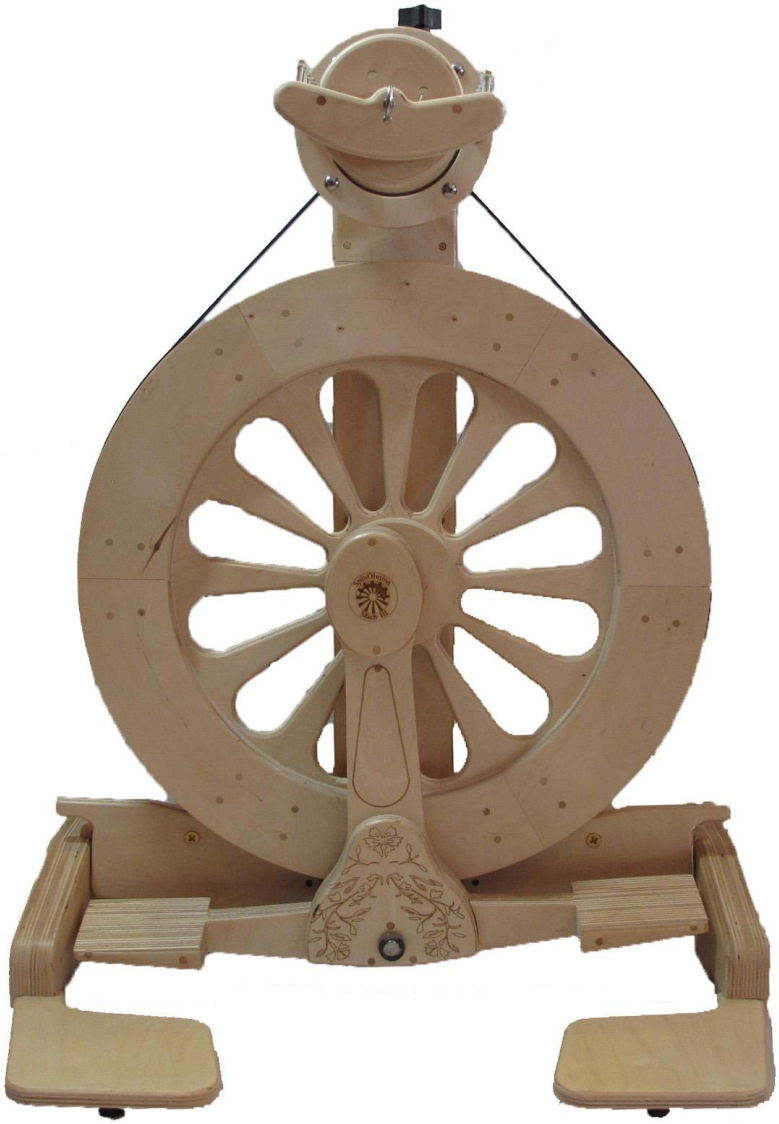


November 2010

The Mach 3 Spinning Wheel

A User Guide by Amelia Garripoli

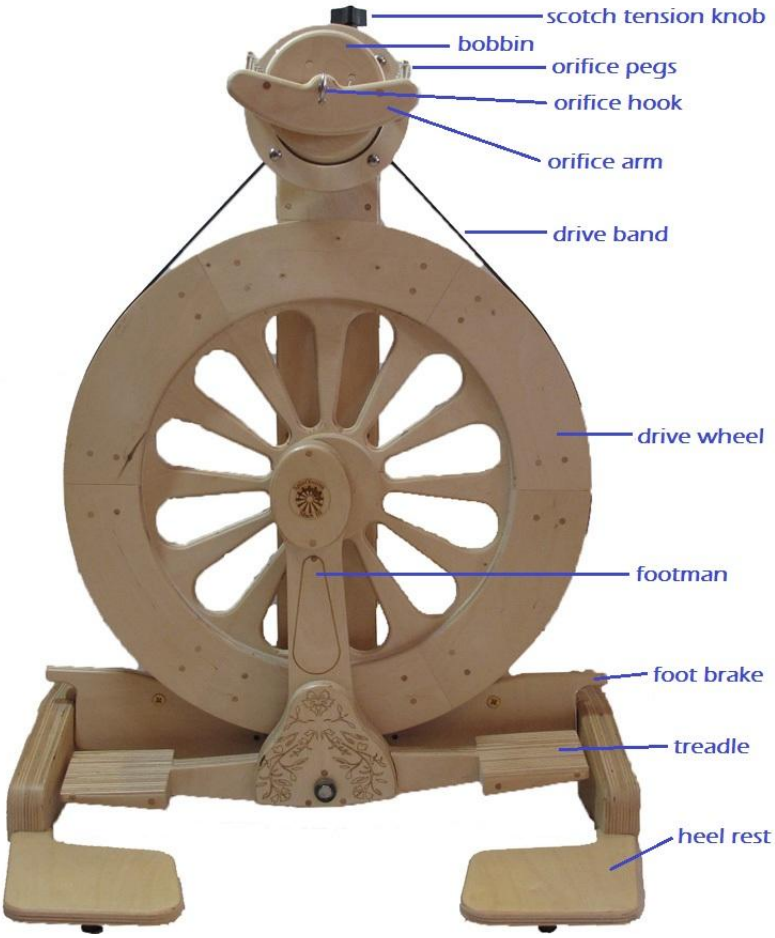
The Mach 3 Spinning Wheel

A User Guide by Amelia Garripoli

Contents

Please use the information in this guide in a responsible manner. A spinning wheel is a complex machine, and needs to be treated with care and respect. Please contact your dealer or the makers if you have any questions or concerns about your SpinOlution Mach 3 Spinning Wheel.

Your Mach 3



The Mach 3 Spinning Wheel by SpinOlution combines traditional functionality with innovative features.

I've used traditional names for traditional parts on this diagram. SpinOlution wheels use a pitman to drive the wheel. The pitman guide is located on the inside of the footman, driving the pitman bearing, which is mounted on the drive wheel.

Your Mach 3 might have a standard flyer or an art yarn flyer. The art yarn flyer is used in this manual, it has higher pegs and a larger hook than the standard flyer. The Mach 3 has unique features in its orifice arm (usually part of the flyer assembly), orifice hook, flyer pegs (usually hooks), cordless scotch tension brake, rocker-treadles, wheel brakes, and heel rests.

On the audience side of the Mach 3 there is a carry-handle. The Mach 3 Kate can be attached to the handle, or a hand-strap to use in conjunction with the fixed caster wheels in the wheel kit.

Author's Note …

The wheel used in writing this manual was one of the early prototypes. Several improvements were made, including:

- A handled-screw for the removable head to make swapping out the head easier, similar in style to the SpinOlution Hopper head screw.
- A T-head on the brake block so it can be rotated if one side is wearing faster than the other.

The Mach 3 Spinning Wheel

A User Guide by Amelia Garripoli

SpinOlution's goal is to provide the most advanced and easy to use spinning wheels that have ever been seen or used. The evolution of spinning wheels is finally here!

Your Mach 3 is a unique wheel – so even if you usually skip manuals, please take a look through this for an overview of its special features. Its scotch tension mechanism is unique, the bobbins and orifice are novel, and the treadling you'll have to experience to believe.

If you are new to spinning on a wheel, I heartily recommend you find a book, video, class, or local guild – check with the vendor you purchased your wheel from, they may teach, or be able to point you to a local teacher or guild. Maggie Casey's *Start Spinning* is an excellent book, and Patsy Zawistowski's video *Spinning Wool: Basics and Beyond* teaches spinning in a similar format to my own classes.

The Mach 3 invites you to spin art yarn with all its capabilities and large bobbin. For that, I recommend Lexi Boeger's book *Intertwined* or Jacey Bogg's DVD *Sit and Spin*.

I want to state clearly up front – this guide introduces the key features for success on your Mach 3; however, it is not a complete book for learning to spin. Please see the recommended material above, for that.

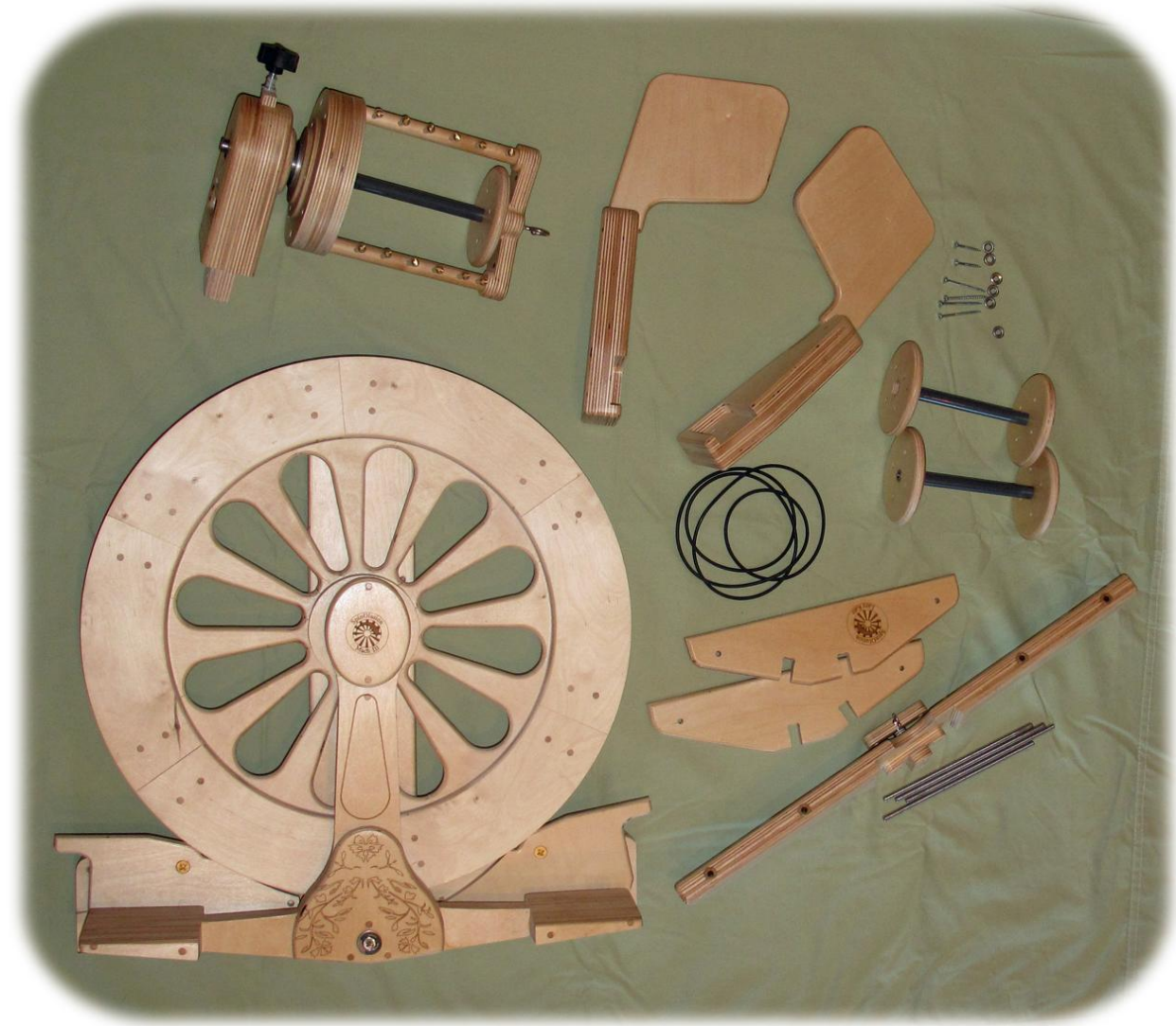
Now, if you take a class, it's likely your teacher hasn't spun on a SpinOlution wheel before – unless she also owns one. So you might want to bring this guide along to help her understand the special features of your Mach 3.

Unpacking your Mach 3

If mailed, your Mach 3 arrives packed in a large box. Lift out any covering pieces of packing material, then check carefully – the flyer head, bobbins, drive band, and any extra accessories will be tucked in amidst the packing material. Look through the packing material to be sure you have taken all of the items out of your box. Check for loose pieces that may have come off during shipping, to be safe.

You will find, as laid out here, clockwise from the lower left:

- Drive wheel, base, and treadle assembly
- Flyer head (with bobbin on), screw knob (not shown – the prototype had 2 additional screws and finishing washers) – it is a screw with a head like the brake block knob, and scotch brake: block, spring, and knob (yours may or may not come assembled as this one is).
- Heel rests (2), 4 screws and finishing washers (6 shown, the smaller 2 have been replaced with a screw knob).
- Two additional bobbins
- Drive band
- If ordered, (shown) the kate has 2 legs, a base, 4 rods, and 4 nylon washers.
- If ordered, (not shown) the wheel kit has 2 wheels, 8 screws, and 1 nylon strap.
- (not shown) Any additional bobbins you ordered.



The wheel shown here is the prototype – you will have just 4 screws and washers, and an additional knob-and-screw. The brake block assembly is shown already on the flyer here. In this picture, the Mach 3 lazy Kate is shown as well.

Assembling your Mach 3

You will need a Phillips screwdriver or an electric drill with a Phillips screwdriver bit to assemble the wheel.

A screw tip: after each few twists in, loosen the screw back out a turn, then continue. This helps it seat well.

First, lay the wheel body down so that the engraved name side is on the floor and the small round logo faces up. Check that the brakes are free of the drive wheel, and rotated so their outer “thumbs” are up, above the sides of the body as shown in the parts picture above.

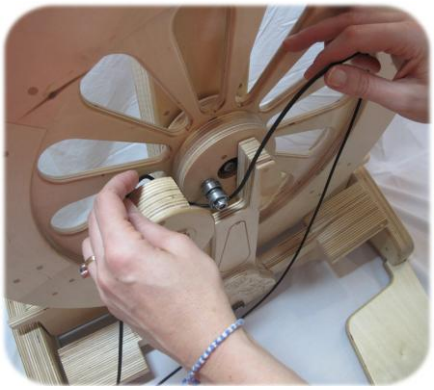
Now attach the heel rests. There is a left and right heel rest; put them on so that the flat heel rest faces in. Each rest is held in place with two screws. Start by putting one in position, and check that the brake pedals are correctly positioned. Thread a screw through a finishing washer, then screw it into the one of the holes on the side of the heel rest and into the outside edge of the side of the base of the main body. Check that the holes are lined up and the screw is going into both by starting to screw with them slightly separated. They will pull together as the screw is tightened. Start each screw so the heel rest is properly in place, verify that the brake pedal isn't trapped in the wrong position, then go back and tighten the screws. Put both heel rests on, tighten all four screws, then stand the wheel on its base for the next step.

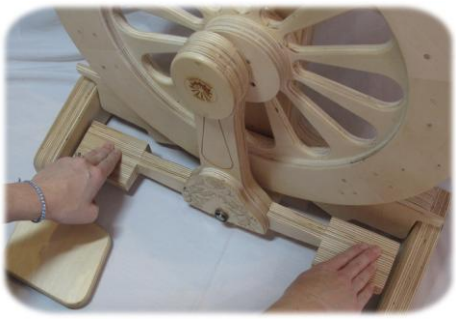
Next, attach the flyer head. The flyer head has a peg at its base that fits into a hole in the top of the main post. Place the peg into the hole so that the flyer arms face the same direction as the heel rests. Now use the knobbed screw (shown here) to tighten the head in place – keep tightening it until you cannot lift off the head. Note, the prototype had the head screwed on with 'permanent' screws, rather than a knobbed screw for easy removal. It is useful to be able to remove the head if you decide to purchase more than one flyer – that way you can swap out the whole head-and-flyer assembly rather than removing the flyer from the head to replace it.

It is likely your brake block assembly is already on your Mach 3 flyer head, since the flyer head and flyer body ship already assembled. However, if not, you can assemble it. At the top of the wheel, from the bird's eye view, there is an open rectangle. You should be able to see the flyer spindle through this opening. The wooden block is placed in it, with the leather-covered side down. Next to this hole is a screw-shaft. Place the white nylon collar, flat side down, on this screw; part of the flat side will touch the block. Then place the spring on the screw – it should fit around the nylon collar, resting on the flat side, and extending above it. The knob is then screwed onto the screw-shaft, just until it starts to push on the screw. You adjust the Scotch tension once you are ready to spin, to suit the fiber and yarn you are spinning.

Brake block parts: brake block, nylon flange (almost clear), spring, knob. The block now ships with a T top rather than one leg as shown here, so it is rotatable for even wear.

If the drive band was not on your wheel, or came off in transit, it can now be positioned. If the drive band was not on your wheel, open the pitman by pushing up on both treadles to "split" the footman. This reveals the pitman bearing and gives you a path to get the brake band behind the treadles and around the drive wheel. Once the band is in place, to ensure a good seating of the pitman guide on the pitman bearing, push the treadles both down to close the pitman guide at the top of the footman around the pitman bearing.





Bring the drive band around the flyer to the back where the flyer whorl grooves are, then stretch it around the main drive wheel.

Before spinning, check that the drive bands are set up for the ratio you desire. The lowest ratio, 3:1, is used by putting the drive band in the largest groove on the flyer. The drive band will seat itself on the drive wheel as needed to align with the flyer groove selected.

If you purchased the lazy kate, it can be set-up free standing by placing the arm in the two legs; or it can be attached to the wheel in the carrier handle by rotating the hook. Place the rods in the openings, and put the flat nylon washers on the rods. The nylon washers cut down on the metal-on-metal rubbing noise – you don't have to use the washers, they are included as a convenience.

Bobbins should be placed on the kate so the metal bearing at the end of the bobbin is down, otherwise the wood of the bobbin will rub on the wood of the kate.

Treadling

The Mach 3 uses a treadling system unique to SpinOlution wheels. It is a left-right treadling, with the ball of each foot on each treadle. Place the ball of each foot, or just toes, on each treadle. Depress one treadle fully, and then the other. Your heels rest on the heel-rests in front of the treadles, only your toes need to go up and down. If you try to push down a treadle with one foot before the other treadle has gone completely down, you will find the treadle difficult to push. That said, I get the quietest treadling action if I at least rest my inactive foot on its treadle, to keep the pitman guide fully closed around the pitman bearing. With a little practice, you will soon find where each side is completely depressed and adapt your rhythm to the upswing of the other treadle.

Treadling moves the drive wheel, which turns the flyer when the drive band is properly placed. If the wheel or the flyer is not moving, or it feels like you are pushing a refrigerator, check that the drive band is in a groove (sometimes called a pulley) on the flyer whorl, not resting on the flyer spindle behind the grooves.

The treadling is very light on the lowest ratios; it will take hardly any effort at all to keep the wheel going. You may be able to keep the wheel spinning with only the toes of one foot treadling on one treadle. The amount of effort needed increases on the higher ratios, though still less than that used on traditional treadled wheels. The highest ratio can feel rather heavy; if it is the only one that does, then try a higher seat – this can help you increase the effort behind your treadling without working harder.

The Mach 3 drive wheel has enough mass that the wheel keeps spinning even when you remove your feet from the treadles. To stop the drive wheel, there is a foot brake on each side of the wheel. Reach forward with one foot and press on the break; the wheel will quickly halt. The picture here shows

my left foot raised to push down the left brake; the right foot is unmoving, resting on its treadle. You can use either brake to stop the wheel.

Please note that as with all spinning wheels with drive bands, it is possible to trap things between drive band and wheel when the wheel is spinning – keep stray pets, audience members, and paper airplanes away from the wheel when it is in motion, to prevent accidents. Be sure to stop the wheel before walking away from it.

As you may have noticed from these pictures, I prefer to treadle in my socks (handspun for special occasions), as this keeps my treadles and heel rests clean of anything my shoes may have picked up.

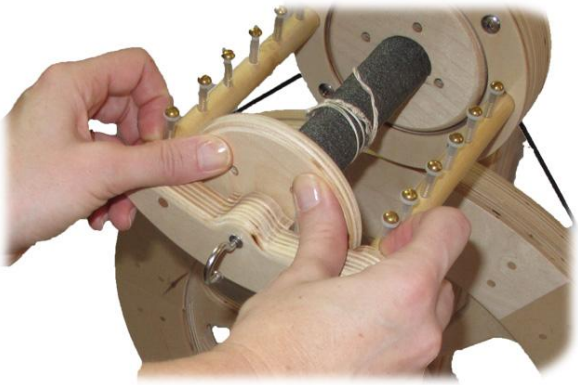
As with all wheels, practice treadling your wheel until you can start it going the direction you desire. Traditionally, spinners learn to spin singles clockwise and to ply counterclockwise, so start there. Or buck tradition, just make sure to ply in the opposite direction to that used to spin your singles.

The key to being able to start your wheel in the direction you desire is stopping the wheel at the right part of the treadle swing. Don't stop with either treadle completely depressed. If your first (slow) push down starts the wheel going the wrong direction, give a little push with the other foot to get the wheel started in the desired direction. Practice treadling until you can get the wheel turning slowly in the desired direction automatically.

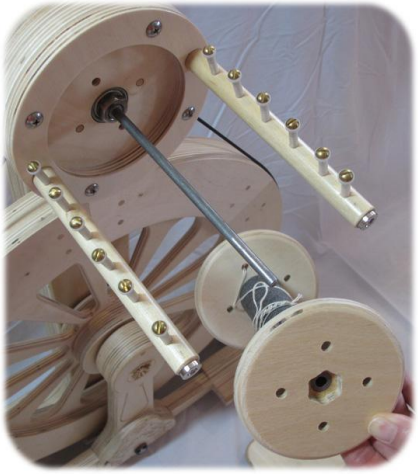
Don't combine this direction-change trick with a fast start – the yarn is likely to jump off the flyer pegs and twist around the flyer spindle, requiring you to stop and fix things before you can continue.

It should not be necessary to touch the drive wheel in order to start the wheel in the desired. That said, beginners can struggle with learning the direction-change start on any wheel – you may find a short push on the top of the main drive wheel in the desired direction gets you up and treadling in the direction you desire while you are still new to spinning. Practice until you no longer need this push to start.

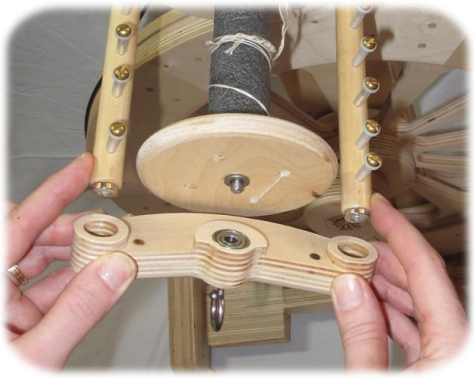
Bobbins



Remove the bobbin from the flyer spindle by pulling off the orifice arm. It is held in place by magnets. I usually push against the bobbin on the wheel with my fingers under the orifice arm and thumbs above, as shown here, to break the magnetic bond, pulling squarely at the middle of the orifice arm. The orifice arm comes off, and then you can take the bobbin off the flyer's spindle (rod).



To put a bobbin on the flyer spindle, make sure to match the hexagon cut-out at the back of the bobbin with the hexnut at the back of the flyer spindle. The bobbin is keyed onto the flyer spindle, as its rotation is braked by the tension knob on the top left of the folding arm. The inner face of the back whorl on the bobbin should sit almost flush to the back of the flyer. If the bobbin is not far enough back, the orifice arm will not fit back onto the flyer in the grooves that hold it in place.



Replace the orifice arm on the flyer arms by seating it squarely, matching both ends of the flyer arms at the same time. If one side seats but not the other, remove the orifice arm and place it more squarely so both seat at the same time. The flyer spindle also keys into a bearing in the orifice arm. Be sure to place the orifice arm so that when the flyer pegs are pointing up, the orifice hook is pointing down. You can put it on "upside down" and even spin on it, but the yarn is more likely to jump out of the orifice hook in that position.

The Mach 3's bobbins have four holes around the end whorls. These can be used to hold the leader. For a leader, make a large loop from about two yards of strong yarn – I use perle cotton, acrylic yarn, or a cabled wool yarn. Tie the loop with a simple overhand knot, and position the knot so it's not at either end of the loop. Push the string through one of the holes and back through another, so the ends of the loop are on the inside of the bobbin. Put one end of the loop through the other, and tighten this up as shown in the picture. This leader will stay secure and works for both clockwise and counter-clockwise spinning. Attach the leader to the front holes of the bobbin for smoothest spinning; if you put it on the back of the bobbin, it can rub against the back of the flyer.

Setting the Ratio

The Mach 3 ratios are:

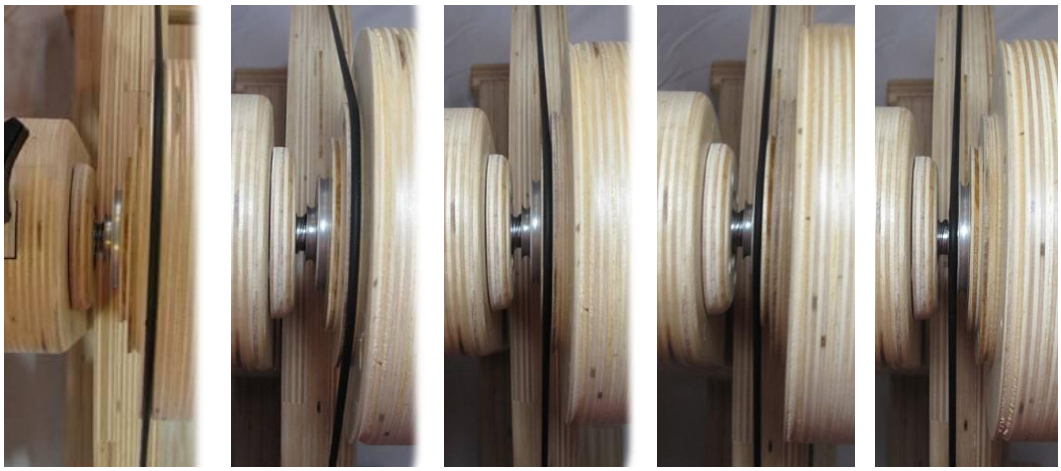
1:3.5, 1:5, 1:7, 1:11, 1:21

Your Mach 3 has five ratios to choose from. But you are wondering – what's a ratio? The ratio is the number of times the orifice hook will rotate – the number of twists it will put into the fiber you are spinning – for each complete rotation of the drive wheel. The drive wheel makes a complete rotation with each complete trip of the treadles (both as a combination) up and down.

Ratios are set by moving which groove behind the flyer you place the drive band in. These grooves are sometimes called whorls or pulleys. The drive band will automatically seat itself on the drive wheel to align with the groove used, over the first few rotations of the wheel. The largest groove, closest to the bobbin, provides the lowest ratio; the smallest groove, a metal one, furthest from the bobbin, provides the highest ratio.

The effort to treadle increases slightly with each ratio; but even at the highest ratio, it is lighter than traditional treadle wheels. For easiest treadling at the higher ratios, start treadling slowly, then gain speed. Once you get it started, it keeps going easily with regular treadling.

In the picture series that follows, we see the drive band first in the largest pulley, then moving down to the smaller pulleys, for ratios of 1:3.5, 1:5, 1:7, 1:11, and 1:21. The largest three pulleys are wood, and the smallest two pulleys are metal.



Ratios, left to right: 1:3.5, 1:5, 1:7, 1:11, 1:21.

How do you pick a ratio? Some spinners go by feel – they fiddle around until they find a ratio they like, and then they stick with it. Then, they take a technical spinning class and find out how their teacher recommends they adjust ratios, up or down, for plying, spinning sock yarns, or whichever technical skill the teacher is presenting. I can heartily recommend the book *The Intentional Spinner* by Judith MacKenzie McCuin, which provides several charts and diagrams showing when and why to apply ratio changes when spinning. A lower ratio is typically used to spin a thicker, lower twist yarn, while a higher ratio is used to spin a finer, higher twist yarn.

Generally, the higher the ratio, the more twists you put in your yarn for a complete treadle revolution, and the less drag there is on the flyer (draw-in tension is lower). The lower the ratio, the fewer twists you put in your yarn per treadle, and the more drag there is on the flyer. So, when you adjust the ratio, you may also then need to follow up by adjusting the tension – but honestly, this change is pretty subtle, so if you don't notice, you aren't alone.

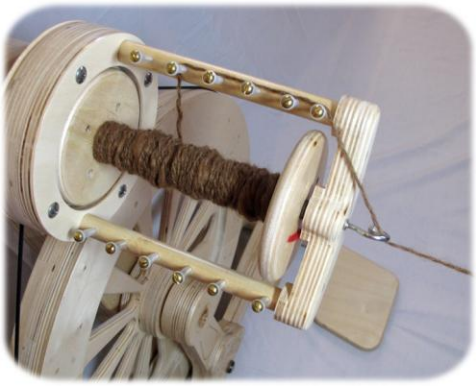
If you are just learning to spin, start at the lowest ratio, 1:3.5, and increase to 1:5 and then 1:7 as you find your drafting speed increases. The jumps to 1:11 and 1:21 can be made as you find you need more twist in your yarn.

I recommend moving the drive band to the highest ratio at the end of each spinning session, so that the band can "recover" from being stretched. This maintains its stretchiness so it will be ready for you, when you are ready for spinning at the higher ratios.

If you are using the large head, your ratios will be: 1:3, 1:4, 1:5, and 1:6.5.

Large flyer with drive band in second groove (1:4 ratio)

Working with Open Threading



No doubt you noticed your Mach 3 wheel's unique open threading system. It uses pegs rather than traditional hooks – no more getting fibers or boucle loops caught on the tip of a hook as you spin! And it has an orifice hook rather than the traditional orifice tube – so there's no need for an orifice threader.

For me, this is priceless – I can interrupt a plying job in mid-stride without breaking off the singles. I don't have an extra tool to keep track of (that orifice threader). And I can spin all the crazy yarns I want without getting hung up on the hooks. The orifice peg has a smooth ball tip too, so it's not going to catch stray fibers either.

The flyer shown here is the art yarn flyer – the standard flyer has shorter pegs, closer together, and a smaller hook at the orifice.

If you've used a delta orifice before, the theory is very similar. You bring the yarn or leader from the outermost point of the orifice hook horizontally toward you. At first, the yarn may slip out of the orifice hook as you are learning to spin – work on keeping the angle of yarn from orifice to you horizontal, and work on keeping the wheel going in the same direction as you treadle. If you're just starting out, changing direction in treadling will cause the yarn on the bobbin to loosen and wind off the bobbin, leaping off the pegs and out of the hooks – stop, breathe in, breathe out, thread it back up, and start again. You're learning, give yourself a break. ☺

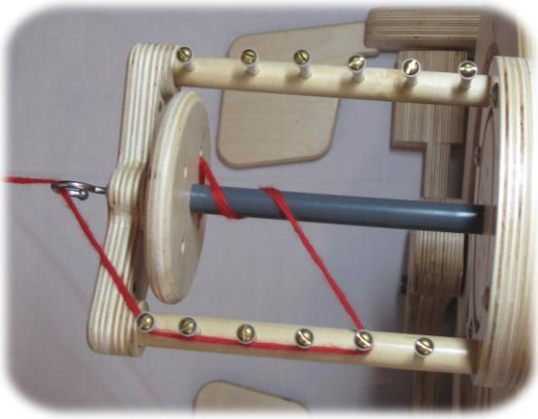
Adjusting the Tension

Once you have assembled your Mach 3 and put a bobbin with a leader on your wheel, you will need to check the tension on the bobbin to ensure your yarn will take up onto the bobbin as you spin. Tension on the bobbin is controlled by adjusting the brake knob at the top of the wheel. Clockwise rotation of the knob (looking at it face on) increases the brake pressure, and counterclockwise rotation decreases it. Very minor adjustments are needed to fine-tune the tension – less than 1/8 of a turn – so only use full rotations for the initial adjustment.

Let's explore the braking system briefly. The brake knob screws onto a threaded rod; it pushes on a spring, which pushes on a nylon flange, which in turn pushes on a wooden block. The wooden block goes into the flyer mounting; on its inside edge, it is curved, and has a piece of suede attached. The suede pushes on the rod (technically, the flyer spindle) that the bobbin rides on. About once a year (or when you notice the brake not being as effective), undo the brake knob completely, and take the spring, flange, and wooden block off. Check the suede – over time its rough surface is smoothed; if needed, rough it up with a stiff-toothed comb, an emery board, your fingernail, or coarse sandpaper.

If your brake block is squeaking on the wheel, sometimes rubbing a crayon or some beeswax on it will quiet it down. This seems to occur in some environments but not others -- it has not happened to me up here in the Pacific Northwest, but a few folks in the southeastern USA have run into a brake block squeak.

To set the initial bobbin tension, start by twisting the knob until there is no pressure on the spring resting on it, so that any more clockwise twisting of the knob would cause the spring to start to compress.



Bring the leader to the orifice by taking it from the bobbin out to a peg directly to the side from it, then forward outside the remaining pegs to the front of the flyer arms, and from there under the orifice hook and toward you. Hold the leader straight from the orifice hook toward you, not at an angle.

Always go along all the pegs from the first one you come to, to the front of the flyer arm. If you skip some pegs, your yarn will rub against the end of the bobbin. (Okay,

except when lacing… what's that? See 'Twists and Turns - Tips to Make Spinning Easier' at the end of this guide.)

If your leader is short, you might add a yard or two of string to the end for this step… now treadle, and see if the bobbin will take up the leader or not. If not, twist the brake knob clockwise half a turn and try again. Once the leader does take up, you will want to fine-tune the tension with turns less than 1/8 of a rotation of the knob, clockwise to increase take-up or counter-clockwise to decrease take-up, until you can easily pull the leader off *while you are treadling* but still have the leader be taken up onto the bobbin if you are not resisting the take-up. If this testing takes a while, be sure to let the twist out of your leader from time to time – treadling with a corkscrewed leader is an exercise in not-fun.

Note: new wheels may have a strong initial pull until the first few bobbins of yarn have been spun on them. Try lacing the leader to perform the above exercise if you cannot overcome the pull even when the knob is not putting any pressure on the flyer spindle.

You might want to have a tighter tension than I've described setting above when you want to make a low twist yarn; when you're drafting quickly enough that you want faster take-up onto the bobbin; or for the stronger take-up needed for a thicker yarn, plying, or a fuller bobbin.

A great SpinOlution feature is that you will not have to adjust the tension when you change bobbins – most Scotch tension wheels put the brake band on a groove in the bobbin, so you have to remove the brake band, and then replace it, when you change bobbins. Not so with the Mach 3. ☺

The Mach 3 is a Scotch tension wheel. Adjusting the brake knob changes the brake pressure on the bobbin via the flyer spindle. The flyer spindle turns independently from the flyer arms, making this a true Scotch Tension, slowing the bobbin, not the flyer arms (Irish tension brakes the flyer arms).

While you are Spinning

When spinning clockwise, it's usually best to start on the right-side pegs; counter-clockwise, start on the left-side pegs. That way, the yarn will want to stay against the pegs as you spin.

You will need to stop and change pegs from time to time so that the little hills of yarn that build up don't collapse into messes on the bobbin. Move regularly toward the back and then back toward the front, up and down. You can simply take the yarn off one peg, leaving it on the rest in the row, or add it around another peg in the row. Don't slalom the yarn around the pegs – it always goes to the outside, and then stays outside along the row of pegs until the last one, when you bring it to the orifice. The last peg before the orifice hook is important – it prevents the yarn from rubbing against the edge of the bobbin: be sure to be outside the final peg.

With experience, you'll find it won't matter too much which side of the flyer arm you are on – you can use the pegs on both arms to more completely and evenly fill the bobbins. Note that when you change which flyer arm you come along, you will need to unhook from the orifice hook to come from that side of the flyer arm to the orifice hook. Otherwise your yarn will wrap around the orifice hook and won't take up onto the bobbin (at all, or as easily… your experience may be either).

Hold the yarn you are making in a line from the center of the orifice hook to you. I keep my forward hand in a fairly neutral position in front of my body, so the yarn is coming in a horizontal line, from the hook to my hand. If you hold it at too extreme of an angle up, down or to the side, the yarn will thump as you spin.

You may find you need to increase tension slightly – only a millimeter-sized nudge at a time – as the bobbin approaches full. The fuller the bobbin is, the more it can overcome the braking pressure. This is true of any Scotch tension based flyer system.

Learning to Spin

If the Mach 3 is your first wheel, I recommend starting out on the lowest ratio – put the drive band on the largest flyer whorl.

For learning to spin, I highly recommend:

Start Spinning by Maggie Casey

The Intentional Spinner by Judith MacKenzie McCuin

The First Steps…

With nothing on the bobbin, practice treadling as described earlier until you can start and stop the wheel going the direction you want.

Then put a leader on the bobbin and attach some yarn leftovers to your leader (acrylic's great for this!) – wrap the end of the practice yarn through and around the leader's loop a few times to catch it in place, or use a half-hitch so it stays attached. Treadle so the wheel spins clockwise, letting the acrylic be drawn onto the wheel. Be sure to adjust the tension as described before. Doesn't the feel of treadling change a lot when you add yarn to the mix? Hold this practice yarn so that it feeds onto the wheel easily, and then hang onto it, so that it gets a little clockwise twist before it draws onto the wheel. You'll be hanging onto your fiber like this while you are drafting it, so get used to that "holding back" feeling.

Once you've had enough of that, put the bobbin on a lazy kate and put an empty bobbin on the wheel.

Now, do the exercise again with the yarn from the bobbin on the kate, but this time spin the wheel counterclockwise. Not only is this good practice, but you can put back in the twist you took out spinning clockwise.

Adding Fiber

Whew! You're really going to learn to spin from these small notes? Remember what I said at the opening… this is really abbreviated! I recommend taking breaks – try these things in 15 minute increments, not more than 4 a day, so your brain has time to learn the muscle skills involved. It easily takes at least a month to develop basic spinning skills – and it takes practice, not just one concentrated session.

I recommend starting to spin with a Romney or Corriedale roving. Ask – roving is better than commercial top for this first lesson, as top is very compressed and harder to draft. Drafting is pulling the fiber along its length to make it thinner. Tear off a piece of fiber a foot long, and if needed, break it lengthwise into pieces about as wide as your thumb. Now hold one of these pieces with your hands 8 inches apart and tug gently. See how it gets longer, but doesn't separate? Do this along the length until your piece is twice its original length. You are pre-drafting the fiber. Eventually, you can skip this step and do all the drafting while you spin.

Now pull out just a bit of fibers at the tip, so you have a skinny piece at the tip of your length of pre-drafted roving that is about 6 inches long. Sit at your wheel with an empty bobbin and a leader on the bobbin. Put the leader on the pegs and orifice hook as described earlier in this guide, and then put 3 inches of the pre-drafted fiber through the loop at the end of your leader, pinching both ends about an inch from the leader with your primary hand (primary = right for right handers, left for left handers). With your other hand, hold the fiber about 8 inches back from your primary hand.

Treadle slowly, clockwise. Keep pinching that fiber! You'll very soon feel twist at your thumb. Slide your pinching, primary hand back about an inch (while treadling s.l.o.w.l.y). See how the twist follows it?

Now things get exciting… your other hand holds the fiber, while your primary hand pulls forward to both pull fiber out of the fiber mass, drafting it, and to feed the yarn you've made onto the bobbin. Every so often, your other hand will need to slide back to provide more fiber for drafting to your primary hand. That back hand should only be holding the fiber gently, as if it were a baby bird, not gripping it. A tight grip will matt the fiber and keep your primary hand from being able to draft from the whole mass.

Your drafted out, twisted fiber is yarn when it doesn't pull apart any longer. Stop, test a length by tugging on it, and adjust. Usually beginners have the opposite problem – their yarn is kinky-crazy with corkscrews. Treadle slower if that happens to you… your hands are learning a skill much more difficult than what your feet are learning!

How much twist, then? If you plan to ply, fold a length of singles back on itself to see what the 2-ply will look like, and adjust the amount of twist in the singles until you like the plyback test.

You've been taking breaks, right?

Sooner or later, you'll reach the end of your piece of roving; stop with 4 inches of it still unspun. To join a new pre-drafted length to it, overlay the last 4 inches of unspun end of your old piece with 4 inches of pre-drafted out end of your new piece. Draft them together just a bit, then hold at the start and start treadling again. Go back to drafting and sliding, and voila! They join! Do this as you need to.

Eventually, you'll fill a bobbin. Then another. Then, it's time to…

Ply!

With two bobbins on a lazy kate and an empty bobbin on your wheel, you will be treadling so the wheel spins counter-clockwise now. Take both ends from the full bobbins, bring them together to the leader and loop them through it and around through it a second time to keep them on the leader. Tension the strands with your right hand, bringing them through two different pairs of fingers, and then pinch the two strands together with your left hand. Start pinching near the leader so you have the ends folded back on the two strands. Treadle… twist enters and your yarn is plying! Slide your left hand back a bit as twist enters, then as needed feed it onto the bobbin and pull more yarn off the bobbins on the lazy kate.

The amount of twist you need when plying is set by the amount of twist in your singles – put plying twist in until the individual fibers in the plied yarn lie along the length of the yarn. This will give you balanced singles. Your plied yarn should look like the plyback tests you made when you spun your singles.

When the plying bobbin is full, wind the yarn off into a skein around your arm – under your elbow, up between thumb and palm, around and around. Tie the skein in 2-3 places with cotton, and soak the skein in a sink of warm water and wool wash to help set the twist. Repeat in a rinse bath the same temperature. Always fill the sink first, so the yarn isn't agitated, or it may felt. Squeeze the water out and hang your skein to dry.

Refining your spinning

Try not to let the twist past your forward hand – in singles, this makes the fiber harder to draft, causing you to spin thicker yarn; in plying, it makes it harder to have an even plied yarn.

Your backward hand holds onto the fiber, but should not squeeze it – if it does, the fiber will bunch up and get matted. Treat it like a baby bird with your back hand.

Go backwards a step –go back to practicing treadling during idle moments and pre-draft a few lengths of fiber at a time, so you can separate out the skills in spinning and focus on individual tasks.

If the fiber is drawing on too quickly, decrease the brake pressure on the wheel, and treadle more slowly.

If the fiber isn't drawing in, first check – if the wheel is spinning the wrong way at first, the yarn may be jumping off the pegs and feeding off the wheel instead of on, wrapping the flyer spindle between the bobbin and the orifice, or wrapping around a peg or the orifice hook; check and fix those things, then after that, try increasing the brake pressure.

If you are having difficulties joining fiber, be sure both the old and new are completely unspun, and draft them together a bit before starting to spin. If your yarn has snapped at a thin spot, unwind yarn from the bobbin to find a thicker spot that can be unspun for a good join.

Thick and thin spots occur during spinning when different amounts of fiber are drafted – look at the thickness of the fiber between your two hands, and keep it consistent for a consistent yarn diameter. Give yourself time to improve at this, it's a very detailed task.

If your yarn is falling apart during plying, put more twist in when spinning the singles.

If your yarn is corkscrewing while spinning the singles, it needs less twist. Treadle slower, check that you are on the lowest ratio, predraft your fiber a bit more, and work on drafting more quickly. That last one will come with practice.

If a strand breaks during plying, overlap the broken ends by 1-2 inches and continue plying.

If one strand is wrapping around the other during plying, check that your right hand is tensioning the strands off the bobbin evenly.

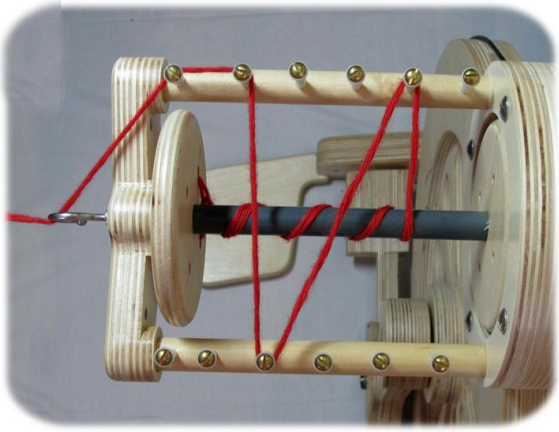
Twists and Turns - Tips to Make Spinning Easier

Yarn is not taking up on the bobbin… increase the tension on the bobbin brake, turn the brake knob by ¼ turns clockwise until yarn takes up. As the bobbin fills, you will find draw-in decreases – this is standard behavior in scotch tension wheels; increase the brake tension and continue filling your bobbin. However, first check – if your yarn has jumped off the pegs, it could wrap around the flyer spindle between the bobbin and orifice arm. Remove the orifice arm, unwrap this yarn, and then restart spinning.

If yarn is still not taking up, check for anything stopping the bobbin from rotating. Is the bobbin not fully seated, so it is rubbing on the orifice arm? It needs to be fully seated on the hex nut at the back of the flyer. Is the bobbin rubbing against the back of the flyer? The latter can occur if the bobbin wood swells or the flyer gets out of adjustment; contact the Paulys for assistance fixing that.

Take up is too strong, yarn is pulling out of your hands too quickly… decrease the tension on the bobbin brake. Turn the brake knob by miniscule increments counterclockwise once you have yarn taking onto the bobbin (1/8 turn or less). Very minor adjustments can have a large apparent effect.

For very fine spinning, start with a half full bobbin (of anything, even a piece of pipe insulation) and/or lace the yarn across the flyer arms like one shoe lace, to decrease the drag-in of the yarn. This is shown in the picture here. I find the half-full bobbin is the same as one lacing across the flyer arm, and that 2-3 lacings will reduce the draw in enough for very fine spinning.



You may find that lacing decreases draw in too much – if this occurs, give the bobbin a small nudge in the wind-on

direction as you start to treadle – this is usually enough that yarn will continue to wind on as you spin.

Yarn is thump-thumping as you spin… be sure your yarn is coming from the center of the orifice hook toward your body in a fairly straight horizontal line. This minimizes any thumping. I have found that a slight angle is possible, but I definitely don't put the yarn at a 45 degree angle up, down, or sideways from the center of the orifice hook.

Drive band is slipping… increase speed slowly, over 5-10 treadlings, from nothing to the speed you want to spin, to minimize or avoid drive band slippage. Going from zero to top speed on the very first down stroke will almost always make the drive band slip.

The band may slip more in the highest ratio position if you often use it at the low ratio settings. Store your drive band in the highest ratio groove or even on the rod behind the grooves (only if the rod is oil free!) between spinning sessions to help it regain its high ratio size.

If you have overstretched the drive band, you may find it will recover elasticity by removing it and placing it in a warm room for a few days. As a last resort, consider cutting and re-gluing them shorter – but be sure to let them dry completely before using, or they will separate under the strain of being used on your wheel. New drive bands can be purchased from your dealer. In a pinch, try cotton carpet warp or string until your replacement bands arrive.

Replacing a drive band… if you need to replace the drive band, it can be removed and replaced on the Mach 3 by pushing the treadles up to open a gap between the footman and the pitman bearing. Once the two parts of the footman separate, you can thread the band around the pitman bearing and then onto the flyer whorl and drive wheel.

Flyer does not rotate as you treadle… check that the drive band is in one of the grooves on the back of the flyer, and not on the metal rod behind them. If it is, check if the drive band is loose and slipping during treadling: see "Drive band is slipping".

Treadling is hard… check if the brake band tension is set too strong; check if something's gotten under the treadles, jamming them; check if one of the foot brakes is pressing against the drive wheel; check if the drive band is out of the grooves on the flyer; try sitting closer to the wheel; if you are on the highest ratio, try switching to the lowest ratio for a few minutes to stretch the band just a bit, and then returning to the highest ratio; or if you are trying to start fast, start with a slower first few treadles, increasing speed gradually over the first few treadlings; open up the footman to check for a foreign object or fibers stuck on the pitman bearing or a loose pitman bearing; as a last resort, take the flyer off the head of the wheel and check for fiber wrapping around the flyer rod or inside the head of the spinning wheel.

A knocking sound when treadling… the pitman guide, on the inside of the footman, can get worn, causing the pitman (a bearing) on the drive wheel to knock. The new design of treadles should self-adjust to compensate; but if you do not maintain light pressure on the upward moving treadle, the pitman may knock inside the groove.

Uneven or noisy treadling… check for damage where the footman connects to the drive wheel – push both treadles up to open up the footman and expose the pitman groove and bearing. Make sure the ball bearing's screw is completely screwed in, and that the pitman guide on the inside of the footman is not damaged – it is a regular flat-sided oval. You will need to contact SpinOlution for information on addressing any damage here.

Maintaining your Mach 3

Your Mach 3 has a polyurethane finish, and is cleaned with a light dusting as needed.

Oiling: the Mach 3 in general does not need oiling, working on sealed bearings and its unique keyed bobbin system. You may find a light coating of oil on the flyer spindle and the bobbin pegs helps you slide the bobbins on and off more easily.

If a squeak develops on your wheel, locate the source. Metal-on-metal squeaks can usually be resolved with a small drop of oil.

Every 6 months (or as needed), check the suede on the inside end of the brake block as described in 'Adjusting the Tension'.

Technical Specifications

Furniture grade Birch plywood with a polyurethane finish
Weight: 23 lbs.
Drive wheel: 20 in. diameter, 1.5 in. thick
Bobbin capacity: 8 ounces plied yarn

Height	31 in
Orifice Height	26.75 in
Width	23 in
Depth	15 in

Mach 3 Accessories

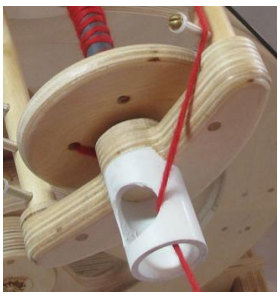
Mach 3 Lazy Kate: holds up to 4 bobbins, uses friction (wood on wood) or gravity (45-degree angle) for braking. Can be used free-standing or attached to wheel. $97

Additional Mach 3 Bobbins, $35 each

Drive Band (replacement band) $7

Tubular Orifice Arm, $28 (shown on flyer here)

Wheel and Strap Kit: caster wheels and strap for ready transport $30



Additional Resources

There is a SpinOlution group on Ravelry, if you have a spinning question about your wheel, you can often find an answer there: http://www.ravelry.com/groups/spinolution. Membership on Ravelry is free. There are several videos on YouTube showing spinning on the Mach I, II, and 3 wheels.

For a video showing assembly of the Mach 3, see this YouTube video:
http://tinyurl.com/mach3assembly

About the Author

Amelia Garripoli has been spinning and blogging since 2001, when she purchased a house that came with two llamas. She blogs as Ask The Bellwether (http://www.askthebellwether. com/blog) and is an active mentor in several online forums. You can find her as askthebellwether on Ravelry, thebellwether on YouTube, and ask@thebellwether.com on email. She was thrilled to win Best Finished Item From Handspun Yarn at her county fair in 2009, a great follow-on to winning Best Handspun Skein in 2008. Amelia has written articles in Knitty, Spin-Off, and Yarn Magazine, knitting patterns for Fiber Trends, Crosspatch Creations and The Bellwether, and has published two books, Spindling: The Basics (2004) and Productive Spindling (2009). She teaches a wide variety of workshops on fiber preparation, spindling, spinning, dyeing, weaving and more. Amelia loves exploring ways to turn fiber into textiles.

Meet the Makers…

The Pauly family built their first spinning wheel in 1983. They started SpinOlution after 25 years of designing and building several wheels for personal use and experimentation. The company's goal is to provide the most advanced and easy to use spinning wheels that have ever been seen or used.

SpinOlution is pleased to offer the **Mach 3** production wheel, the **Mach II** production wheel, **Bee** travel wheel, the **Echo** entry level wheel, the **Hopper** art yarn/travel wheel, and an assortment of drop spindles and accessories.

SpinOlution wheels are guaranteed for 1 year. The Pauly's are happy to assist you with any questions you may have concerning your wheel. They will work with you to resolve any questions you may have about its operation or maintenance.

They can be contacted via
email Kris Pauly: kris@spinolution.com
phone Mike Pauly: (951) 765-0643 (PT)
www.spinolution.com

SpinOlution
970 Banbury Dr
Hemet CA 92544