For example, during the first week of the first and second batches, take temperatures daily and then gradually reduce the frequency to once or twice a week when the system has stabilized. This is generally not a problem, given that you will likely be enthusiastic about how your system is operating at the early going.

When you have become familiar with the Aerated Macro-Bin Composting method and you understand the cause and effect of changing the airflow, a periodic look-see will suffice. It will be important to increase the frequency of monitoring with changes in climate, for example from hot, dry summers to cold, wet winters. This is also true when changing the types of materials being composted.

In addition to pile temperatures, make note of changes in moisture content and pay attention to the odors given off when the blower turns on. In every organic system, some odor will always be produced, therefore it is important to pay attention to the character and intensity of the odor. The odor from your compost bin should be mild and non-offensive (perhaps even pleasant) and should mellow dramatically after a day or two of operation. You may notice some ammonia at first, and there may be a smoky or slightly musty fragrance.

- **Method of Gathering and Recording Pile Temperature Data**

Take pile temperatures using the 20-inch temperature probe that is included in the Macro-Bin Kit. Insert the probe vertically into the pile: 1) 6 inches in from the side of the bin; 2) 6 inches in from the front of the bin; and 3) in the center of the bin. First insert the probe to a depth of approximately 6 inches, allow the needle to stabilize, and then take and record the reading. Following this, insert the probe to the full depth and repeat the process. Record the readings on the monitoring form that is included as Attachment A. It helps to take readings at approximately the same time each day and to record the air temperature and make note of any unusual conditions (e.g., 12-inch snow fall overnight).

When the aeration rate is changed, it may take several hours or even a day or two for the bin temperatures to re-stabilize. Temperature readings reveal trends and are inexact.

- **Adjusting On / Off Time Settings**

  Airflow is controlled by establishing a balance between duration, frequency and air volume.

  The timer that is included with the Macro-Bin allows you to adjust both the blower On-time and Off-time. As mentioned above, a small amount of airflow will generally cause the pile temperature to go up quickly – for example, from 100°F to 160°F overnight. A good starting on/off cycle is 30 seconds On and 30 minutes Off. To increase the airflow, simply increase the on-time (increase the duration) or decrease the off-time (increase the frequency), or both.

  A gate valve assembly may also be used to control airflow by restricting the opening through which the air passes. When a pile has met PFRP conditions and pile temperatures have stabilized, it is helpful to make discrete adjustments to the airflow (the cause) and observe the change in pile temperature (the effect). When making these adjustments, change only one variable at a time and allow the system to stabilize for 24 to 48 hours before making the next change. Be sure to record these changes so that you can track your progress.

  This experimental process is important to learn how to fully utilize the aerated compost system. And Don't Worry - You Can't Break It. Learning by doing will also reveal the elegant simplicity of this method of composting.

Macro-Bin Equipment Package

The components for the Macro-Bin Compost System are described below and illustrated in Figure 1, on the following page.

Aerated Compost Macro-Bin Kit

- Blower – ¼ Horsepower, 110 Volt, 2 Amp
- Connector Fitting – Fernco 3" to 4" rubber gasket with two pipe clamps
- Timer – Cycle timer with variable On/Off settings
- Temperature Probe – 20" Backyard Compost Thermometer, 0° to 200° F
- Materials List – Aeration manifold and alternative bin designs
- Macro-Bin Operations Manual

Manifold Kit – 4" Diameter Pipe and Fittings

- Solid Pipe Sections: (3) 12-inch; (2) 6-inch
- Perforated Pipe Sections (2) 24-inch
- (1)Tee
- (2) 90's
- (2) Couplers
- (2) End Caps

OPTIONAL: Valve Assembly – 4" Diameter Pipe and Fittings

- (1) 3" Slide Gate Valve Assembly
- (1) Tee
- (2) 6" pipe sections

Aerated Bin Designs

The aerated bins were designed to be: 1) easy and inexpensive to construct, 2) free-standing and portable, and 3) effective at retaining heat to destroy parasites, pathogens, weed seeds and fly larvae.

- **Wire Mesh Cylinder**

The wire mesh cylinder is the most economical and easily constructed bin system. With this approach, a 3-foot high by 16-foot long section of wire mesh fencing material is formed into a cylinder that measures approximately 5 feet in diameter. A cylinder of this dimension can accommodate approximately 2.2 cubic yards of material. To form the cylinder, the cut ends of the wire at one end of the length of fencing material can be wrapped around the corresponding grid at the opposite end of the cut section. (Refer to Attachment B)

The wire mesh cylinder should be placed on level ground, and wooden stakes may be driven into the ground at the quarter points to provide temporary stability prior to filling. As the manure mix is dumped or shoveled into the cylinder, it should be pulled out to the perimeter of the cylinder using a shovel or rake, thereby forming a funnel-shaped depression toward the center. This is done to create outward force against the wire mesh to provide stability. When full, the cylinder will be a solid unit.

Using this bin construction method creates a compromise given that the raw material is exposed at the sides and therefore cannot reach sufficient temperatures to destroy parasites, pathogens and weed seeds. This can be overcome by placing a circular wedge (~ 6-inches high) of previously composted material around the perimeter with each lift of fresh manure. As the bin is filled, the wedges will encapsulate the raw material and provide some insulation to help meet the temperature objective throughout the pile. When the pile is near the top of the wire mesh, a 6-inch thick layer of finished compost should be added to the top of the pile. This top layer serves four purposes: 1) to insulate the raw materials within the core of the pile; 2) control odors; 3) control flies; and 4) help maintain moist conditions throughout the raw materials.

When filling a cylinder, some material will pass through the wire mesh. At the end of each day, this material can be shoveled back into the center of the bin to keep it from accumulating around the base of the cylinder. A few minutes taken for general “housekeeping” will result in reduced odors, flies, impacts to surface water, etc.

- **2.4 CY Square Plywood Bin**

A square bin structure, measuring 4’ L x 4’ W x 4’ H (~2.5 cubic yards) can be simply constructed using plywood, lumber and metal fasteners (Refer to Attachment C). The materials list for this plywood bin system is presented on the following page.

Description	Dimensions	Number
Plywood Sheets	4’ x 8’ @ ¾”	2
Lumber	2” x 4” @ 10’	4
Lumber	2” x 2” @ 8’	2
Carriage Bolts	5/16” @ 3 ½” Long	8
Hex Nuts	5/16”	8
Fender Washers	5/16” @ 1 ¼”	16
Hanger Bolts	¼ - 20 @ 3”	12
Wing-Nuts	¼ - 20	12
Fender Washers	¼ @ 1 ¼”	12
Deck Screws	3“ Long	1 Box
Deck Screws	1 ½” Long	1 Box
Wood Glue	Jug	1

Tools Required for Bin Construction:

Skill Saw with Plywood Blade	Screw Driver Bit (for electric drill)
Measuring Tape	Handheld Jig Saw
Chalk Line	1/2” Box Wrench
Set Square	Pliers
Handheld Electric Drill	Hammer
Extension Cord	Eye Protection
3/8” Wood Drill Bit	Ear Protection

Square Bin – Panel Assembly Instructions

Prior to beginning construction, study Figure 2 – Schematic Drawing of the Square Bin Design, as well as the following set of photographs.

1. Cut the two sheets of plywood in half to produce (4) half sheets that measure 4 feet x 4 feet.

2. Cut the two 2” x 2”s in half to produce four 4-foot lengths. On two sheets of plywood, attach two of the 2” x 2”s along the vertical edges using wood glue and 1 ½” deck screws.

3. Cut two of the 2” x 4”s to measure 56” in length. On the reverse side of the two sheets of plywood (from Step 2), attach the 2” x 4”s on edge and perpendicular to the 2” x 2”s to the dimensions shown. Make sure that they are centered (i.e., extend 4 inches past the plywood edge on both ends). Attach the plywood to the 2” x 4”s using several 3” deck screws.

   Note: The purpose of the 2” x 4”s is to provide stiffness to the walls to minimize bowing of the plywood sheets due to the lateral pressure of the manure / compost. Below, these are referred to as “reinforced panels”.

4. Temporarily assemble the bin by standing the two reinforced panels vertically and screwing the two remaining sheets of plywood at the four corners of each un-reinforced sheet. Use the 1 ½ inch screws through the plywood and into the vertical 2” x 2”s.

5. Cut the remaining 2" x 4"s to 56" in length and lay them horizontally on top of the 2" x 4" extensions from the adjoining reinforced panels. Where the 2" x 4"s overlap, drill a 3/8" diameter hole vertically through both boards and then attach each corner using the 3 ½ inch bolts, washers (top and bottom) and nut. During this step, make sure that there are no gaps between the plywood and 2" x 2"s. The reinforcing 2" x 4"s are now connected at eight points.

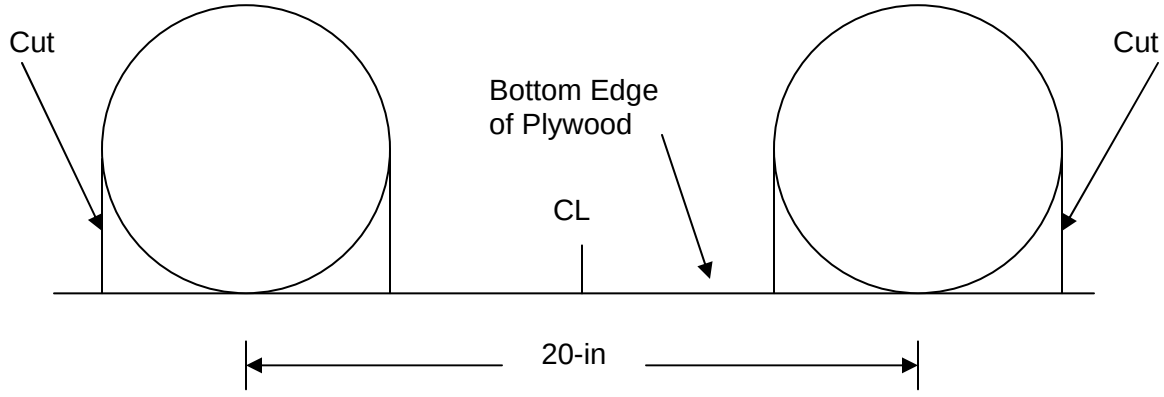
6. Remove and set aside two of the 2" x 4"s and the corresponding un-reinforced plywood sheet (from one side of the bin). From the inside of the bin, screw the remaining un-reinforced plywood sheet to the two horizontal 2" x 4"s using the 3" deck screws.

7. Reassemble the fourth un-reinforced side of the bin, remove the third reinforced side, and repeat Step 6 from inside of the bin to reinforce the fourth side. When this is completed, reassemble all four sides of the bin.

8. At this point, two of the sheets of plywood are attached to the 2" x 2"s and the other two sheets of plywood are not. To further secure the eight corners and four midpoints on the unsecured sheets (12-connections), drill a 3/8-inch hole through the plywood and approximately ¼-inch into the corresponding 2" x 2" board. Screw one hanger bolt into each of these twelve locations. Finally, slip a washer onto each hanger bolt and secure tightly using a wing nut.

9. To provide easier access to the bin on one side, you can now cut a portion of the plywood panel as follows. Remove the third (or fourth) side of the bin and lay flat with the 2" x 4"s side down. Mark a chalk line at the centerline of the 2" x 4" and then remove the screws that secure the plywood to the 2" x 4". Using the skill saw, cut along the chalk line to produce a lower reinforced plywood section and an upper un-reinforced plywood section. Using 3" long deck screws, re-attach the 2" x 4" to the plywood section. Next, reassemble the lower section of the bin using the bolts and wing nuts (i.e., the two bottom and two midpoint hanger screws). Last, place the upper plywood section into the groove behind the 2" x 4" and attach with the upper two wing nuts.

10. Finally, tip the bin on one side to mark and cut the "mouse holes" through which the 4" diameter aeration pipes will pass. The centers of the two circles should be approximately 10-inches to the left and right of the bin centerline. Using a short section of 4" pipe as a template, scribe the two circles so that they touch the bottom of the bin. With a setsquare, extend a vertical line that is tangent to the circle from both the 9:00 and 3:00 positions to the bottom of the bin, as shown below. Cut these two mouse holes using the handheld jigsaw.



➢ 6.0 CY Hexagonal Plywood Bin

Construct six reinforced panels as described in Steps 1 – 3 of the instructions for the 2.5 CY Square Plywood Bin above. Align the reinforcing 2" x 4"s so that they overlap on alternating panels. Assemble the six panels using 3 ½" bolts where the 2" x 4"s overlap. Because the individual panels do not come together at right angles, each panel will have 2" x 2"s attached along each of the vertical edges. This arrangement eliminates the need for hanger bolts and wing nut connections. (Refer to Attachment D).

➢ Insulated Plywood Bin

An insulated square bin structure, measuring 4' L x 4' W x 4' H (~2.5 cubic yards) can be simply constructed using plywood, lumber and metal fasteners (Refer to Attachment E). The following is the materials list for this insulated plywood bin system:

Description	Dimensions	Number
Plywood Sheets	4' x 8' @ ¾"	4
Lumber	2" x 2" @ 8'	12
Hanger Bolts	¼ - 20 @ 4"	12
Wing-Nuts	¼ - 20	12
Fender Washers	¼ @ 1 ¼"	12
Deck Screws	1 ½" Long	1 Box
Wood Glue	Jug	1

Tools Required for Bin Construction

Skill Saw with Plywood Blade	Screw Driver Bit (for electric drill)
Measuring Tape	Handheld Jig Saw
Chalk Line	1/2" Box Wrench
Set Square	Pliers
Handheld Electric Drill	Hammer
Extension Cord	Eye Protection
3/8" Wood Drill Bit	Ear Protection

Insulated Bin - Panel Assembly Instructions

1. Cut the four sheets of plywood in half to produce (8) half sheets that measure 4 feet x 4 feet.

2. Cut four 2" x 2"s in half to produce (8) 4-foot lengths. On four sheets of plywood, attach two of the 2" x 2"s along the horizontal (what will become the top and bottom) edges using wood glue and 1 ½" deck screws. To do this, lay the plywood on top of the 2" x 2"s and screw down through the plywood.

3. Measure the distance between the attached 2" x 2"s along the vertical (what will become the side) edges. Cut additional 2" x 2"s to this length and attach using wood glue and 1 ½" deck screws as described in Step 2 above. This will result in a square 2" x 2" frame around the edge of each plywood panel.

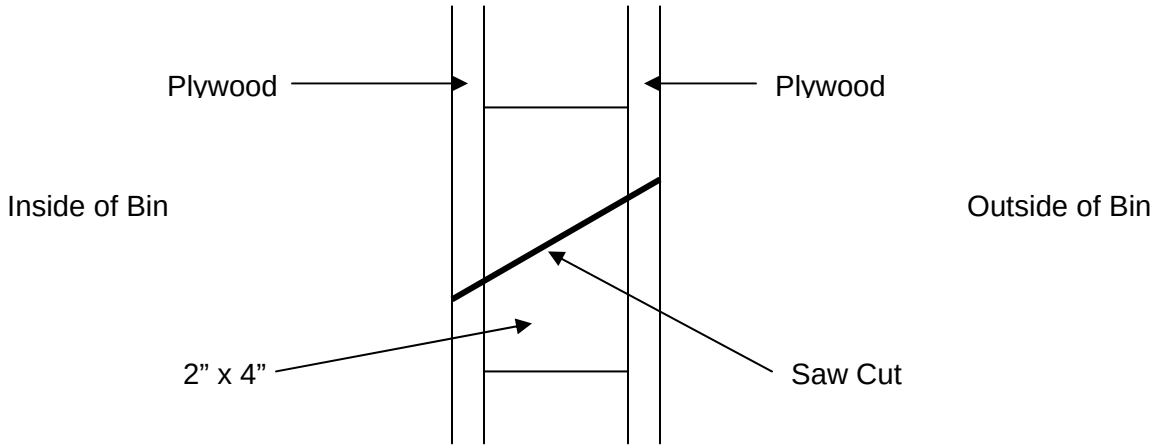
4. Next, flip three of the panels over (plywood side down) and cut, glue and screw a fifth 2" x 2" such that it is aligned along the vertical centerline of the panel (see photo).

5. On the fourth panel, cut, glue and screw a 2" x 4" such that it is aligned along the horizontal centerline of the panel. Make sure that the screws are along one edge of the 2" x 4".

   (Note: Once this panel is fully assembled, it will be cut into two using the skill saw to produce a bottom and top panel. This will facilitate filling the bin without having to lift the manure and bedding over a 4-foot high wall).

6. On each of the four panels, place the remaining sheets of plywood on top of the 2" x 2" wood frames and secure with wood glue and 1 ½" wood screws. Completing this step will result in four double-walled panels.

7. Using a skill saw, cut the front panel horizontally in half along the length of the 2" x 4". Make the cut at a 15-degree to 20-degree angle, as shown below. After filling the bin, the angled cut will keep the top half seated against the bottom half once the bin is fully assembled.



(Note: Prior to making the saw cut, make sure that all screws are removed from the area of the cut).

8. Next, stand two of the panels upright (with internal vertical 2" x 2"s) and at a right angle to one another. When connected, these will become the back panel and one of the side panels. Through the back panel, drill a ½-inch hole at each of the two corners and at the mid-point along the edge. Align these holes such that they extend slightly into the apposing 2" x 2" of the adjoining panel. Through each hole, screw a 4-inch long hanger bolt into the apposing 2" x 2" and once completed, secure the panels together with fender washers and wing nuts. Repeat this process to secure the second side panel.

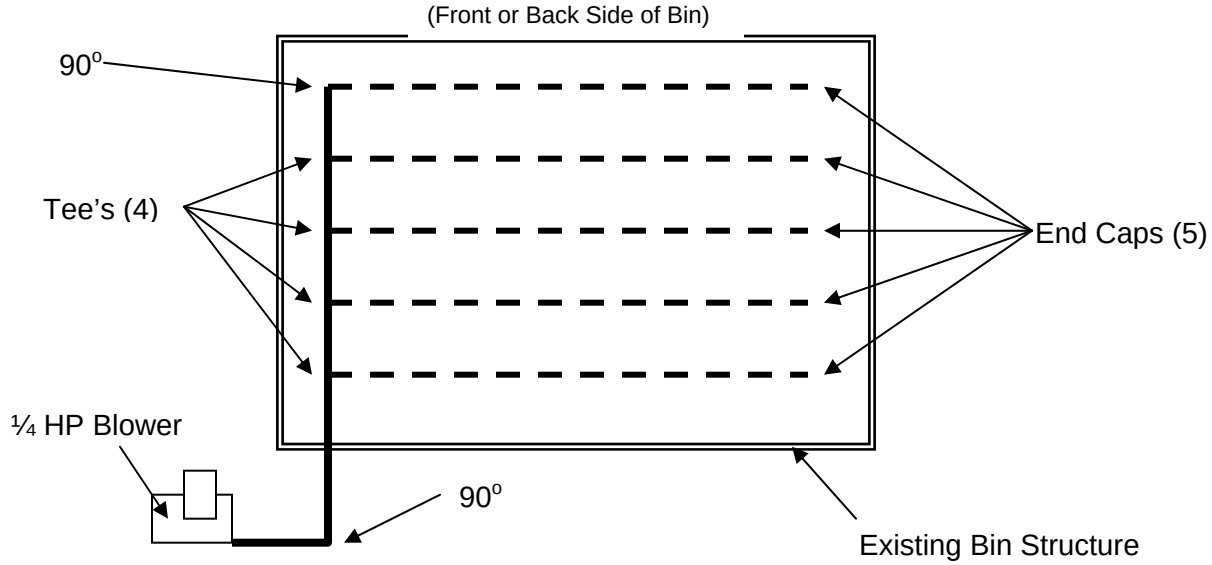
9. For the front-bottom panel, drill ½-inch holes and install hanger bolts at each of the four corners. For the front-top panel, drill ½-inch holes and install hanger bolts in the top corners. The bottom edge of the top-front panel will be held in place by the angled saw cut from Step 7 above.

10. Cut two "mouse holes" in the back or one side panel as discussed in Step 10 of the Square Bin Panel Assembly Instructions above.

11. To provide further insulation, the void space within each panel can be filled using an expanding foam spray (purchased in aerosol cans at most hardware stores). To do this, drill 1/8-inch holes on a 6- to 12-inch grid pattern through the inside plywood sheet, insert the tube from the aerosol can and spray the expanding foam for 1 to 2 seconds at each location. Within a relatively short time, the foam will expand and then set up to provide a semi-ridged core. Be careful not to overfill at any of the injection points because the foam can apply excessive internal pressure and cause the plywood to bow outward.

- **Existing Bin Retrofits**

  Existing compost bins can be retrofitted for aeration by placing a simple network of 4-inch diameter drainpipe on the bottom of each bin. An example is illustrated below.



The materials list for this example would include the following:

1. Solid 4-inch diameter drain pipe (solid heavy line)
2. Perforated 4-inch diameter drain pipe (dashed heavy line)
3. (2) 4-inch diameter 90°'s (Elbow)
4. (4) 4-inch diameter Tee's
5. (5) 4-inch diameter end caps

To avoid short-circuiting of the aeration system, the perforated zone should not be within 12 inches of any sidewalls. This 12-inch space should be filled with horse manure and bedding to provide encapsulation of the aeration pipes and to allow for the build-up of air pressure in the system.

Moving and Assembling the Aerated Bins

When a bin has completed a composting cycle (approximately 30 days), the bin walls may be disassembled and moved to a new location for refilling with a fresh batch of manure / bedding. The composted material from the earlier batch may be left in position or moved to a new location for curing.

To set up the bin walls, first assemble each panel using the hanger bolt / wing nut connections. Leave each wing nut somewhat loose until the bin is fully assembled and then tighten to provide a tight seal along each of the panel edges. For the bin designs that utilize carriage bolts, hand-tighten each connection and then secure with a ½-inch box wrench. Adjust as needed to provide a square, rigid structure.

Frequently Asked Questions

- **Web Site FAQ Page**

  If you have questions that are not answered in this Micro-Bin Operations Manual, please review the Q&A page at www.o2compost.com. Generally speaking, if you have a question, someone before you has also had the same question. If your question is not answered on the Q&A page, then please send it as an e-mail to info@o2compost.com. We will respond to you directly and add the question / answer to the web site.

- **Do I need to turn the pile?**

  No, you do not need to turn the pile. In fact, turning the pile can dramatically slow the composting process down by releasing excessive heat and moisture to the atmosphere. During the latter stages of composting (the curing phase), turning will break up the fungal (filamentous) networks that help to breakdown the more resilient forms of carbon in the mix (cellulose and lignin). The only reason to turn the pile is to rewet the mix if it has become dry.

- **How long does composting take?**

  There are two stages in the composting process: 1) the active phase, and 2) the curing phase. The active phase takes 21 to 30 days (rule of thumb), during which the pile temperatures will reach their highest levels. Toward the latter stages of the active phase, pile temperatures will drop to 110 – 120^{o}F and then gradually drop off from there. The active phase is primarily a bacterial driven process and some change in color and texture will occur.

  The curing phase takes an additional 30 to 60 days (rule of thumb). This duration is largely a function of the type and amount of carbon in the mix of materials. With straight horse manure, curing will take a minimum amount of time. However, with increased woody material, the curing phase takes longer. In fact, with savings-based bedding most of the woody material will remain largely unchanged other than appearing to be a darker color.

The curing phase is a fungal driven process and therefore it is not unusual to see mushrooms growing off the top of the pile. Also, a white, fibrous material called actinomycetes will create a marbling effect in the top 24-inches or so of the pile. This is a good thing! Actinomycetes helps to breakdown the more woody materials in the mix and ultimately gives the compost it's "forest duff" fragrance. It is during the curing phase that most of the textural change occurs.

- **How do I recover the aeration pipe between batches?**

  At the end of the active phase of composting, a portable bin may be broken down and the aeration manifold may be reused time and time again. For simplicity, it is easiest to leave the perforated section of pipe in the pile and recover it only when the pile is ultimately moved.

- **How does passive aeration differ from active aeration?**

  Passive aeration involves placing lengths of perforated pipe across the bottom of or diagonally within the compost pile. The heat of composting provides some convection within the pile and causes some airflow, albeit a small amount. Because it is "passive", this method of composting is not a controlled system.

  Active aeration is the result of induced airflow through the compost pile. This can be done in two ways: 1) positive aeration in which case the air is pushed through the pile; and 2) negative aeration where air is drawn through the pile.

  Positive aeration is considerably more efficient in small scale applications. Active aeration is also a controllable process, given that a timer controls the frequency and duration of blower operation and because a valve can be used to control the volume of air entering the pile.

- **Where should I put my compost bin?**

  Put your compost bin where it is most convenient and yet out of the flow of traffic. It should be assembled on flat ground and relatively close to water and electrical power. Because the motor on the blower is small and draws very little electricity, an extension cord can safely be used in virtually all situations.

- **How do I get the manure up into the bin?**

  The front of the bin has been partially cut away to make it easier to lift the manure and dump a muck bucket into the bin. Some people construct the bins next to a retaining wall so that they can dump a wheelbarrow directly into the bin and others construct ramps. An example of a ramp design is included as Attachment H.

- **Can the compost bin catch on fire?**

  No. The highest possible temperatures produced in the composting process are far below the temperatures required for spontaneous combustion. Fires do occur at large compost facilities, however it typically happens in very large piles that are unmanaged for long periods of time and go from a wet condition to a dry condition. Fires will not occur at this scale of operation or within the short time intervals involved.

- **Should I cover the blower up to protect it from the weather?**

  Yes, it is always advisable to cover the blower up to protect it from the weather. A plastic storage bin with a notch cut out of it for the outlet pipe is a very simple and inexpensive cover. Make the notch large enough to also allow air to flow freely into the cover.

- **Should I construct more than one bin?**

  For a continuously operating (flow-through) composting system, it is helpful to have a second bin that can be filled as the first bin is composting. Alternatively, manure can be piled in a staging area and then placed in the bin when the preceding batch is finished.

- **Should I paint the bin or use pressure treated lumber?**

  This is completely optional. Some people feel that the compost might leach out chemicals from paint or treated lumber and others simply want to prolong the life of the constructed bin.

- **Should I construct a wood cover over the bin or use a tarp?**

  While not essential, a wood cover or tarp will help to retain some heat and further control odors and flies. It will also help maintain proper moisture conditions by retaining moisture in the mix and shedding precipitation. In very cold climates, snow on the top of the bin will further insulate the system.

- **Should I start the airflow before the bin is full?**

  Based on our experience, it seems best to wait until the bin is entirely full to begin the aeration process. This is the simplest approach and since the "newest" material dictates when a compost batch is done, then starting it early really won't expedite the process. Having said that, however, it would be just fine to add salad scraps and coffee grounds to the mix during the first two weeks of operation as these materials break down very rapidly. When doing this, bury the food at least 12 inches down into the mix. Worms, by the way, love the stuff.

- **What if the compost pile causes odors or draws files before it is completely full?**

  If this occurs, simply add a thin (say 1-inch thick) layer of finished compost on top.

- **Are worms in my compost a good thing?**

  Absolutely! Worms in your compost are a wonderful thing and should be encouraged at every opportunity. Worms prefer a mix temperature of 75 to 90^{o}F, although they can survive at considerably cooler temperatures. In a hot compost pile, worms may seek cooler regions near the sides and top of the pile but will readily re-colonize the pile once temperatures drop off toward the end of the active phase and throughout the curing phase.

- **Where do I get worms if I want to include them in the composting process?**

  Worms can be purchased from any number of "worm-wranglers". Simply do an internet search for "worms, worm castings, vermi-compost, or vermi-culture" and you'll find hundreds of suppliers. Keep in mind that worms should not be shipped during periods of hot weather because they are fragile to hot and dry conditions. Spring and fall are the best times to order. Because the aerated bins are typically placed directly on the ground, worms in most parts of the country will just show up. Also, if you find worms in your garden, collect them and add them to a curing pile. To recover worms from one old pile before using the compost in the garden, simply spread the compost out on a tarp in 5-gallon sized piles out in the sun. To concentrate the worms into a tight knot, gently scrape the top ½-inch layer of compost away from the pile every 5 minutes or so. With multiple piles, simply move from pile to pile and when you've reached the end, go back to the beginning and start over. This, by the way, is a perfect job for youngsters. At the core of each pile you will ultimately find hundreds, if not thousands, of worms that can be added into your next batch.

- **What happens if the material becomes too dry or too wet?**

  If the moisture content of the pile drops much below 50%, microbial activity will slow down or stop altogether. Re-moisturizing the pile will, in most cases, reactive the composting process.

  When the moisture content is too great, much over 65 to 70%, the void spaces within the mix become filled with free water and this will inhibit oxygen exchange and result in anaerobic conditions. This will in turn result in offensive odors and a dramatic slowing of the composting process. If this occurs, the pile should be broken down and either allowed to dry out or be amended with a dryer, more porous bulking material.

- **Can I compost yard waste (e.g., grass clippings and leaves) and food waste in my bin system? What about pet manure?**

  Yes, aerated composting works with virtually all organic waste materials provided that the initial mix has a balanced Carbon to Nitrogen Ratio (C:N ~ 30:1), moisture content (~60 – 65%), and bulk density (20 to 30 pounds per 5-gallon bucket).

  While pet (i.e., dog and cat) manure can be composted, the finished product must only be used in a landscape application to avoid the possibility of exposing humans to potential viral infections. For this reason, composting pet manure is generally discouraged.

Bonus Offer – Discount to Upgrade

All Micro-Bin Composters are eligible for a 100% credit toward an O_2Compost Bay Training Program. In some cases, participants may discover that a small portable compost system does not meet their operating requirements and that a larger, permanent system becomes a "must-have" item. In this case, we are happy to rebate the cost for your Micro-Bin Compost System in exchange for the original Micro-Bin blower and timer.

O_2Compost Return Policy

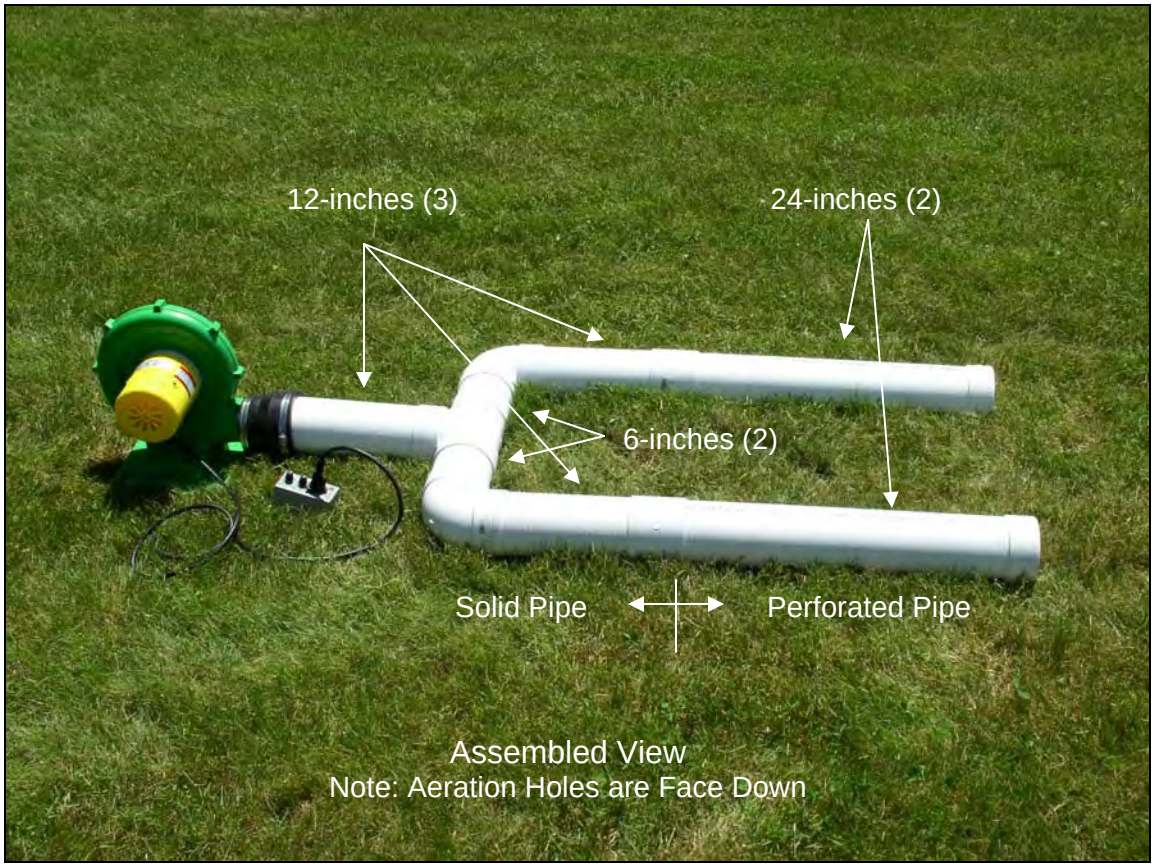
Effective upon making full payment for this Compost System:

For a period of 30 days beginning on the day payment is received, Purchaser is entitled to a refund of 50% of the purchase price – payable to Purchaser within 60 days of communication of order cancellation. If Purchaser is already in receipt of the O_2Compost equipment, the 50% refund will be payable to Purchaser within 60 days of our receipt of the returned equipment in As-New condition.

The remaining 50% is nonrefundable and will be retained to cover administrative costs, design time, and related expenses.

If the decision to cancel is made after 30 days and before 60 days from the date of sale, Purchaser will be entitled to a refund of the retail value of the equipment package only. In this instance, the refund will be paid to Purchaser within 60 days following our receipt of the returned equipment in As-New condition.

No refunds will be made after 60 days from the date of sale.



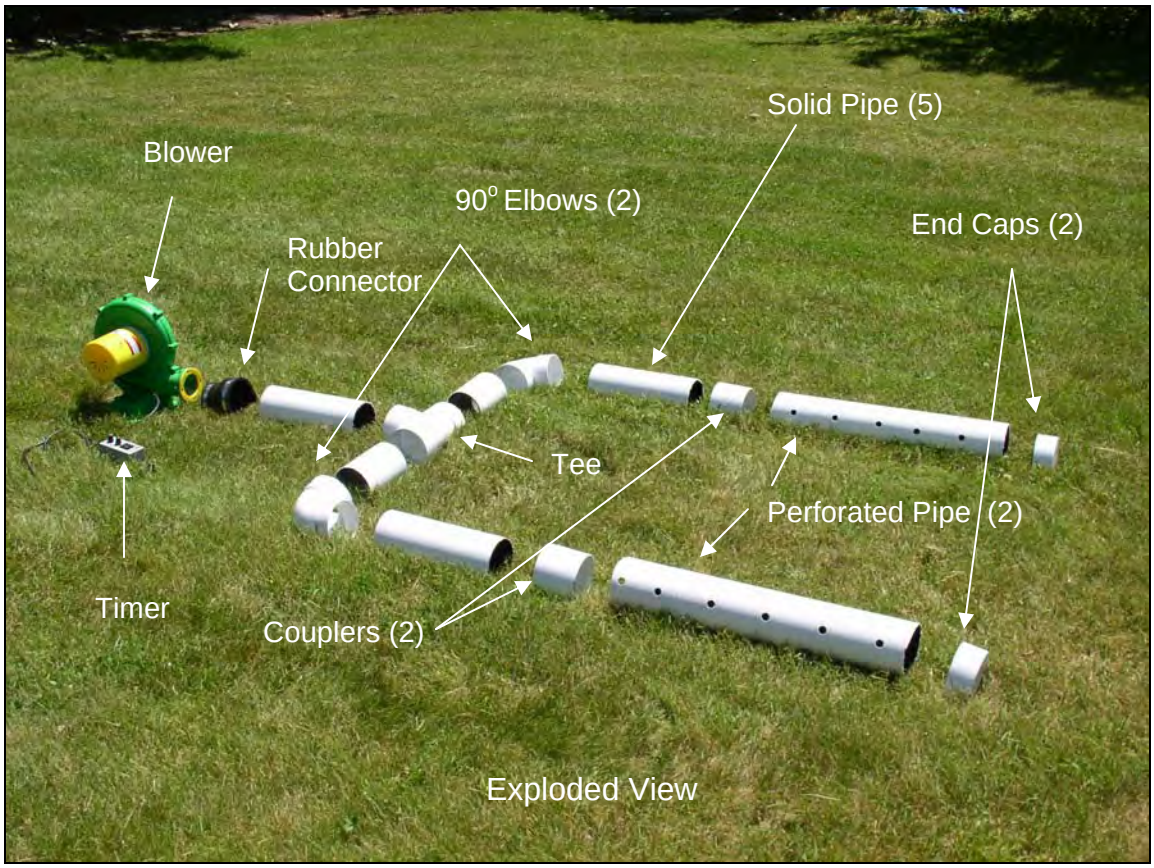


Figure 1 - Blower & Manifold for Aerated Compost Bin
2.4 Cubic Yard / 1 – 4 Horse Capacity

Attachment A

Temperature Monitoring Form

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Attachment A - Compost Monitoring Form

Aerated Micro-Bin System

Day	Date	Day No.	Air Temp.	1-Ft	2-Ft	1-Ft	2-Ft	1-Ft	2-Ft	Damper Setting	Cycles / Hour	Duration (Min)	Weather & Comments
Week 1													
M													
T													
W													
T													
F													
S													
S													
Week 2													
M													
T													
W													
T													
F													
S													
S													
Week 3													
M													
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W													
T													
F													
S													
S													
Week 4													
M													
T													
W													
T													
F													
S													
S													

Attachment B

Wire Mesh Cylinder

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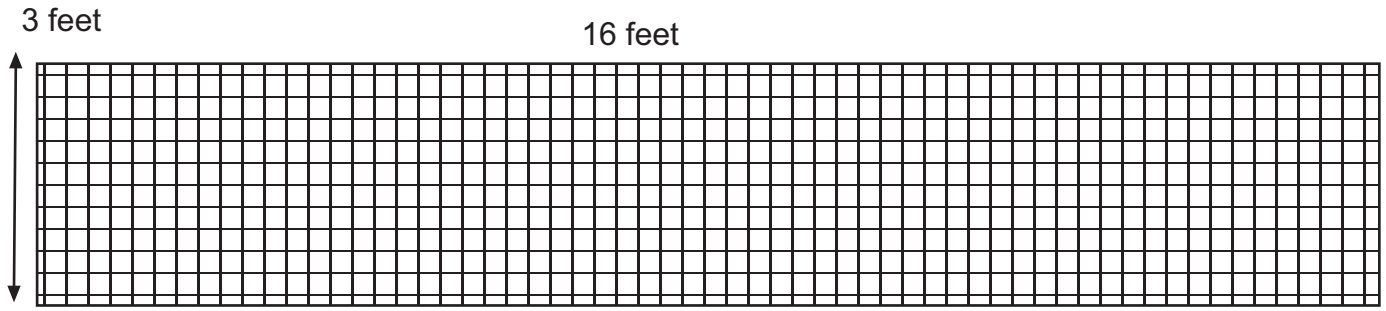
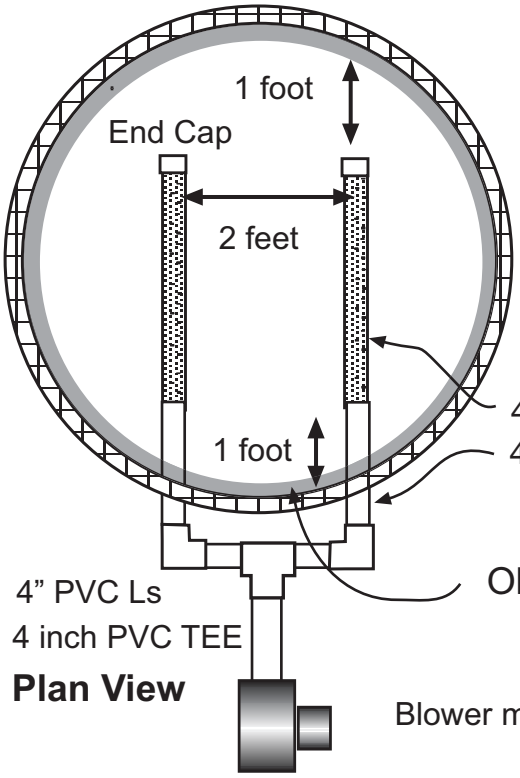
MIcro Bin Wire Mesh Cylinder Attachment B

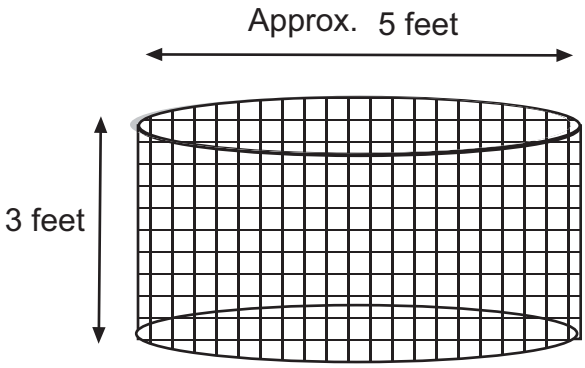


Wire Mesh Fence

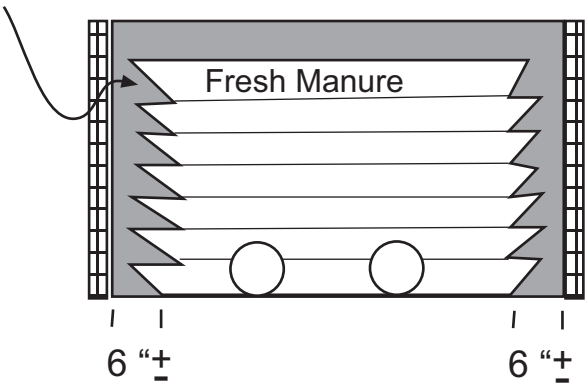
Volume = 2.2 cubic yards



Plan View



Cross Section



Pipe can be assembled without gluing. You may use duct tape on assembly outside of pile. It is critical that a space of 12” to 8” is non-perforated pipe. This allows the manure to seal the edge and force air to enter the manure and not short circuit to the open.

Micro Bin 2.20 yd3 bin, Design	HR
Revised January 30, 2007, HaroldRuppert	PM

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Attachment C

2.4 CY Square Plywood Bin Design and Photographs

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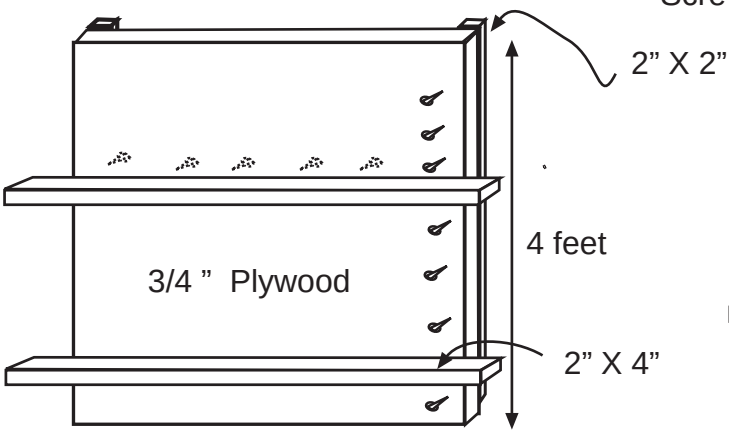
Micro Bin 2.4 yd3, Attachment C

1 ft

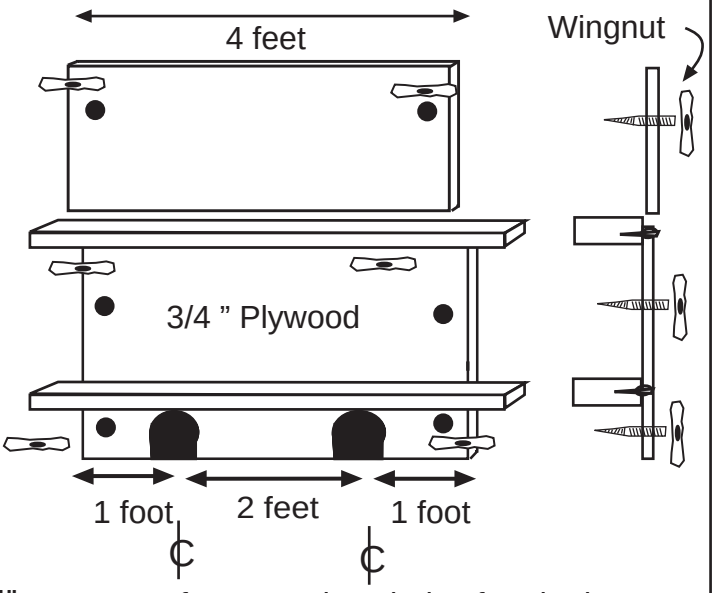
Construct 4 Panels

Screw from plywood side into dimensional boards.

Side Panel View

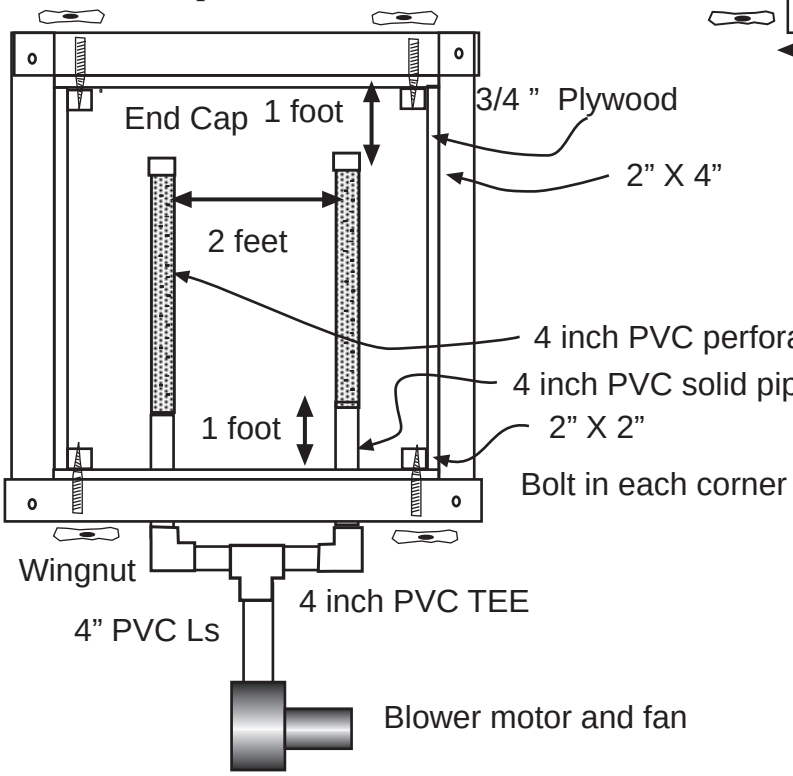


Front Panel View

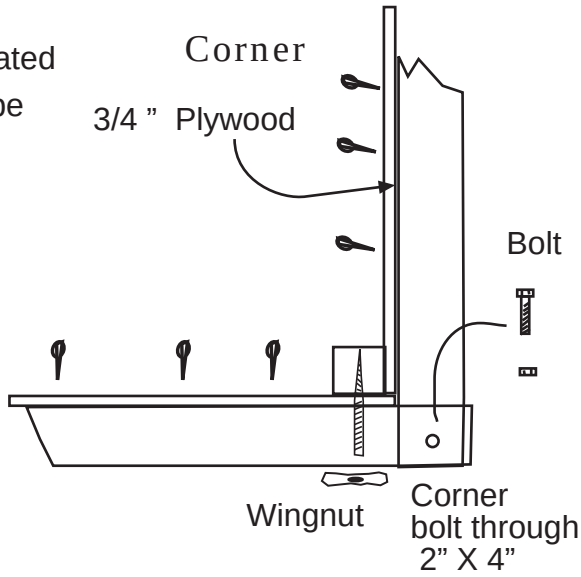


In front panel cut holes for air pipe.
Openings may be square.

Top View



Corner



Pipe can be assembled without gluing.
You may use duct tape on assembly outside of pile. It is critical that a space of 12” to 8” is non-perforated pipe. This allows the manure to seal the edge and force air to enter the manure and not short circuit to the open.

Assemble to allow breakdown with full bin

Volume = 2.4 cubic yards

Micro Bin 2.4 yd3	HR
Revised August 13, 2010, HaroldRuppert	PM

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Photo 1 – 2.4 CY Bin Assembly

This photo shows five wall panels that comprise the 2.4 CY Bin laid out in their respective positions. Note that the removable top panel to the right forground.

Photo 2 – First Side Panels Connected

Lift one side panel and the back panel into their respective vertical positions and fasten loosely with washers and wing nuts.

Photo 3 – Wing Nuts Loosely Fastened

Continue by connecting the second side panel and then the lower front panel to the bin assembly. Again, begin with washers and wing nuts loosely fastened to allow for minor adjustments prior to tightening. In total, there are 12-wing nut connections.

Photo 4 – Bolted Horizontal Supports

Connect all eight places where the horizontal 2” x 4” supports come together. First intall all bolts loosely and then starting on one side, tighten to ensure that the vertical seams are tight where the adjoining panels come together. Finally, tighten all 12-wing nuts connections.

Photo 5 – Bin Fully Assembled

This photo shows the 2.4 CY bin fully assembled, with the front open to receive manure and bedding.

Photo 6 – Label Corners

When first constructing the bin, label each corner points AA, BB, etc. This will result in four panels labeled AB, BC, CD, DA plus the top front panel also labeled AB. This will greatly facilitate breakdown and reassembly of the bin when moving to a new location. This photo shows the BBB connection.

Photo 7 – Bin Placed Over Aeration Pipes

The bin has been placed over the two aeration pipes. Two "Mouse Holes" have been cut through the side panel to form a tight fit between pipe and panel. Every effort should be made to minimize air leakage as this will greatly reduce the effectiveness of the aerated system.

Photo 8 – Blower, Valve, Aeration Pipes

This photo shows a close up of the blower, in-line valve assembly and twin aeration pipes. The amount of air delivered to the bin is controlled by three mechanisms: 1) the frequency the blower operates; 2) the length of time the blower runs during each on-cycle; and 3) the amount of air allowed to flow into the bin (valve). In this picture, the valve assembly is in the full open position. ***NOTE:*** *The valve assembly is not included with the Micro-Bin kit but may be purchased separately through* O_2*Compost.*

Photo 8 – Aeration Pipes Inside Bin

The perforated aeration pipes distribute air across the base of the bin. These are spaced 20-inches on center, thereby leaving approximately 1-foot to the left and right. Also, the aeration holes are located 1-foot away from the front and back of the bin. This allows the raw materials in the bin to provide a seal along the base of the bin and minimize air leaks. It is critical to build up positive pressure to force the air to flow up through the mix and bathe the microorganisms with fresh oxygen. Orient the holes in the down position (up position is shown here) to minimize the amount of material that gets into the pipes.

Attachment D

6.0 Hexagonal Plywood Bin Design

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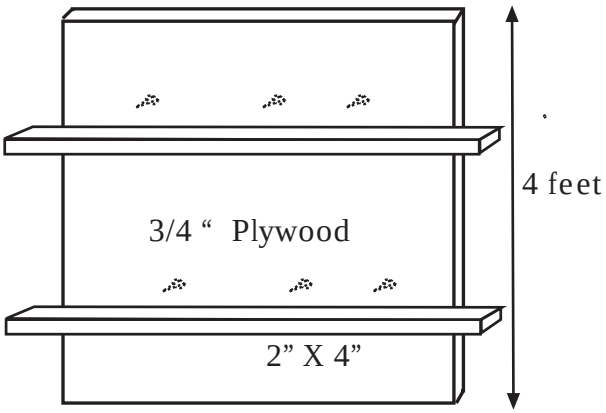
Micro Bin 6.2 yd3 Hexagonal, Attachment D

1 ft

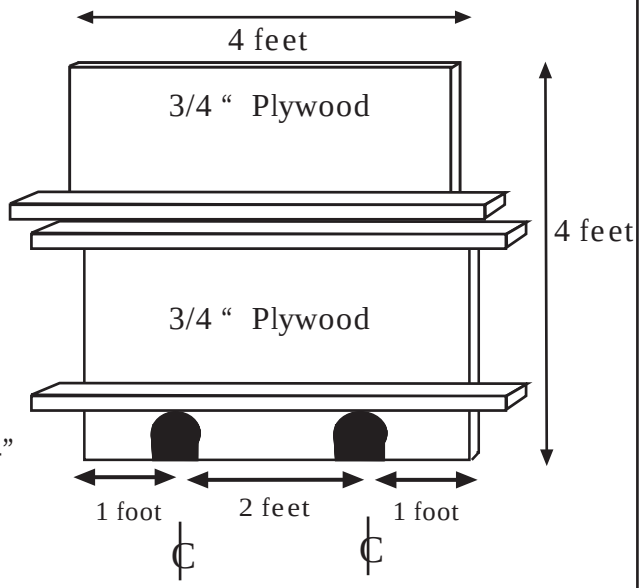
Side Panel View

Construct 6 Panels

Screw from plywood side into dimensional boards.

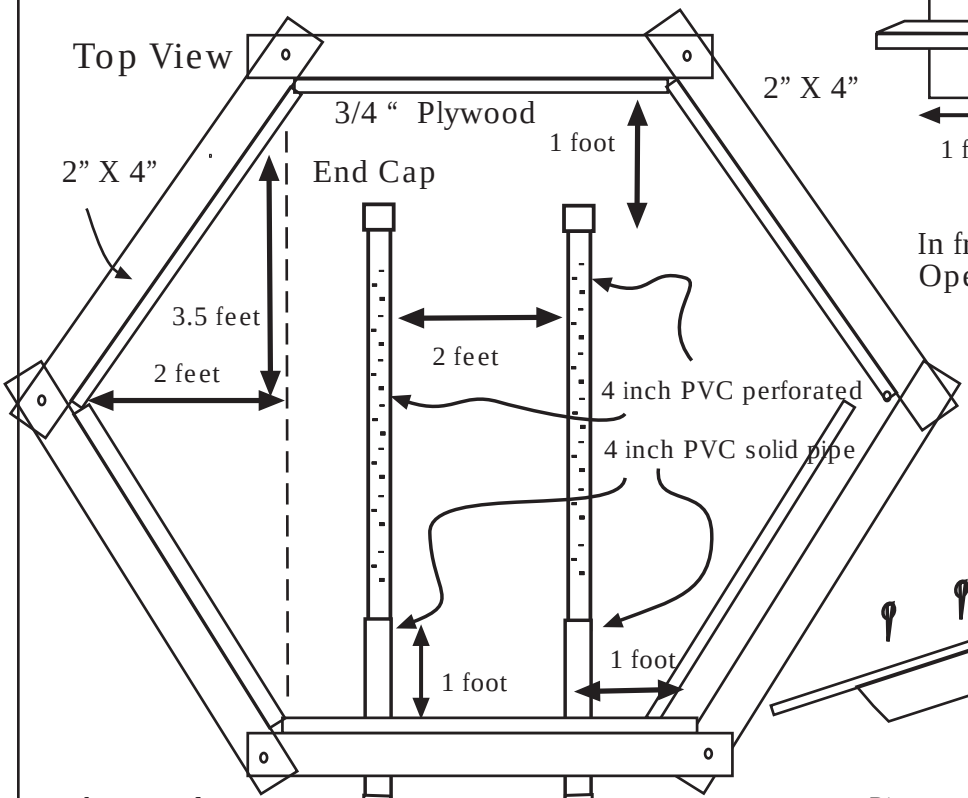


Front Panel View

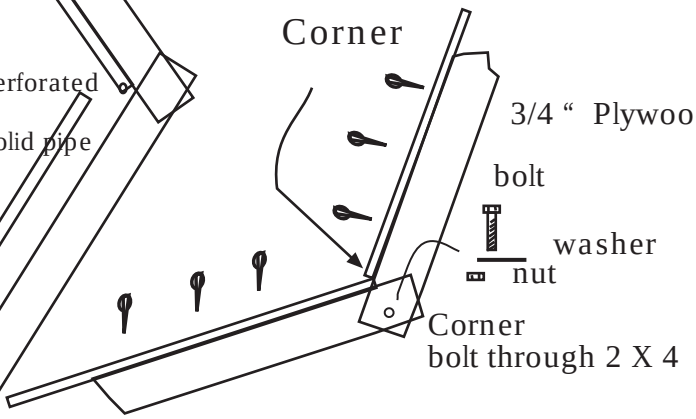


In front panel cut holes for air pipe.
Openings may be square.

Top View



Corner



Bolt in each corner

4” PVC Ls

4 inch PVC TEE

Valve

Assemble to allow
breakdown with full bin

Volume = 6.2 cubic yards

Blower motor and fan

Pipe can be assembled without gluing. You may use duct tape on assembly outside of pile. It is critical that a space of 12” to 8” is non-perforated pipe. This allows the manure to seal the edge and force air to enter the manure and not short circuit to the open.

Micro Bin 6.2 yd3 Hexagonal,	HR
Revised August 13, 2010 HaroldRuppert	PM

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Attachment E

2.4 CY Square Insulated Plywood Bin Design (#1) and Photographs

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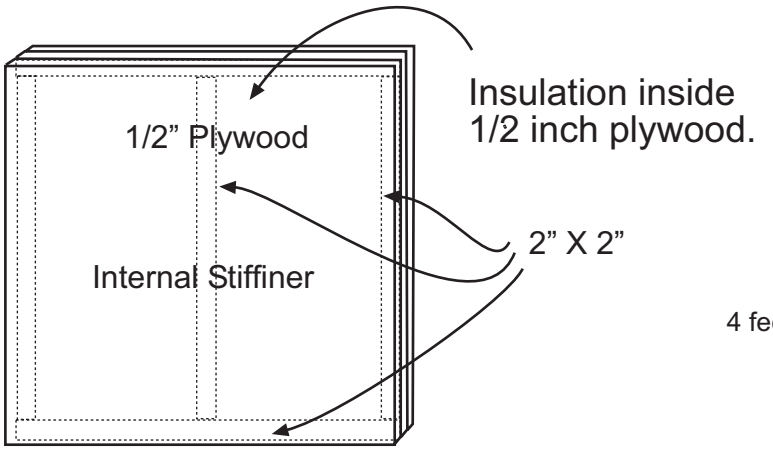
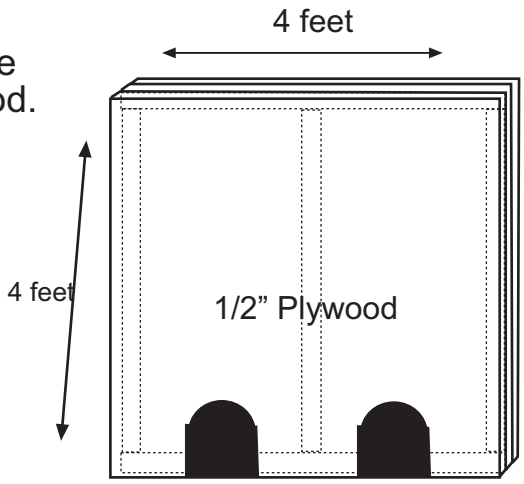
Micro Bin Insulated 2.4 cy Attachment E

Construct 4 Panels

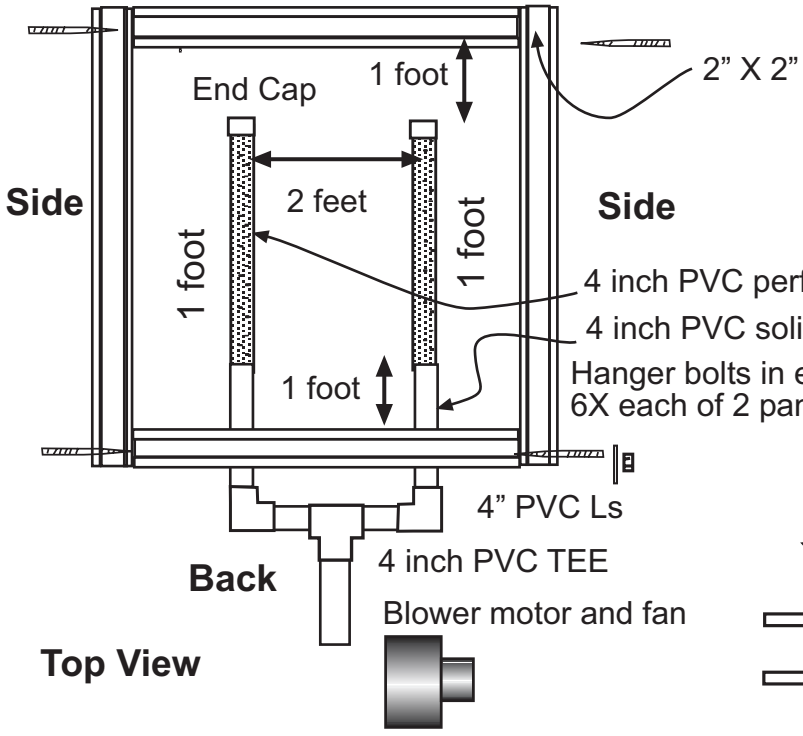
Panel View (3)



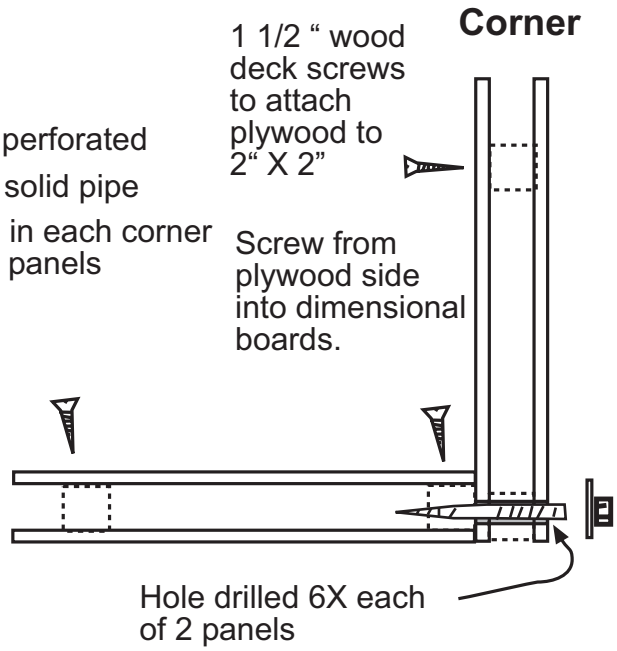
Back Panel View (1)



Front



Corner



Pipe can be assembled without gluing. You may use duct tape on assembly outside of pile. It is critical that a space of 12" to 8" is non-perforated pipe. This allows the manure to seal the edge and force air to enter the manure and not short circuit to the open.

Assemble to allow breakdown with full bin.

Volume = 2.4 cubic yards

Micro Bin Insul 2.40 yd3	HR
Revised January 30, 2007, HaroldRuppert	PM

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Photo 1 – Insulated Panel Construction

This photo shows the Inside of the insulated wall panel with a vertical internal brace support. Plywood is ½-inch reinforced with 2” x 2” stiffeners. A second sheet of 4-ft. x 4-ft. plywood is screwed to the top of this frame to provide a hollow core. This core will later be filled with a expading spray foam insulation to provide heat retention in cold climates.

Photo 2 – Corner Connectors

Note that the panel has been fully constructed and a 4-inch long hanger bolt has been installed. The adjoining panel will slide over a total of six hanger bolts to fully assemble a side.

Photo 3 – Corner Connector

This corner has been assembled using a flat washer and wing nut. There are similar assemblies at each corner and each mid-point along each connecting edge.

When fully assembled. Label the connecting panels at each corner: AA, BB, etc. This will result in four panels labeled AB, BC, CD, and DA. This will help when disassembling and reassembling the bin at a new location.

Photo 4 – Cutting "Mouse Holes"

Tip the assembled bin on it's side to cut mouse holes for the two aeration pipes. Locate the holes on one of the sides or the back of the bin. The centers of the holes should be located 10" to the left and right of centerline. Scribe a circle around a short length of pipe and then extend vertical lines to the edge of the panel.

Photo 5 – Cut Mouse Holes

Cut the mouse holes through both sheets of plywood and the bottom 2" x 2" using a hand held jig saw. This will expose the core area between the sheets of plywood.

Photo 6 – Reinforce Mouse Holes

Insert short lengths of 2" x 2" to provide support around each hole and to close them off for foam insulation. Screw these 2" x 2"s in place.

Photo 7 – Assembling the insulated bin

Layout panels in their correct order so that they can be leaned in toward the middle and then fitted together. By doing this, one person can assemble the bin fairly easily. Note that the two panels in the forground are the bottom and top panels for the front side of the bin.

Photo 8 – Assembled View

When assembling the panels, leave the wing nuts somewhat loose until all four sides of the bin are together. Then, tighten each side, making minor adjustments to ensure a tight seal along each bin edge.

When disassembling, make a habit of collecting wing nuts and washers and putting them in the same pocket each time. This will facilitate reassembly and minimize the risk of losing small pieces at an inconvenient time. It may also be advisable to have spare wing nuts on hand.

Photo 9 – Fully Assembled w/ Aeration Pipes

The aeration manifold splits the air into two pipes to provide symetrical distribution of airflow across the bottom of the bin. The perforated section of each aeration pipe should be located no closer than 1-foot to any side wall to minimize the possibility of short circuiting. With all forms of aerated composting it is essential to encapsulate the aeration zone on all sides to ensure that oxygen will reach the core of the compost mass. This photo also shows airflow to a secondary (older) bin.

Attachment E-1

2.4 CY Square Insulated Plywood Bin Design (#2)

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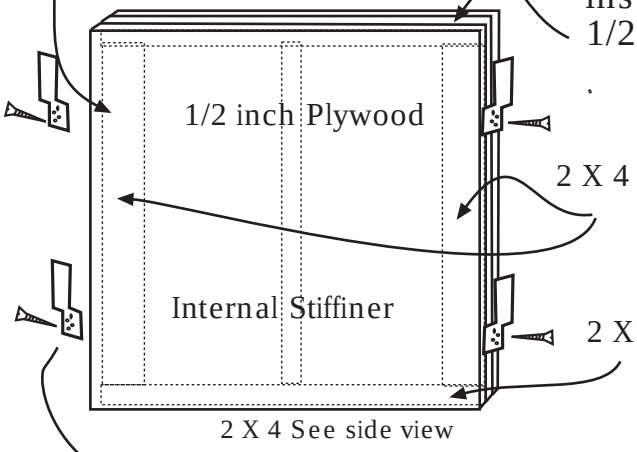
Micro Bin Insulated 2.4 cy Attachment E-1

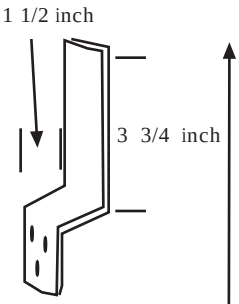
Panel View (3)

Metal Bracket
on side panels only

Construct 4 Panels

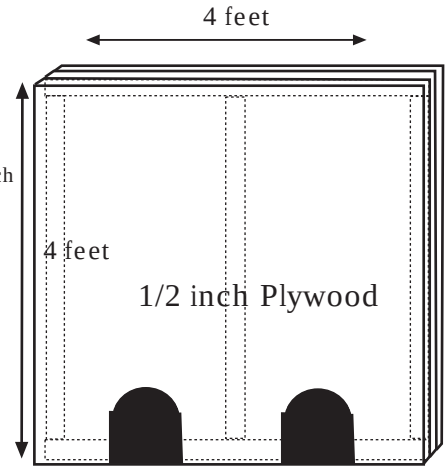
Insulation inside
1/2 inch plywood.

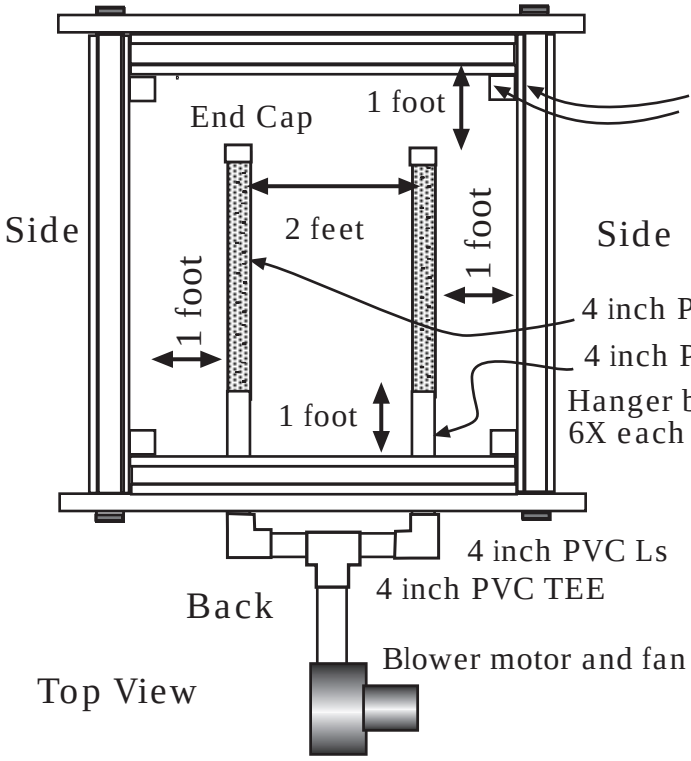




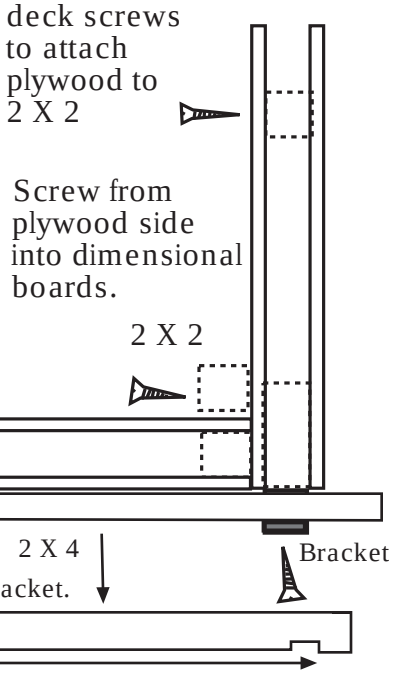
Detail of bracket
from local
hardware store

Back Panel View (1)





Corner



Distance to outside of notch should
be equal to outside of bracket when assembled
Cut these notches after panels are built
to allow measurement to exact length.

Pipe can be assembled without gluing.
You may use duct tape on assembly
outside of pile. It is critical that a space of
12" to 8" is non-perforated pipe. This allows
the manure to seal the edge and force air to
enter the manure and not short circuit to the open.

Assemble to allow breakdown with full bin.

Volume = 2.4 cubic yards

Micro Bin Insul 2.40 yd3 E-1	HR		
Revised April23_08, HaroldRuppert	PM		

Attachment F

2.4 CY Square Bin w/ Vertical Supports

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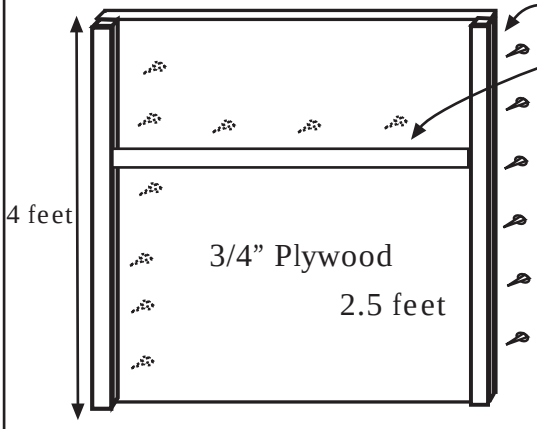
Compost Systems & Training

Micro Bin 2.4 cy Vertical Support Design Attachment F

Front Panel View



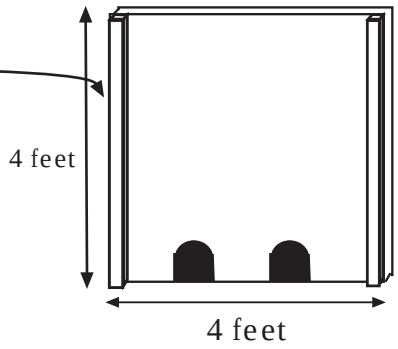
2" X 2"

Construct 4 Panels

1 1/2 " wood deck screws

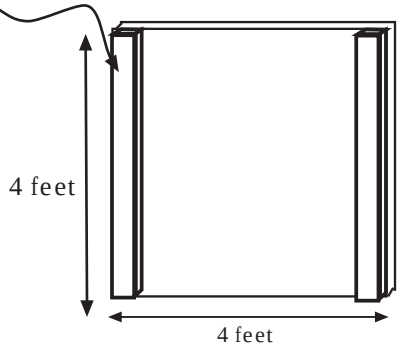
Screw from plywood side into dimensional boards.

Back Panel View



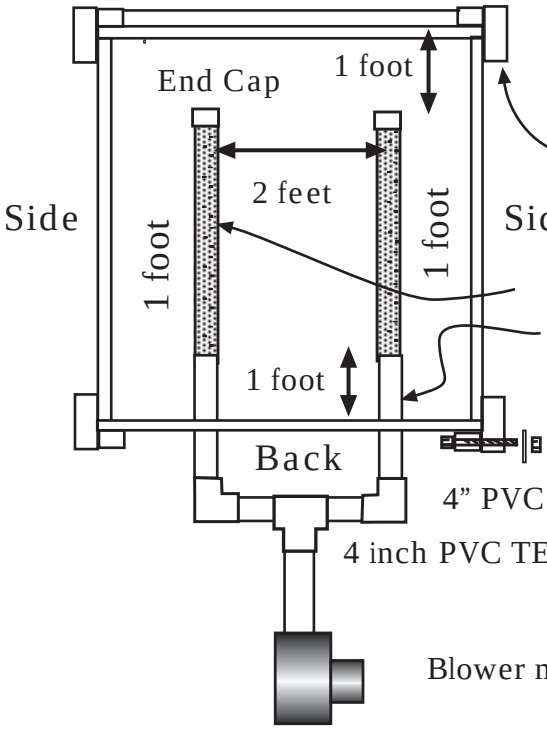
Side Panel View (2)

2" X 4"



Top View

Front



2" X 4"

4 inch PVC perforated

4 inch PVC solid pipe

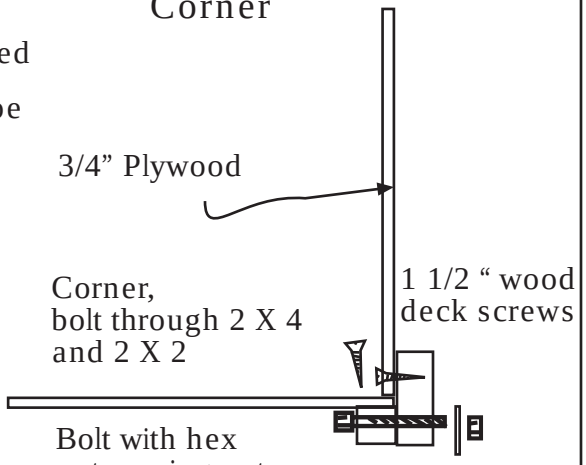
Bolt in each corner
3 per corner

4" PVC Ls

4 inch PVC TEE

Blower motor and fan

Corner



Pipe can be assembled without gluing. You may use duct tape on assembly outside of pile. It is critical that a space of 12" to 8" is non-perforated pipe. This allows the manure to seal the edge and force air to enter the manure and not short circuit to the open.

Assemble to allow breakdown with full bin.

Volume = 2.4 cubic yards

Micro Bin 2.40 yd3 Vert Support	HR
Revised August 13, 2010 HaroldRuppert	PM

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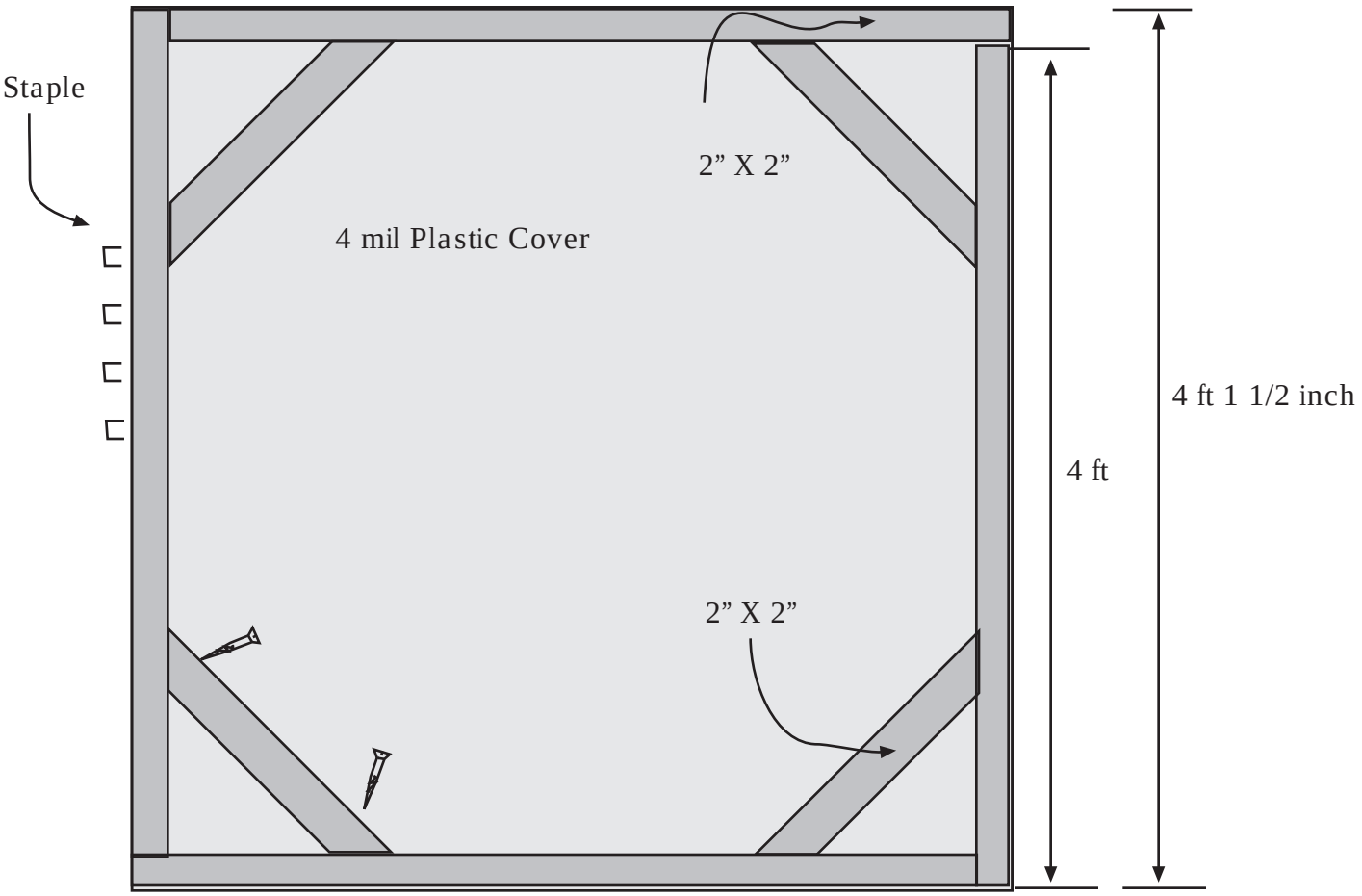
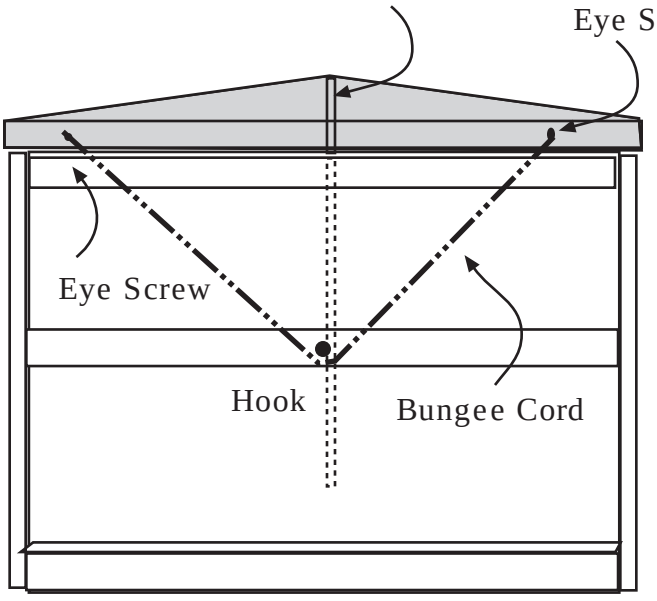
Attachment G

Micro-Bin Cover Design

O2Compost
Compost Systems & Training



Center dowel to support 4 mill plastic



Side View

O2Compost Compost Systems & Training	Reviewed By: PRM	Date: 9/20/07	Micro Bin Cover	Drawing No. 1/ 1
	MicroBinCoverSept20_07 Harold Ruppert			

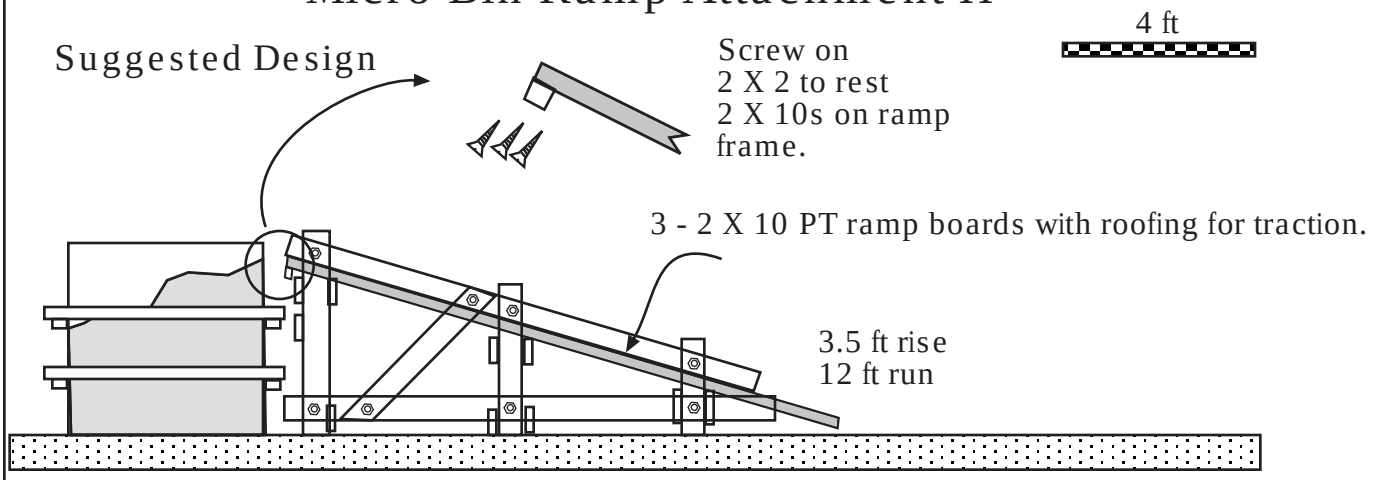
Attachment H

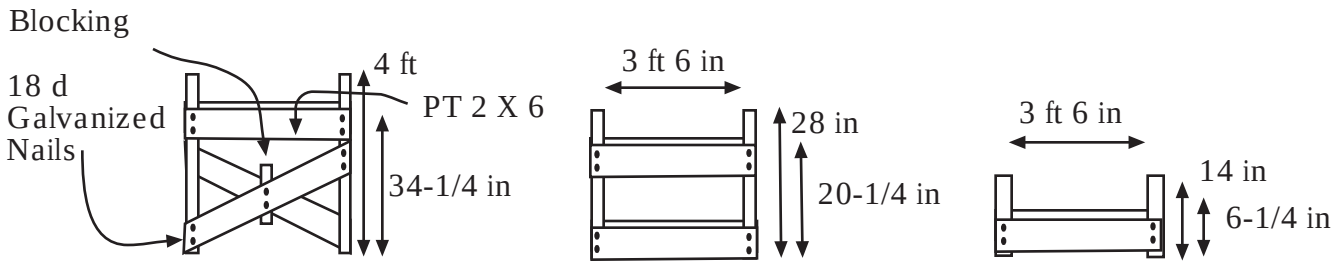
Micro-Bin Ramp Design

O2Compost
Compost Systems & Training

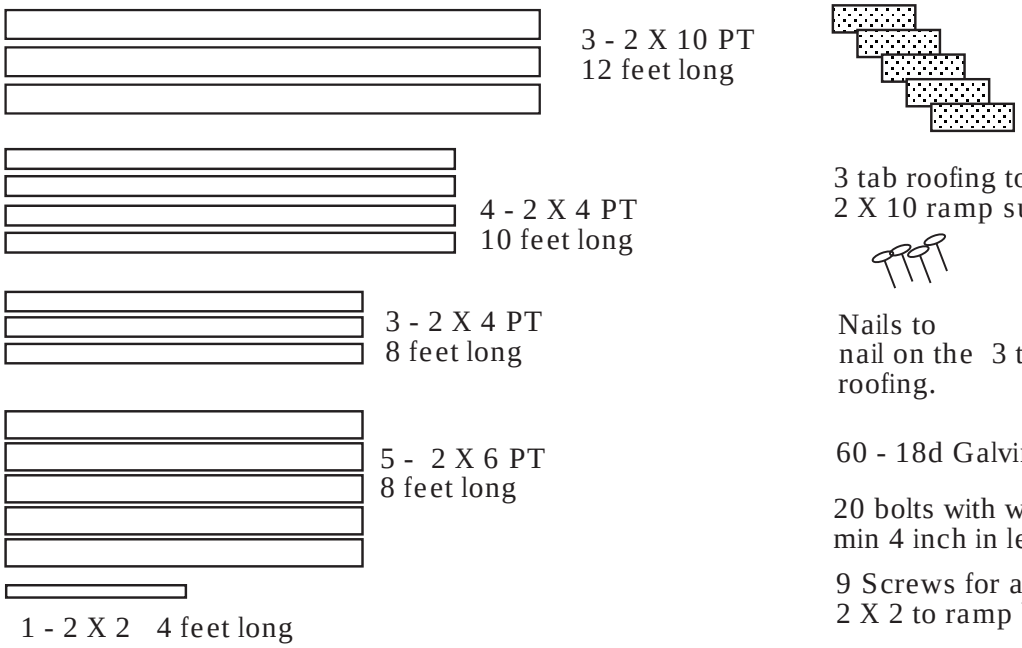
Micro Bin Ramp Attachment H

Suggested Design





Materials List



3 tab roofing to nail onto
2 X 10 ramp surface for traction.

Nails to
nail on the 3 tab
roofing.

60 - 18d Galvinized nails

20 bolts with washers and nuts,
min 4 inch in length.

9 Screws for attaching
2 X 2 to ramp boards.

Ramp Design Jan 20, 2007	HR
MicroBinRamp Jan20_07, HaroldRuppert	PM

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Attachment I

Example Micro-Bin Systems

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Snohomish, WA

Quebec, Canada (Top-Down Construction)

Rolling Hills Estate, CA

Salem, Oregon (Hexagon Design)

New York, NY (Pisticci Restaurant)

Brush Prairie, WA (Ramp Design)

Attachment J

Blower Owner's Manual

O2Compost
Compost Systems & Training

OWNER'S MANUAL

AERATED MICRO-BIN BLOWER
MODEL # KP-280

- INTRODUCTION
- OPERATION
- SAFETY
- SERVICE
- WARRANTY
- CONTACT
- SPECIFICATIONS
- TROUBLESHOOTING

INTRODUCTION

YOUR NEW O2COMPOST BLOWER HAS A HIGH EFFICIENCY MOTOR, WHICH HAS STATE OF THE ART CONSTRUCTION AND SCREENS ON OPEN VENTS FOR SAFETY AND LONG LIFE. THE HANDLES ARE DESIGNED FOR EASY CARRYING. A BASE PLATE IS ENCLOSED TO "SNAP" ON BOTTOM OF BLOWER TO INSURE STABILITY.

OPERATION/USE

THIS HIGH PRESSURE UNIT IS INTENDED TO INFLATE VARIOUS INFLATABLE PLAY STRUCTURES, BUT IS SUITABLE FOR A VARIETY OF OTHER APPLICATIONS INVOLVING AERATED COMPOSTING.

A. CAREFULLY PLACE THE BLOWER ON STABLE FLAT DRY SURFACE-KEEPING CHILDREN AWAY.
B. REMOVE THE BASE PLATE FROM BOX AND PLACE IT ON A FLAT STABLE SURFACE, WITH PRONGS FACING UPWARD. (SEE DIAGRAM "A").
C. CAREFULLY "SNAP" BLOWER INTO THE BASE PLATE ON A FLAT STABLE SURFACE. MAKE SURE ALL 4 CORNERS ARE SECURELY SNAPPED INTO PLACE (SEE DIAGRAM "B").
D. ATTACH TO AERATION MANIFOLD USING BLACK RUBBER FITTING (3":4").
E. PLUG CORD INTO A GROUNDED G.F.C.I. OUTLET ONLY (TIMER).
F. TURN ON SWITCH AND MAKE SURE IT IS OPERATING CORRECTLY.
G. ALL BLOWERS IN OPERATION MUST BE SUPERVISED AT ALL TIMES.

STORAGE

- WHILE IN USE, COVER WITH A LARGE, NOTCHED PLASTIC STORAGE BIN.
- WHEN NOT IN USE, STORE UNIT INDOORS IN A CLEAN DRY ENVIRONMENT TO ENSURE LONG LIFE

SAFETY

1. BLOWER MUST HAVE BACK PRESSURE, MEANING IT MUST BE ATTACHED TO AN INFLATABLE OR DUCT TO AVOID ANY DAMAGE TO MOTOR.
2. KEEP CHILDREN AWAY FROM UNIT AT ALL TIMES WHILE IN OPERATION AND/OR PLUGGED IN.
3. DO NOT PUT FINGERS OR OTHER OBJECTS IN UNIT WHILE IN OPERATION AND/OR PLUGGED IN.
4. DO NOT OPERATE IN POOLED WATER TO AVOID ELECTRIC SHOCK.
5. MOTOR MUST BE KEPT DRY AT ALL TIMES. IF UNIT BECOMES WET, THOROUGHLY DRY BEFORE NEXT OPERATION.
6. INDOOR USE: USE ONLY WITH A GROUNDED PLUG AND/OR EXTENSION CORD TO AVOID RISK OF ELECTRICAL SHOCK OR FIRE. REMEMBER NEVER TO USE A CORD WITH ANY KIND OF DAMAGE OR WEAR.
7. MAKE SURE THE POWER SOURCE IS SUFFICIENT TO MEET THE REQUIREMENTS OF THE BLOWER.
8. KEEP AIR INTAKES CLEAR AT ALL TIMES TO AVOID CLOGGING OR BLOCKING IN ORDER TO PREVENT OVERHEATING THE UNIT. BLOCKING THE AIR INTAKES COULD RESULT IN A FIRE OR ELECTRICAL HAZARDS.
9. DO NOT REMOVE ANY SCREENS OR SAFETY GUARDS FROM THIS UNIT TO PREVENT INJURY TO PERSONS, AND TO AVOID OBJECTS FROM COMING IN CONTACT WITH THE BLOWER WHEEL. UNIT DAMAGE IN THIS MANNER WILL VOID YOUR WARRANTY.
10. DO NOT OPERATE UNIT CLOSE TO ANY DANGEROUS AREAS, SUCH AS EXPLOSIVE GASES, FLAMMABLES, HEATERS AND VENTILATED ENVIRONMENTS, WHICH MAY RESULT IN EXPLOSIONS OR ELECTRICAL HAZARDS.
11. DO NOT USE ANY FORM OF SPEED CONTROL DEVICE AS DOING SO MAY RISK INJURY OR FIRE.
12. ALWAYS PLACE BLOWER ON A SMOOTH AND LEVELED SURFACE FOR SAFE OPERATION.
13. DO NOT USE UNIT IF DAMAGED.
14. BEFORE CLEANING OR SERVICING UNPLUG UNIT.

WARRANTY

6 MONTHS: From Original Purchase date will cover all parts (except Cords), labor and one-way shipping costs to your location in the 48 Contiguous states, using UPS Ground Service. Customer will pay shipping to our warehouse. Canada and Non-Contiguous States must pay for freight both ways.

SERVICE

IN ORDER TO RECEIVE SERVICE OR REPLACEMENT PARTS UNDER WARRANTY, YOU MUST:

A) CALL FOR A RMA# (Return Merchandise Authorization Number)
B) HAVE PROOF OF PURCHASE
C) SHIP TO: O2COMPOST
IF IMMEDIATE SERVICE IS REQUIRED, O2COMPOST WILL SHIP A REFURBISHED BLOWER IMMEDIATELY TO REPLACE THE ONE REQUIRING SERVICE IF A CREDIT CARD IS PROVIDED AND CHARGED. ONCE WE RECEIVE YOUR BLOWER, WE WILL CREDIT YOUR CREDIT CARD ACCOUNT.

UPON INSPECTION, WE WILL CALL WITH THE STATUS OF YOUR ORDER AND WILL ISSUE REPAIR OR REPLACEMENT PARTS DEPENDING ON WARRANTY CRITERIA.

CORDS

1. USE 3 PRONG ADAPTORS THAT ARE **UL** APPROVED AND NOT LESS THAN 14-3 WITH GROUND FAULT CIRCUIT INTERRUPTER (G.F.C.I.).
2. DO NOT USE CORDS THAT SHOW ANY KIND OR WEAR OR DAMAGE.
3. CORDS ARE NOT COVERED BY WARRANTY.

O2COMPOST BLOWERS LIMITED WARRANTY

COVERS:

O2COMPOST BLOWERS ARE COVERED AGAINST DEFECTS IN MATERIAL AND CRAFTSMANSHIP USED UNDER NORMAL INTENDED USE TO ORIGINAL PURCHASER FOR A TERM OF 6 MONTHS FROM THE ORIGINAL DATE OF PURCHASE.

DOES NOT COVER:

ANY SIGNS OF MISUSE INCLUDING; BUT NOT LIMITED TO ROUGH HANDLING, ABUSE, TAMPERING, IM-PROPER VOLTAGE USE, UNAUTHORIZED MAINTENANCE AND REPAIRS.

WARNING

ALL BLOWERS IN OPERATION MUST BE SUPERVISED AND ATTENDED AT ALL TIMES.
THE USE OF A 3-PRONG TO 2-PRONG ADAPTER IS PROHIBITED.

CONTACT:

O2COMPOST
PO BOX 1026
SNOHOMISH WA 98291
1-800-611-3718
FAX:(360) 563-5790
EMAIL:INFO@O2COMPOST.COM
WEB SITE: www.o2compost.com

SPECIFICATIONS

MODEL: KP-280

115 VOLT	KP-280
MOTOR POWER	280W
AMPS	2A
MAX STATIC PRESSURE	5
WEIGHT NET	8LBS
UNIT SIZE (LxWxH)	14.2 x 14.2 x 11
MAX AIR VOLUME	180
ATTACHED CORD (18G)	6FT

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Motor Not Running	A) Switch is OFF	A) Turn Switch On
	B) Bad Outlet	B) Check Outlet/Change to Another Outlet
	C) Faulty Switch/Cord	C) Call Factory for new Switch/Replace Cord
Scraping Noise from Blower	Wheel Out of Line	Call Factory for Replacement Advise
Weak Air Flow	Obstructed Vents/Inlets	Clean Out Vents/Inlets